A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

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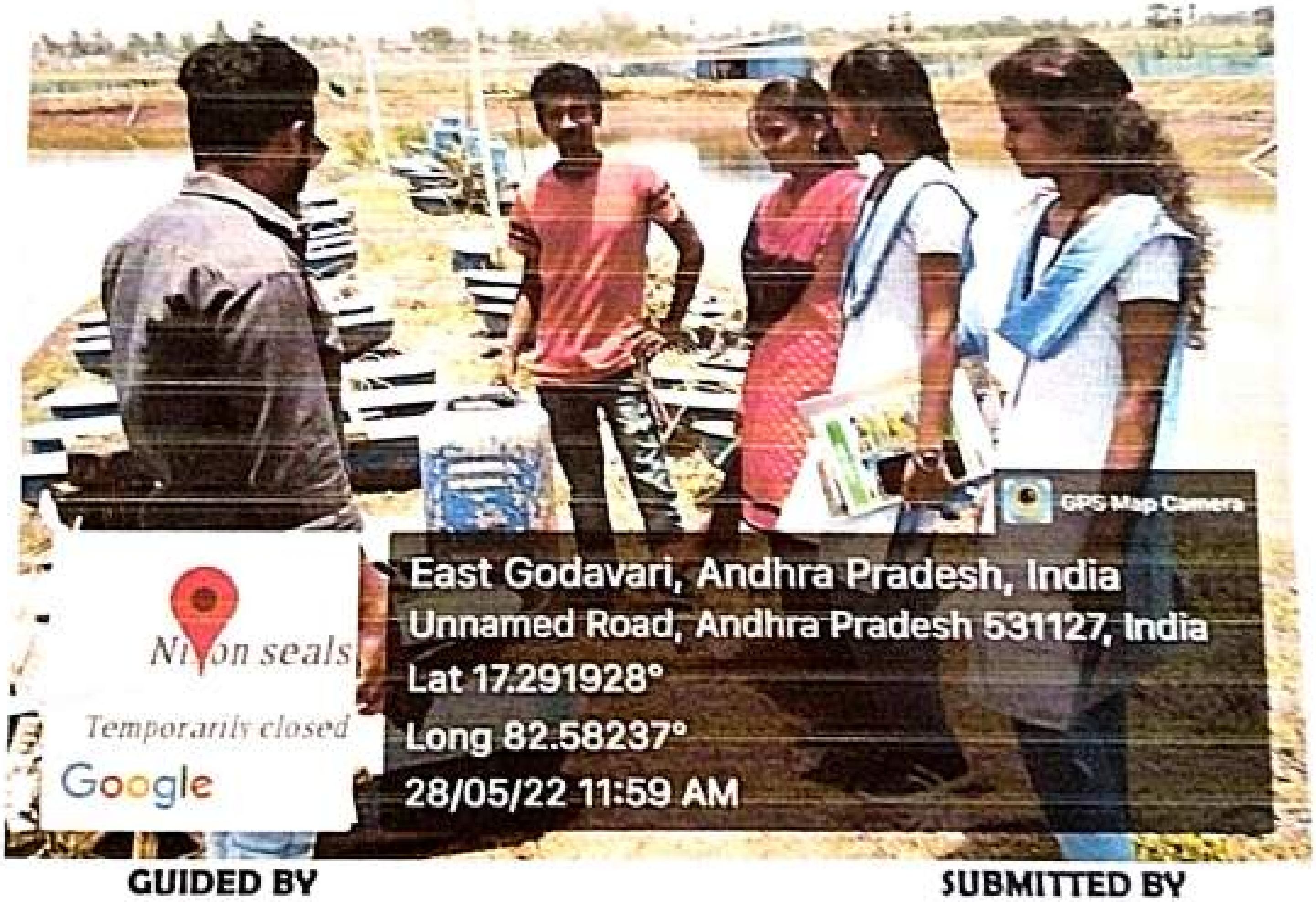
Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES



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ACKNOWLEDGMENTS

It gives me an immense pleasure to express my deep sense of reverence and gratitude for all those who have rendered their support at various stages of the project work.

I express my deepest sense of gratitude to **Smt. M.Vasantha Lakshmi, Lecturer in charge of Zoology and Smt. S. Madhavi, Lecturer in Zoology for guiding the project.**

I would like to express my sincere gratitude to **Dr. V. Anantha Lakshmi, Principal,** ASD Government Degree College, (W) (A), Kakinada, for her constant support, encouragement and valuable suggestions.

I extend my gratefulness to Sri. Prudvi Raju garu Aqua farmer of Addaripeta village of Thondangi mandal, East Godavari District, Andhra Pradesh for allowing me to carry out the project work at their fish farms and enlightening me by providing detailed information regarding the site selection, soil composition, pond preparation, liming, pond fertilization, culture species, stocking, water quality management, feed management and disease management.

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Certified that this is a bonafide record of Project work in Zoology, done by Ms. D.Sravani of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at shrimp ponds located at Addaripeta village of Thondangi Mandalam,East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

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INTRODUCTION :-

The word of aquaculture through uses rather widely for the last two decades to denote all forms of culture of aquatic animal and plants in fresh brakish and Marine Environment is still used by many in a more restrictive sence for some it means aquatic culture other than fish farming or fish husbandary where as other understand it as aquatic farming other than mariculture

However when it is used to be used to denote

1. The type of Culture technique or system
Ex:- pond culture raceway culture cage culture
8. pand culture raft culture

2. the type of organism Cultured
Ex:- fish culture or fish husbandary, oyster, mussel shrimp or Seaweed Culture

3. the Environment in which the Culture is done
Ex:- fresh water, brakish water, salt water or marine aquaculture

4. A specific Character of the Environment used for

Ex:- Cold water or warm water aquaculture upland low land inland coastal or marine the use of restriction terms would properly be more appropriate

History of aquaculture :-

"Large scale aquatic farm is a relatively recent development but small scale aquatic farming existed inland area in some countries from ancient train time most being the evolution to pastoration and land cultivation

Origin and growth of aquaculture :-

Most publication on aquaculture refer to long history of fish culture in Asia ancient Egypt and Central Europ the classic fish culture believed to have been written around 500 BC by fan lei a chinese - politician turned fish culturist is considered proof that commercial fish culture existed in china in this time, as he cited fish ponds on the source of his wealth [ling 1977]

Later writings of chow mit of the Sung dynasty [Kevie Sin Chak shik in 1243 AD] and of the Henca -A Compleate Book of agriculture in 1639 AD] Various of this systems came to be practised in

Indonesia for Carps and in thailand for the Cat fish pangasious

the Earliest brackish - water farming in Southeast Asia appears to have originated in Indonasia in the island of Java during the 15 Century AD

As Mentioned earlier, the history of aquaculture in Europ stars from the middle ages with the Introduction of Common Carp Culture in monastee ponds

Present status of aquaculture :-

To evolute the present status of aquaculture It is Essential to assess the state of Capture of fisheries including the processing of animal feed

for example of 94.8 million tons produced by Capture fishries in the year 2000, only 70 million tons Can be expected to become available for human Consumption of the Current rate of utilizing

Available fishry statiscs for the year 2000 seem to Justify Some of the optimistic Estimates made Earlier. the Capture fishries landing amounts to 94.84.800 tons and aquaculture harvest are Estimated to be 35,58,500 tons, which together yield 130,33,3000 tons of the edible fishries

Products

Aquaculture production of fish Crustaceans and Molluscs amounts to about 35,58,5000 tons valued at US $ 50,85,900 in the year 2000. Aquatic plant production mainly in the asian region amounts to 10,130,448 tons valued at US $ 56,07,835

the overall production of all aquatic organisms is expected to amount to 457,15,530 tons valued at US $ 56,466,752 in 2000

Aquaculture production increased from

7.4 million tons - 1980
16.8 million tons - 1990 more than
42 million tons - 1999 valued at over US $ 53 billion

Current status of the World Fisheries :-

in 2018, total global Capture fisheries production reached the highest level ever recorded at 9.4 million tons an increase of 5.4 percent from the average of the previous three years

in September 2015 the united Stations nations launched the 2030 Agenda for Sustainable Development a beautiful blueprint for global peace and prosperity

However After 5 years of uneven progress and with less than 10 years to go, and despite progress in many areas. it is clear that action to meet the 17 sustainable development Goals (SDGS) is not yet advancing of the speed of scale required

the 2020 edition of the stage of world fish-eries and aquaculture contains to demonstration the significant and growing role of fisheries and aquaculture in providing food

~~Current~~ Current status of aquaculture in india

fisheries in india is a very important economic activity and a flourishing sector with varied resources and potentials. only after the indian independence, has fisheries together with agriculture been recognised as an important sector from 0.75 million tonnes in 950-51 to 9.6 million an unparalle-led average annual growth rate over 4.5 percent over the years which has placed the country on the forefront of global fish production, only after China india is also an important country that produces fish throughly aquaculture in the world in india home to more than 10 percent of the global fish diversity present the country ranks

As the second largest country in aquaculture production the share of inland fisheries and aquaculture has gone up from 46 percent in the 1980s to over 85 percent in recent years in total fish production.

The freshwater prawn farming has accrued increased attention only in the last two decades due to its high consumer demands. indian aquaculture production basically can be classified into freshwater and brakish water fish farmers development agencies [BFDAs] for promoting freshwater and coasted aquaculture

Present status of aquaculture in AP:-

in recent, aquaculture has boomed in Andhra pradesh, the state has become one of the indias largest produces of farmed fish and shrimp among the reasons for the boom: a major expansion of inland aquaculture farms along rivers and canals where people once raised crops.

the operational land images (OLI) on the natural - colour image of Landsat 8 aquired their natural - colour image of an area dense with inland aquaculture ponds along the uppateru River on June 8, 2021 the appeture river on june 8, 2021

Aquaculture ponds appear dark green farmland is generally brown. Coastal areas with Mangrove forests are light green

the indian government established the first aquaculture pond in this area in the 1970s around lake Kolleru despite the Expansion india agriculture sector has faced challenges recently one recently one Study Calaculated that it shrimp farming sector may have lost as much as $1.5 billion in 2020-2022 due to descruptions related to the pandamic

the state of Andhrapradesh acount for about 70 percent of indias shrimp production

Prawn Culture :-

there are two types of prawns forming freshwater Prawn forming and salt water prawn forming Commercially fresh water prawn forming Can be done in taopical and sub- tropical climatee regions having resorviors, lakes irrigation ditches reivers pond and other natural water resources

Marine shrimp Farming

Marine shrimp is an aquaculture business for the Cultivation of marine shrimp or prawn for human Consumption the total global production of farmed shrimp reached more than 1.6 million tones in 2003, representing a value of nearly 9 billion U.S dollars, about 75% of farmed shrimp is produced in Asia in particular in China and Thailand the other 25% is produced mainly in Latin America where Brazil, Euador Largest exporting nation in india

shrimp farm has changed from traditional small-scale business in Southeast Asia into a global industry

Fresh Water Shrimp farming

Freshwater shrimp also called malaysian prawns are the species Macrobrachium rosenbergii originally from malaysia there are relatively Easy to aquaculture but require large ponds with excelent filleration and water Quality

Many shrimp farms have successfuly employed a three-pond grow-out system. allowing for three harvest a year. the pond should maintaine a temperature of at least 70 degrees fahrenheit and a pH between 6.5 and 9.5 purchase Juvenile shrimp from a hatchery.

Need for prawn Culture

Currently Macrobrachium rosenbergii is the favourite species of india prawn Culture in india prawn breeding unit of Central Inland fisheries Research institute developed indigenous technologies for prawn Culture in the year 1975. Macrobrachium rosenbergii is also known as Giant fresh water Prawn

World wide shrimp farmed production:-

the shrimp pond with at the National Fishery institutes' Global seafood market Conference Miami, florida USA January 21-25, 2018 Estimated that the world production of farmed shrimp would reach 3.5 million metric tons in 2018.

there were some Concerns Expressed by the panelists over the Sustainability of indian production Expansion. Robins Mcintosh, Senior Vice president of thai agribusiness and food processing in india Couldn't Continue forever

the panel Estimated that Ecuador would Export 531,000 tons of farmed Shrimp in 2018 up from 469,000 tons in 2017 Ecuador had what sandro Coglitor, who owns Omasa a

Major shrimp farms and process called a hiccup on the hatchery side in 2017 limiting the supply of larvae

Shrimp farmed production in india :-

India is the second largest country on shrimp aquaculture production in the world the share of the brackish - water sector includes the culture of shrimp varieties primarily the native great giant tiger prawn paneous monodon and exotic white - leg shrimp litopenaus vannami, Today. L. vannami species is the most extensively farmed crustacean species in the world

the selection of a suitable site always plays a major role in shrimp aquaculture farming the selection of a site for shrimp farming mainly depends on topography. ecosystem meterological and socioeconomic conditions about farm design, species compatibility

the type of soil condition is the most critical in site selection since the shrimp will spend most of its time on the pond bottom during the culture period

Present status of shrimp Culture in Andhra Pradesh :-

shrimp farming has grown a traditional small-scale business in Southeast Asia, into a global industry Joseph selvin et. al 2009. In india extensive production systems of shrimp culture is more profitable Leung & Engle 2006 than the other Culture Systems. technological advances haved led to growing shrimp at even higher densities almost all the farmed shrimps are penaeid group of the family penaeus monodon and pacific white shrimp lito pennaneous vanamei occupied more then 90% of the farmed shrimp production

Further, shrimp Culture has been listed as one of the priority sector in india by the Government for increasing Exports and there by contributing to the foreign exchange reserves the shrimp and marine Exports from Andhra pradesh has also been tremendously increased from RS. 2100 Crores to Rs. 14 200 Crores during the same period MPEDA, 2015

the farmers had First bred tiger variety peneaus Monodon had first bred variety peneaus Monodon and there shifted tiger variety peneaus Monodon and there shifted to Litopenaeus Vannamei and their Earnings are increasing

Construction of shrimp pond :-

there is no standard design for a shrimp rearing pond present days farming practices still heavily rely on the Experience of individual farmers financial Capability and the environmental Condition prevailing at the Site. A shrimp pond from the engineering view point is Essential an in important Improved in fish Culture pond

Size and shape of Culture ponds :-

there is no standard design for a shrimp rearing pond. present days farming practice Rectangular of square pond are appropriate for shrimp culture. the longest axis of a pond should be parallel to the prevailing wind direction

the breadth of a pond depends largely on the purpose and the operational system employed. the following are the various sizes recomended.

Nursery pond – 500 to 1,000 m^2
Grow out pond – Intensive – 0.25 to 1.0 ha
semi intensive – 0.5 to 2.0 ha
extensive – 1.0 to 10 ha

feed Management in shrimp Culture :-

To ensure optimal water quality and clean pond bottoms at shrimp farms. Choosing consistently good quality feed and close monitoring of food trays supported by a proven feeding guide are recommended practices to control the amount of feed applied to ponds the use of autofeeder and biofloc Technology. as well as awareness of ponds Carrying Capacities Can.

help shrimp farmers reduce feed costs, preserve Capital and maximize profit

feed quality

Not all feeds are created equal some feeds have better digestibility amino acid profiles and fatty acid profiles and contain sufficient immune stimulator. Selecting a consistently good quality feed will result in better average daily growth, survival and feed conversion and there by a better bottom line

Water Quality

To culture shrimp one must first culture the water" is the adage of many shrimp farmers in Asia. As shrimp are reared in a small space with a small volume of water to maximum profit the shrimp excretion, uneaten feed and myriad opportunistic microbiota growing in it put tremendous strain of pond Ecosystem

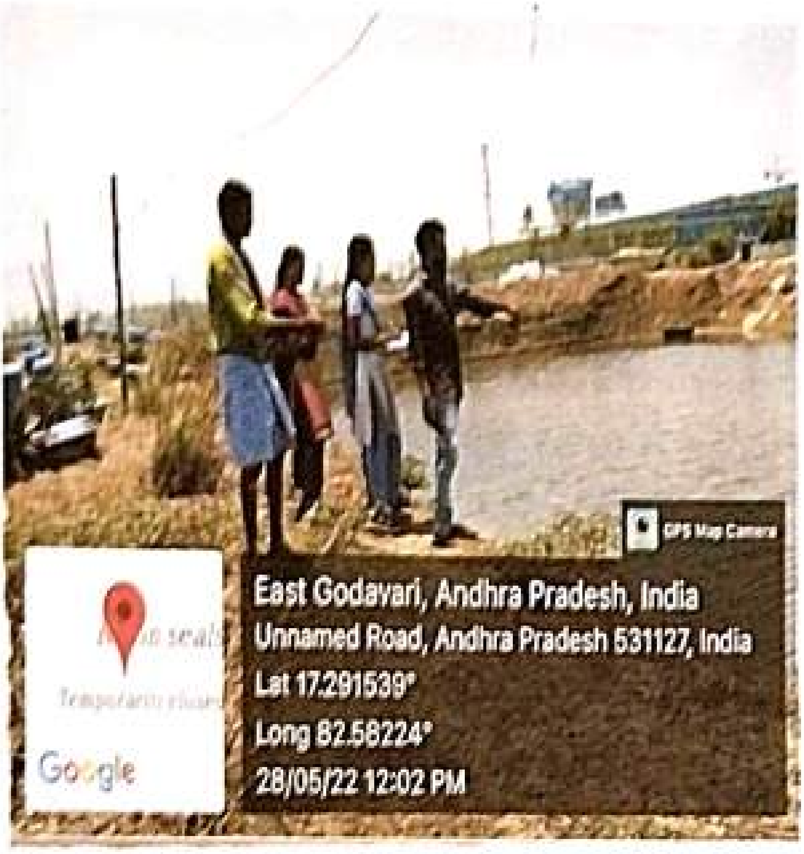
Harvesting :-

There are several behaviour characteristics of shrimp which can be used to advantages during harvest. they move around the pond at night looking for food they are attracted to light. When water is let into a pond, the shrimp become active, swimming around the pond and after gathering near the sluice gate

Partial harvesting :-

partial harvesting is useful in some types of management systems where only large shrimp are to be caught and smaller shrimp left in the pond to grow larger, and in polyculture where a farmer wants to harvest shrimps not fish

Study Area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METHODS & MATERIALS REQUIRED

Methods

1. Observation
2. Questionnaire

Materials :-

1. Aerator
2. Motor pumps
3. Generator

Qustionnaire :

1. From which nursery pond you will collect the fry for culture?
2. How far the pond is to the nursery?
3. How many tanks of fry will bring to the culturing pond?
4. What precautions should we take culturing the transportation of fry?
5. How much of time it will take to make that fry adaptable to that culture pond introduce a fry into pond?
6. What measures should be follow to make that fry adaptable to that culture pond?
7. Are you producing fry yourself or import from any other?
8. How many fry's reared in single pond?
9. What is the soil pH of your culture pond?
10. Which type chemicals do you used to increase the growth phyto and zooplanktons?
11. What is depth and size of the pond?
12. Which type of culture you are doing right now?
13. What species of fish you are culturing as monoculture?
14. How many types of species rearing in the cultured in the your area?
15. From where you are collecting the water for your culture?
16. How many months it will take to culture to shrimp?
17. What chemicals is used for nutrients?
18. How amounts dissolved oxygen present this pond?
19 :- What is the total hardness present and how much?
20. Hardness will be suitable for culture?
21. How the tanks are prepared for fry rearing or culture?
22. What care should be take when a shrimp exposed to disease (or) stress?

Results and discussion :-

the present working Area is located at Addaripeta village of Thondangi Mandal, East godavari District Here the aquaformer PRUDVI RAJU was Culture in Shrimp pineaus Monodon. He was prepared the shrimp form as per Monodon instruction. As per my knowledge of text books. He Collected seed from Srinidhi Hatchery located At Addaripeta village. he has taken Care of seed about feed Management. Disease Management. He changed in physical and chemical parameters of Water and in physical and chemical parameters of of water and soil. While he practice Culturing After three months of Culturing the harvesting is perform under Marketing in local Area

By following proper Management practices of Shrimp Culture in the former was getting the best income and he was Continue in the shrimp Culture He was Continue, since 10 years onwards.

CONCLUSION :-

By during this projects we learn the actual practices of shrimp ~~farming~~ and practicle experiences too. we need some more practical experiences of shrimp culture. Because at the time of our visiting the pond is de-watering and dryingand prepared for next batch of shrimp culture

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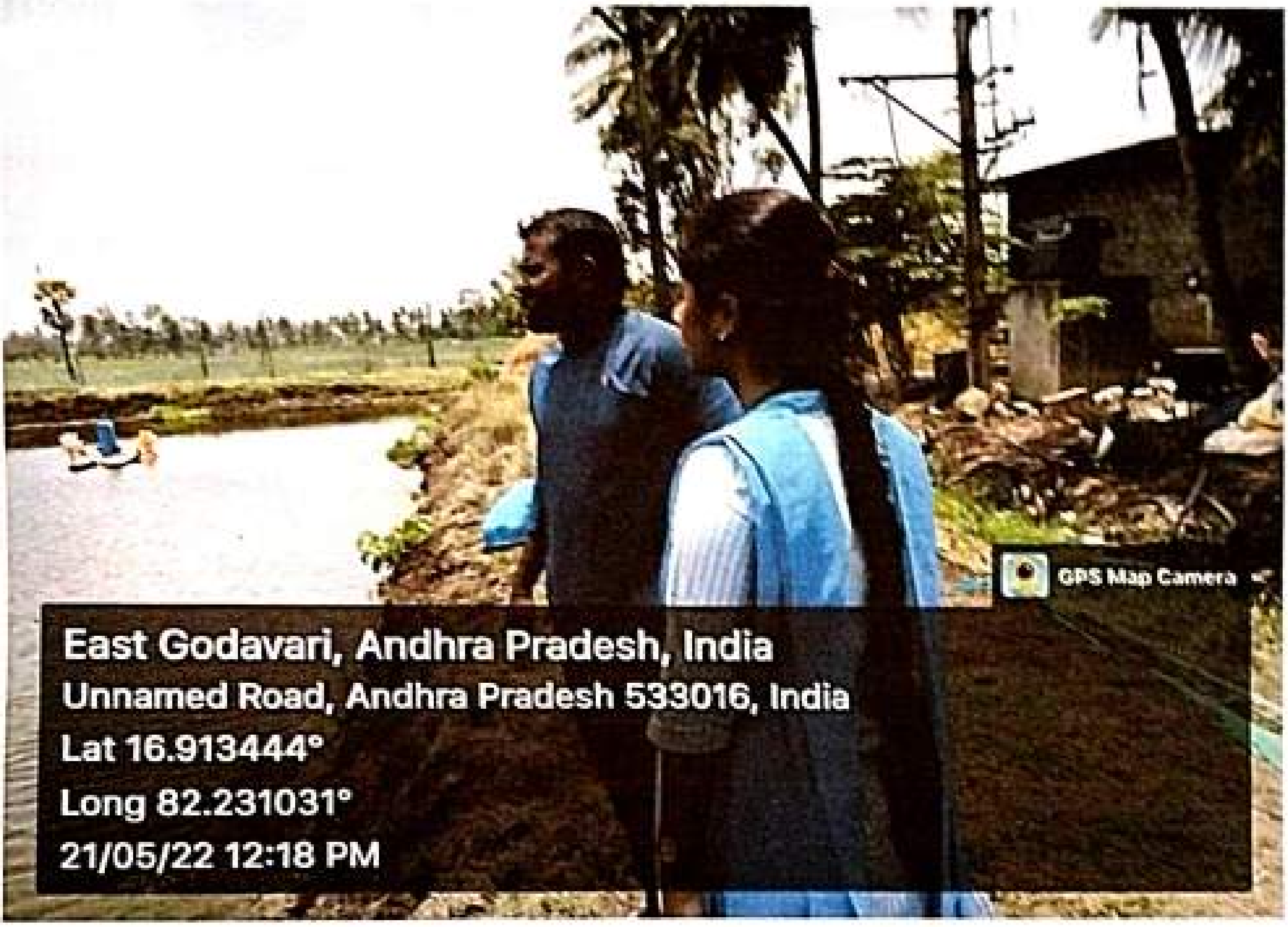

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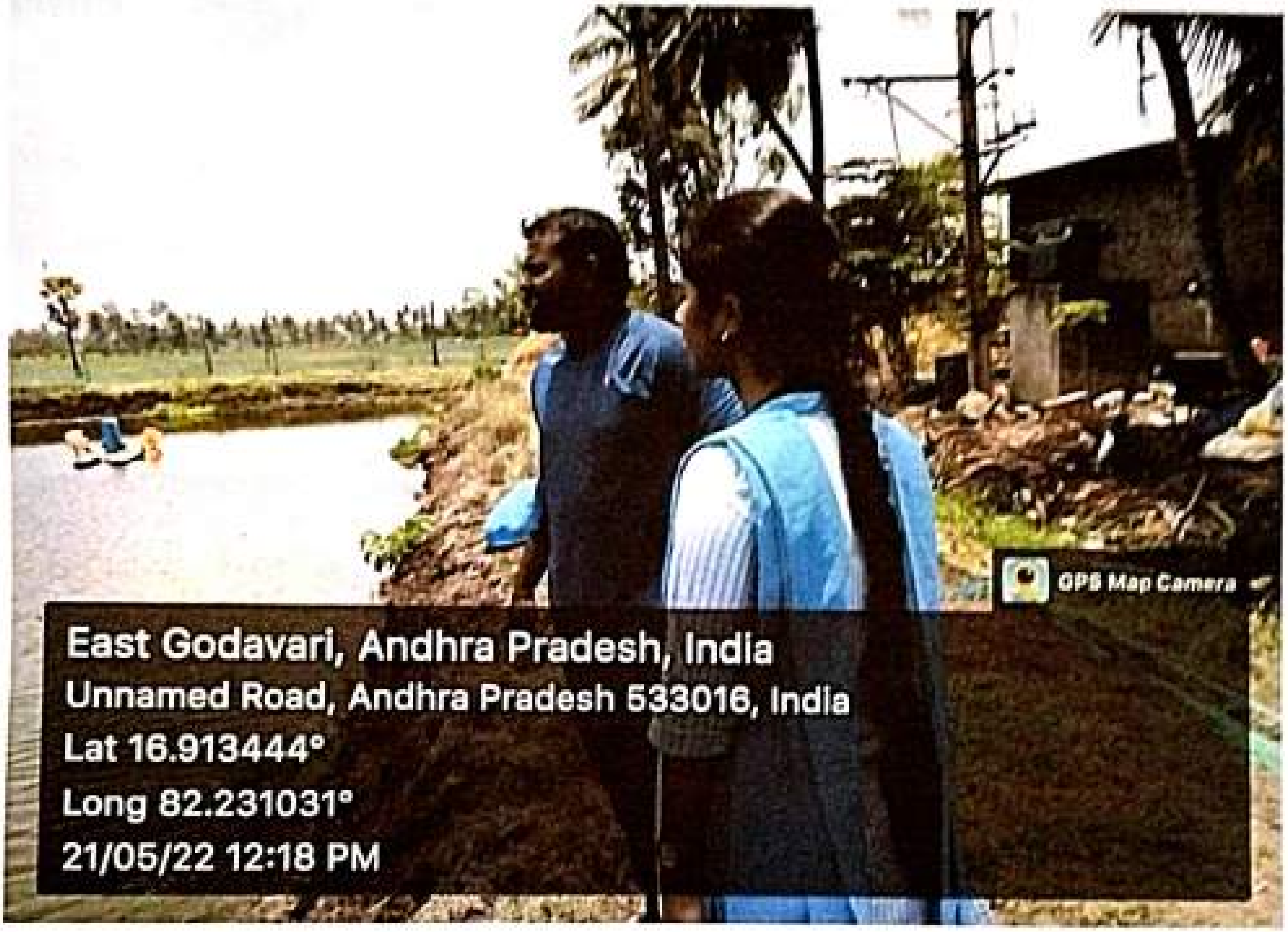

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Title of the Project: **Fish Farming and Management Practices.**

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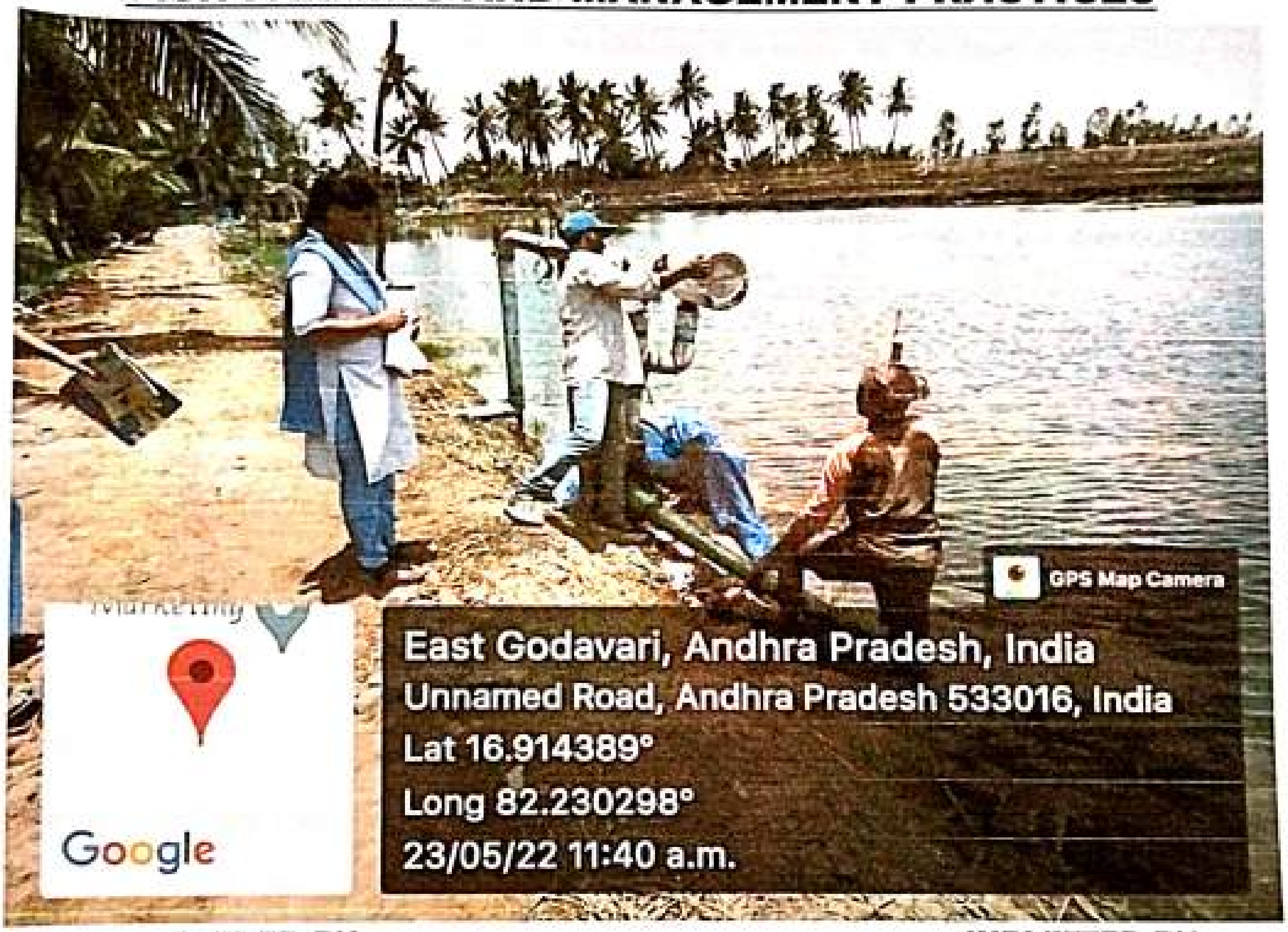

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Title of the Project: **Shrimp pond and Management Practices.**

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A. S. Govt. College for Women KAKINADA-1	A.S. GOVT. COLLEGE FOR WOMEN KAKINADA-1

Valued by

1. 29/6/22
2. 29/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

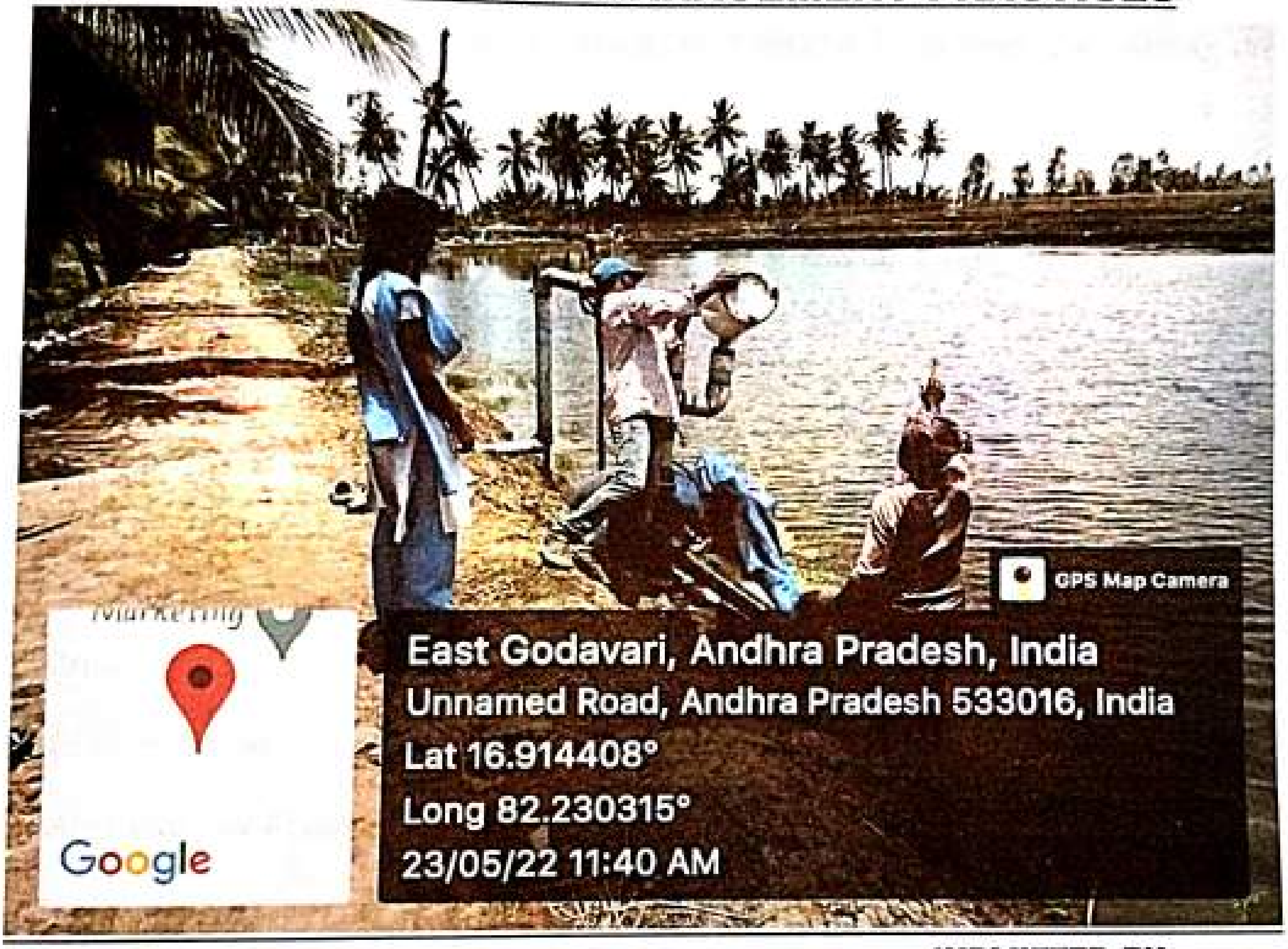
(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

S. Nagasatya

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933011

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms.S.Nagasatyaof III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at bulliabbaireddy colony village of kakinadamandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

Lecturer in charge

DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

29/6/2022

Head of the Department

A.S. Govt. College for Women
KAKINADA-2

Valued by

1. 29/6/22
2. 29/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

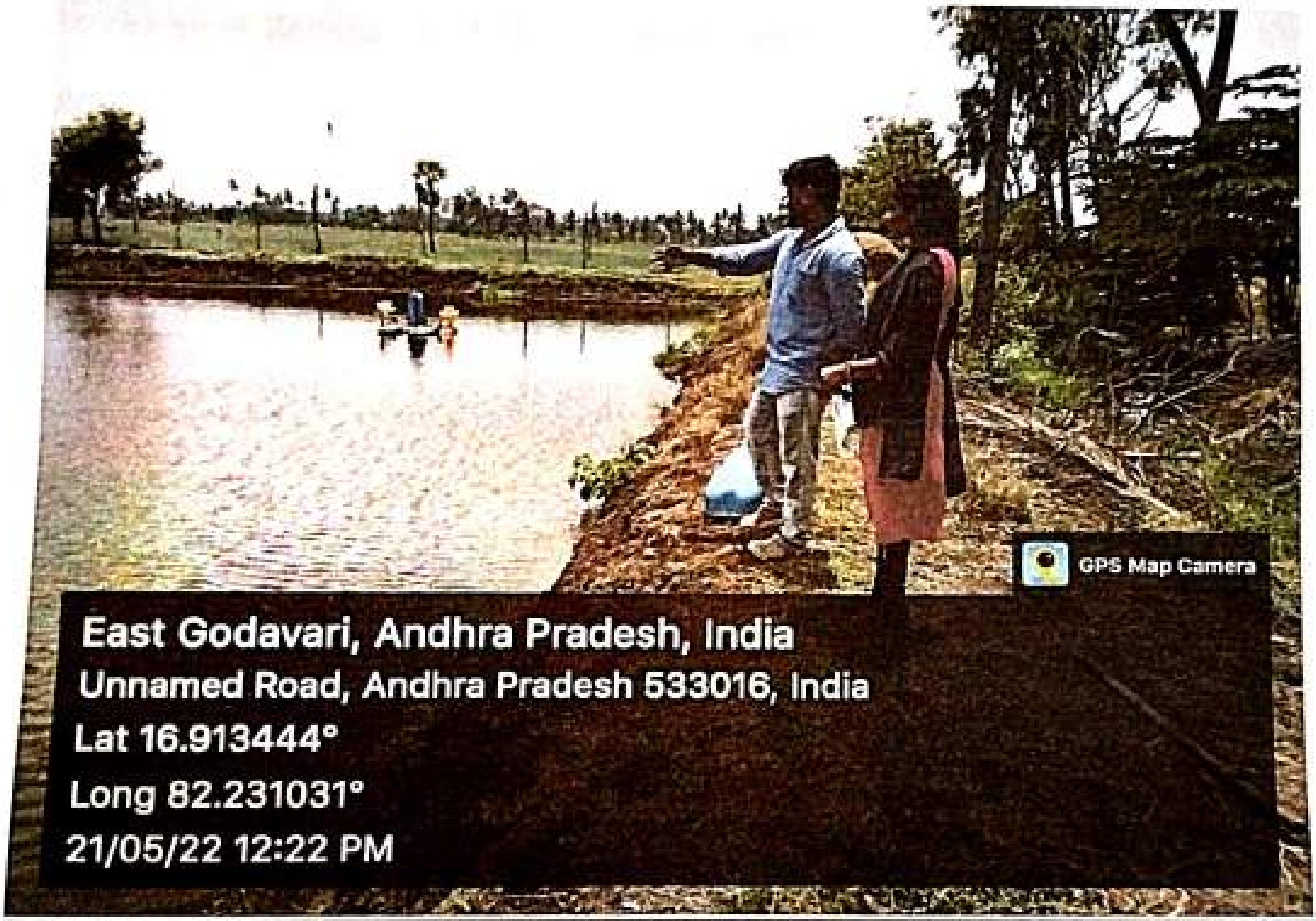
(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

Ch. Devi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933013

స్త్రీ విద్యా ప్రవర్ధతాం

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **Ch. Devi** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at bulliabbai reddy colony village of kakinada mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

Lecturer in charge	28/6/2022 Head of the Department
A.S. Govt. College for Women KAKINADA-2	DEPARTMENT OF ZOOLOGY A.S. GOVT. COLLEGE FOR WOMEN KAKINADA-2

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2. 29/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

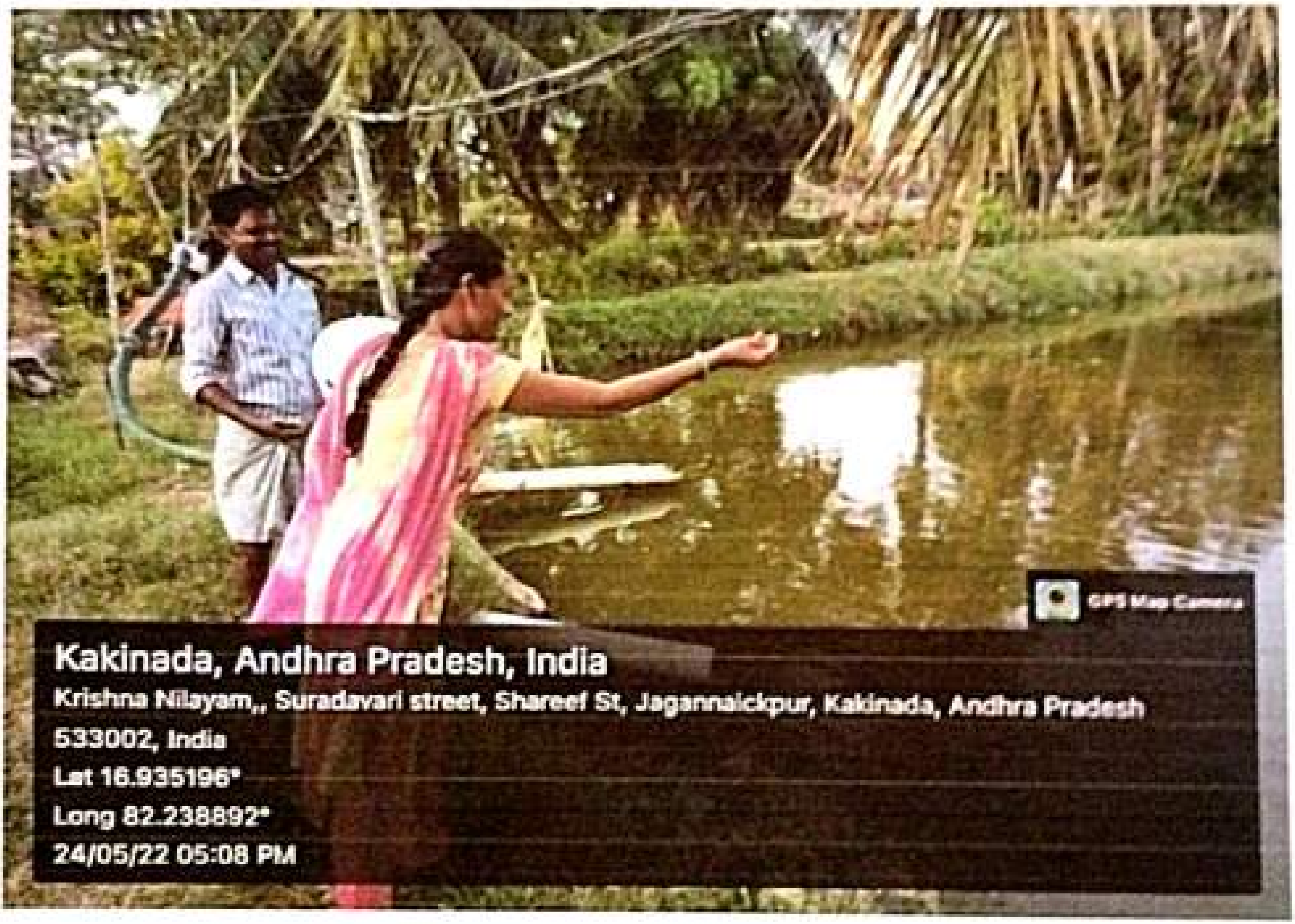
(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

Ch.kumari

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933014

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. Ch.kumari of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:**Fish Farming and Management Practices.**

Lecturer in charge

A. S. Govt. College for Women
KAKINADA-2

29/6/2022

Head of the Department

29/6/2022

DEPARTMENT OF ZOOLOGY
A.S.D. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

Valued by

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29/6/22
29/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

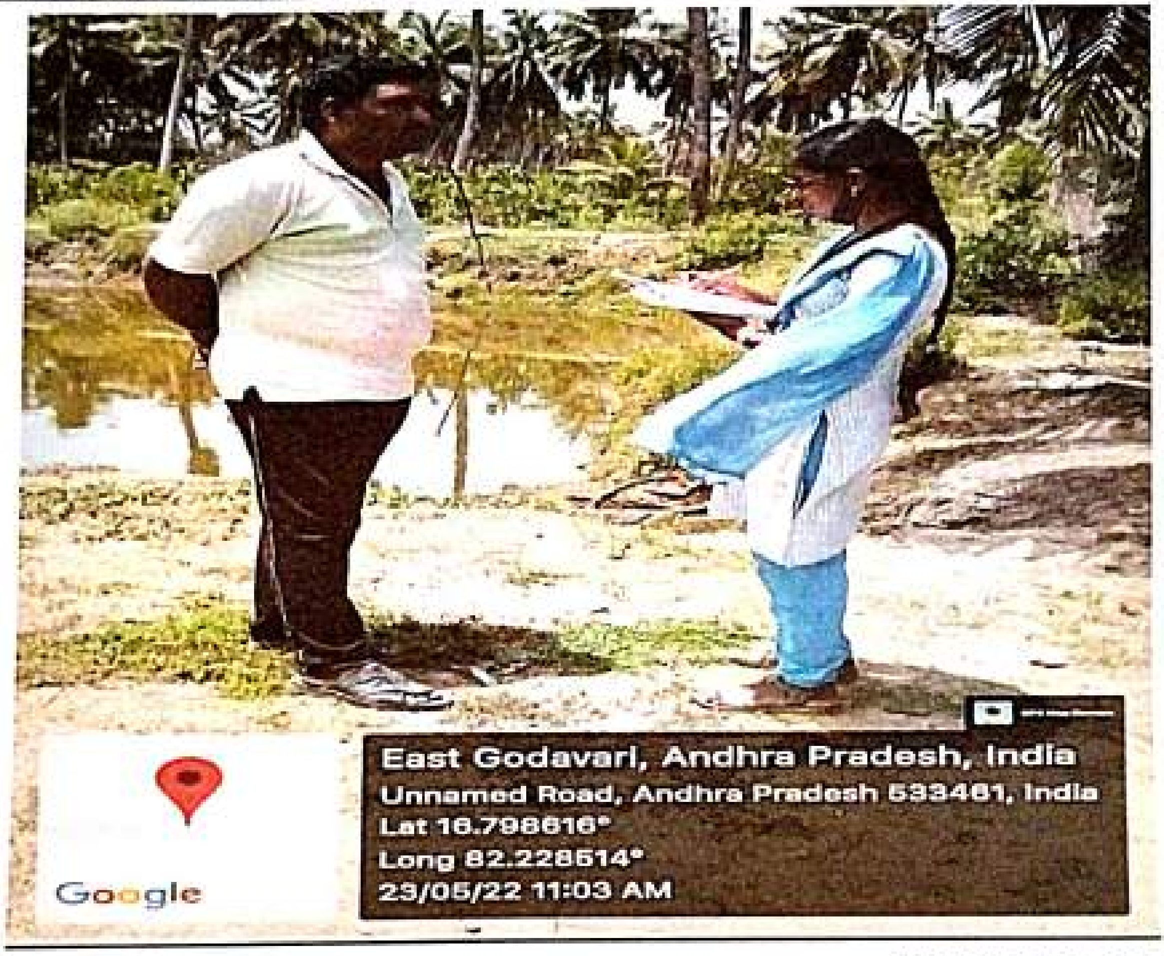
(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP POND AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

Ch.sai lakshmi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933015

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms Ch.sai lakshmi of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located korangi village of Thallarevu mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp pond and Management Practices.**

28/6/2022

Lecturer in charge

Lecturer in Zoology
A.S. Govt. College for Women
KAKINADA-2

Head of the Department

DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

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A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

CH.Manasa

III B.Sc (CBZ).

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933019

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **CH.Manasa** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at shrimp ponds located at Addaripeta village of Thondangi Mandalam,East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

28/6/22

Lecturer in charge

Lecturer in Zoology
A. S. Govt. College for Women
KAKINADA-2

29/6/2022

Head of the Department

Lecturer-in-charge,
DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

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A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

D.Sivamma

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933019

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **D.Sivamma** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at shrimp ponds located at Addaripeta village of Thondangi Mandalam,East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

29/6/2022

Lecturer in charge
Lecturer in Zoology
A. S. Govt. College for Women
KAKINADA - 2

Head of the Department
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

Valued by

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2. 29/6/2022

29/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)
(Re- Accredited by NAAC with 'B' Grade)
Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT
ON
SHRIMP POND AND MANAGEMENT PRACTICES

GUIDED BY
Smt. M.Vasantha Lakshmi,
Smt. S. Madhavi,
Lecturers in Zoology.

SUBMITTED BY
D.mahalakshmi
III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

M. Akhila

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933026

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. M. Akhila of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Atchuthapuratrayam village of peddapudi mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

Lecturer in charge

Head of the Department

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30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

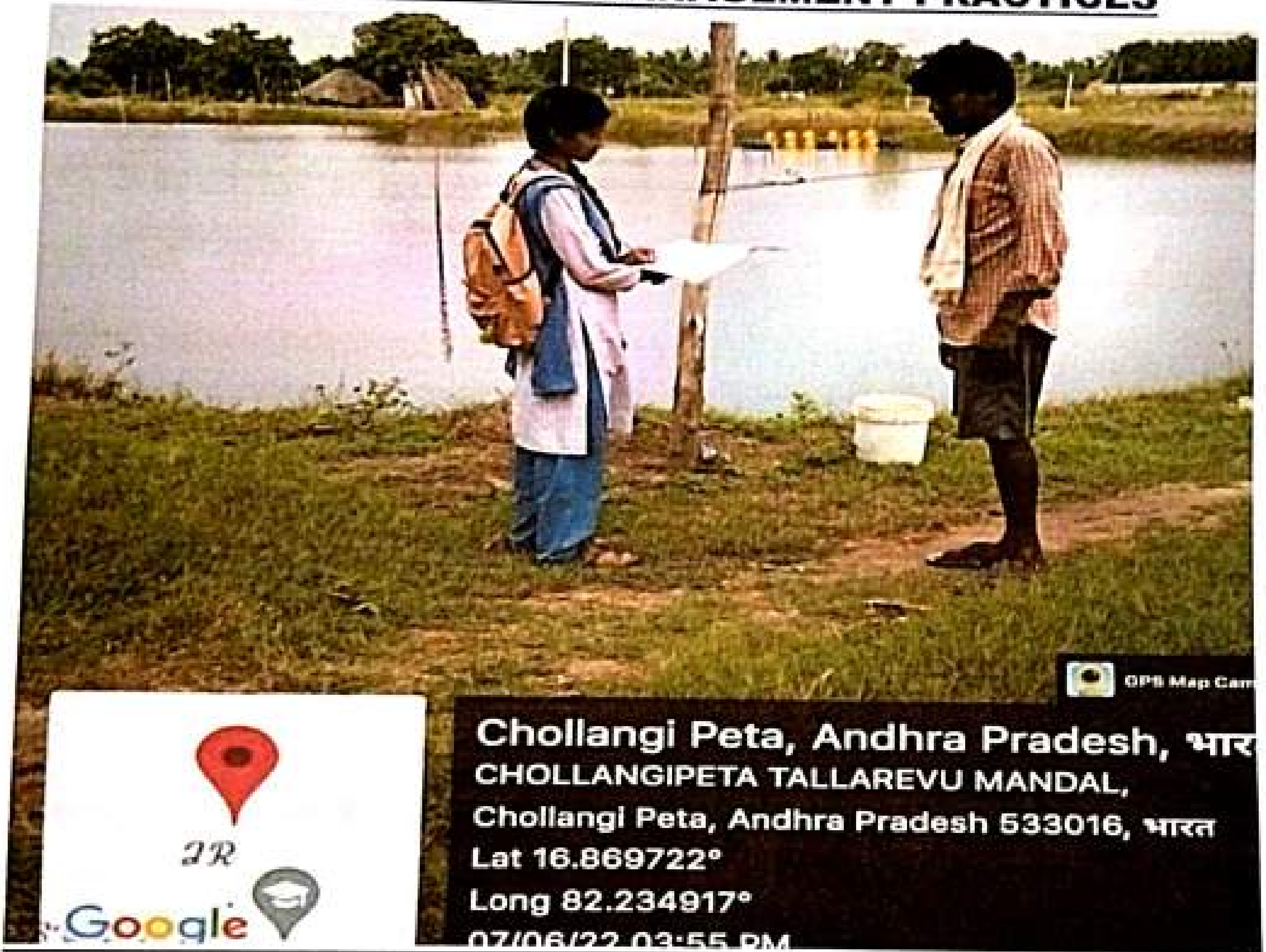
(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

K. Rajeswari

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933024

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. **K. Rajeswari** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:**Fish Farming and Management Practices.**

Lecturer in charge
A. S. Govt. College for Women
KAKINADA

28/6/2022
Head of the Department
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

<u>Valued by</u>

1.
2. 30/6/22
30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

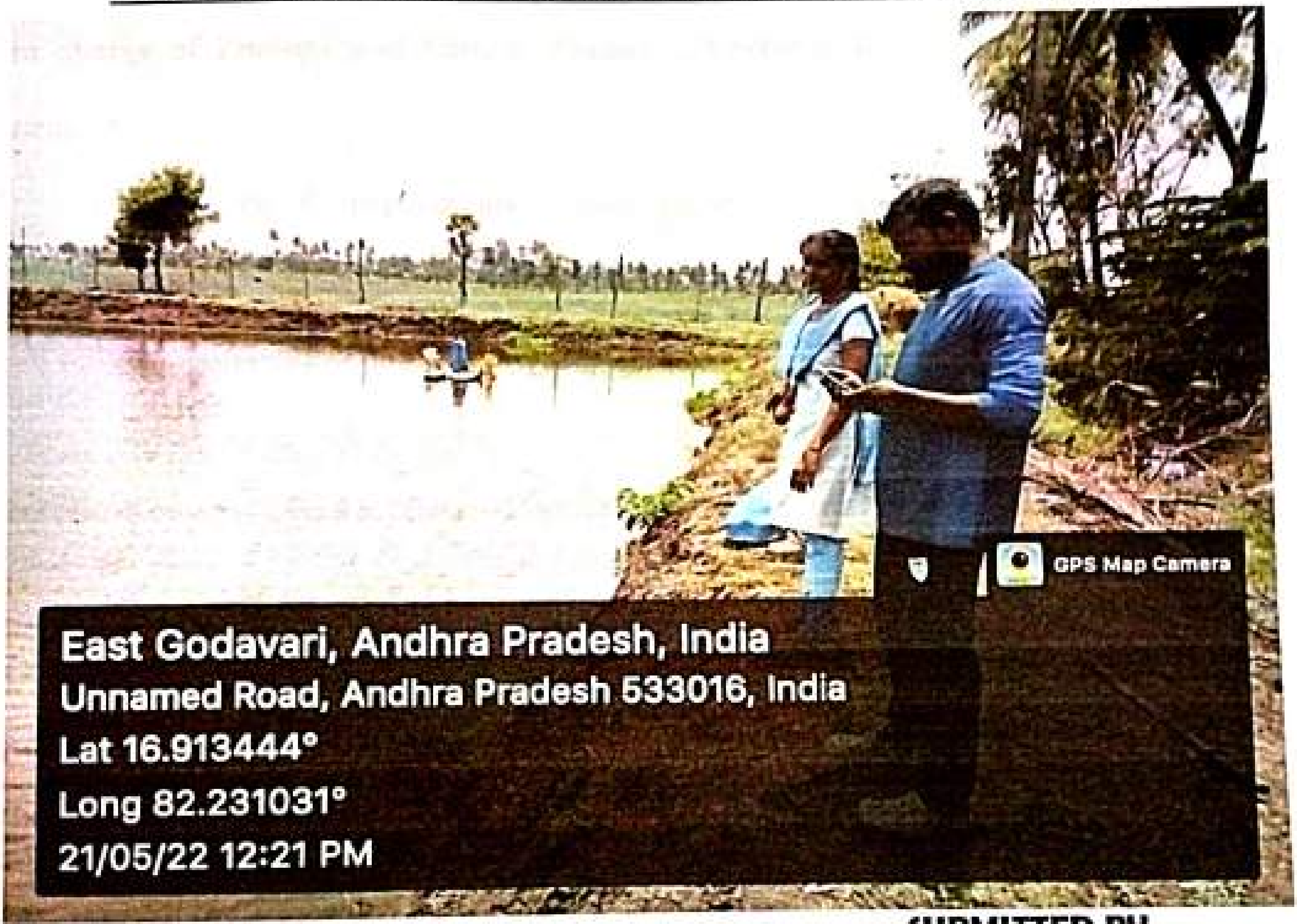
(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES



GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

G. Prema Jyothi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933024

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **G.Prema Jyothi** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds location at Bullabai Reddy colany Thurangi kakinada, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish pond**

Leeturer in charge

Lecturer in Zoology
A. S. Govt. College for Women
KAKINADA-2

Head of the Department 29/6/2022

DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

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A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

G.Anjali Devi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)
(Re- Accredited by NAAC with 'B' Grade)
Jagannaickpur, Kakinada - 533002, East Godavari, AP.
Regd. No. 1933023

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **G.Anjali Devi** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at shrimp ponds located at korangi village of Thallarevu mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Farming and Management Practices.**

Lecturer in charge
Lecturer in Zoology
A.S. Govt. College for Women
KAKINADA-2

29/6/2022
Head of the Department
A.S. GOVT. COLLEGE FOR WOM...
KAKINADA-2

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2. 30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP HATCHERY MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers In Zoology.

SUBMITTED BY

p. Suneetha

III B.Sc (CBZ)

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933034

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. P. Suneetha of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at ChHANDRABHAGA VILLAGE of KONARK MANDAL , PURI Dist., ODISHA during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp Hatchery Management Practices.**

Lecturer In charge

A.S. Govt. College for Women

KAKINADA

Head of the Department 29/6/2022

DEPARTMENT OF ZOOLOGY

A.S. GOVT. COLLEGE FOR WOMEN

KAKINADA

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30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

P.bhava devi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933032

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. P.bhava devi of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: Post Harvest Technology (Cluster VIII B 3).

Title of the Project:Fish Farming and Management Practices.

Lecturer in charge

Lecturer in Zoology
A. S. Govt. College for Women
KAKINADA-2

8/6/2022

Head of the Department

Valued by

1. 30/6/22

2. 30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

P.sravanthi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933033

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. **P.Sravanthi** of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Chollangipeta village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: Shrimp **~~Fish~~ Farming and Management Practices.**

28/6/2022

Lecturer in charge

Lecturer in Zoology
A.S. Govt. College for Women
KAKINADA-2

28/6/2022

Head of the Department

DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

Valued by

1. 30/6/22
2. 30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY	SUBMITTED BY
Smt. M.Vasantha Lakshmi,	**S. SIRISHA**
Smt. S. Madhavi,	**III B.Sc (CBZ).**
Lecturers in Zoology.	

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933039

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. S. Sirisha of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at BANGARAYYAPETA village of payakaraopeta mandal, Visakha Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

1. Title of the Project: **Shrimp Forming and Management Practices.**

Lecturer in charge

Head of the Department 30/6/2022

Valued by

1.

2. 30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP FARMING AND MANAGEMENT PRACTICES

GUIDED BY **SUBMITTED BY**

Smt. M.Vasantha Lakshmi, P Jayashila

Smt. S. Madhavi, **III B.Sc (CBZ).**

Lecturers in Zoology.

ACKNOWLEDGEMENTS

It gives me an immense pleasure to express my deep sense of reverence and gratitude for all those who have rendered their support at various stages of the project work.

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms. **P Jayashila** of III B.Sc. (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at Bangarammapeta village of Nakkapalli Mandal, Visakha Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: Shrimp Farming And Management Practices

29/6/2022

Lecturer in charge

Lecturer in Zoology
A. S. Govt. College for Women
KAKINADA-2

Head of the Department

DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

<u>Valued by</u>

1. 30/6/22
2. 30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES

UIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

T.jessi

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933043

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms.T.jessi of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at bulliabbai reddy colony village of kaninada mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Fish Farming and Management Practices.**

28/6/2022

Lecturer in charge

Lecturer in Zoology
A.S. Govt. College for Women
KAKINADA-2

Head of the Department

DEPARTMENT OF ZOOLOGY
A.S.D. GOVT. COLLEGE FOR WOMEN
KAKINADA

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2. 30/6/22
30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

SHRIMP POND AND MANAGEMENT PRACTICES

GUIDED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

SUBMITTED BY

S.Lalitha

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933040

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology, done by Ms.S.Lalitha of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at ~~fish~~ prawn ponds located korangi village of Thallarevu mandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project: **Shrimp pond and Management Practices.**

Lecturer in charge
Lecturer in Zoology
A.S. Govt. College for Women
KAKINADA-2

29/6/2022
Head of the Department
DEPARTMENT OF ZOOLOGY
A.S. GOVT. COLLEGE FOR WOMEN
KAKINADA-2

Valued by

1. 30/6/22
2. 30/6/2022

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

A STUDY PROJECT

ON

FISH FARMING AND MANAGEMENT PRACTICES

GUIDED BY

SUBMITTED BY

Smt. M.Vasantha Lakshmi,

Smt. S. Madhavi,

Lecturers in Zoology.

v.meghana

III B.Sc (CBZ).

A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)

(Re- Accredited by NAAC with 'B' Grade)

Jagannaickpur, Kakinada - 533002, East Godavari, AP.

Regd. No. 1933046

CERTIFICATE

Certified that this is a bonafide record of Project work in Zoology,done by Ms. V.meghana of III B.Sc (CBZ) of ASD Government Degree College for Women (A), Kakinada at fish ponds located at korangi village ofThallarevumandal, East Godavari Dist., Andhra Pradesh during Semester VI of the academic year 2021-2022.

Title of the Paper: **Post Harvest Technology (Cluster VIII B 3).**

Title of the Project:**Fish Farming and Management Practices.**

Lecturer in charge

Lecturer in Zoology
A. S. Govt. College for Women
KAKINADA-2

Head of the Department

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Valued by

1.

2.

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

NEW ECONOMIC REFORMS

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

PALLAPROLU SYAMALA

Regd.No.:1911003

Under the Esteemed Guidance of

Ms.G.PAVANI DEVI

Lecturer in Economics

DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"NEW ECONOMIC REFORMS"** is a benefited record of the main project done by **PALLAPROLU SYAMALA** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

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A.S.D GOVERNMENT DEGREE COLLEGE FOR WOMEN

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FINANCIAL MARKETING DEVELOPMENT

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the degree in

BACHELOR OF ARTS

By

Pulapakura Saraswathi devi

Regd . No: 1911004

Under the esteemed Guidance of

G. Pavani Devi

Lecturer in Economics

DEPARTMENT OF ECONOMICS

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A.S.D. GOVT DEGREE COLLEGE FOR WOMEN ,

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that the main project titled " **FINANCIAL MARKETING DEVELOPMENT**" is a benefited record of the main project done by **P.SARASWATHI DEVI** submitted in partial fulfilment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMENS (AUTONOMOUS) KAKINADA.**

20/7/22
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A.S D.GOVT.DEGREE COLLEGE (W)
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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

UNEMPLOYMENT

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

SHAIK KARISHMA

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Lecturer in Economics

DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)

Kakinada 533002.

DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"UNEMPLOYMENT"** is a benefited record of the main project done by **SHAIK KARISHMA** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

Sar
20/7/22
Project In-Charge

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శ్రీ విద్యా ప్రవర్ధనం

LAND REFORMS

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

KOPANATHI DEVI SRI

Regd.No.:1911008

Under the Esteemed Guidance of

Ms.G.PAVANI DEVI

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DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"LAND REFORMS"** is a benefited record of the main project done by **KOPANATHI DEVI SRI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

NEW AGRICULTURAL STRATEGY

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

PEMMADI NAGA LAKSHMI

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శ్రీ విద్యా ప్రకాశం

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)

Kakinada 533002.

DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"NEW AGRICULTURAL STRATEGY"** is a benefited record of the main project done by **PEMMADI NAGA LAKSHMI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge

A.S.D.GOVT.DEGREE COLLEGE (W)
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A.S.D GOVERNMENT DEGREE COLLEGE FOR WOMEN

(AUTONOMOUS), KAKINADA 533002

ORIGIN of NITI Aayog

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the degree in

BACHELOR OF ARTS

By

UNDRAJAVARAPU SANTHI

Regd . No:1911013

Under the Esteemed Guidance of

G. Pavani Devi

Lecturer in Economics

DEPARTMENT OF ECONOMICS

A.S.D GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS) . KAKINADA 533002

A.S.D GOVERNMENT DEGREE COLLEGE FOR WOMEN

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certify that the project titled " O R I G I N O F N I T I A a y o g " is a benefited record of the main project done by "Undrajavarapu Santhi" submitted in partial fulfillment of requirement for the award of the degree of bachelor of Arts from A.S.D government degree college for women (autonomous) . Kakinada.

20/7/22

Project In-Charge

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

INTERNATIONAL TRADE

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

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DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"INTERNATIONAL TRADE"** is a benefited record of the main project done by **KATADI BHUVANESWARI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)Kakinada.

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

THE PROBLEM OF UNEMPLOYMENT IN INDIA

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

KUDELU SWATHI

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Kakinada 533002.

DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"THE PROBLEM OF UNEMPLOYMENT IN INDIA"** is a benefited record of the main project done by **KUDELU SWATHI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22
Project In-Charge
A.S D.GOVT.DEGREE COLLEGE (W)
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20/7/22
Head of the Department
A.S D.GOVT.DEGREE COLLEGE (W)
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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)Kakinada.

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

FOREIGN DIRECT INVESTMENT

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

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Under the Esteemed Guidance of

Ms.G.PAVANI DEVI

Lecturer in Economics

DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"FOREIGN DIRECT INVESTMENT"** is a benefited record of the main project done by **MOSA DEVIKA** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge

A.S D.GOVT.DEGREE COLLEGE (W)
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20/7/22

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)Kakinada.

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

POVERTY

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

PALEPU HARIKA PUJITHA

Regd.No.:1911036

Under the Esteemed Guidance of

Ms.G.PAVANI DEVI

Lecturer in Economics

DEPARTMENT OF ECONOMICS

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)

Kakinada 533002.

DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"POVERTY"** is a benefited record of the main project done by **PALEPU HARIKA PUJITHA** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge

A.S.D.GOVT.DEGREE COLLEGE (W)
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20/7/22

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A.S.D.GOVT.DEGREE COLLEGE (W)
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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)Kakinada.

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

"AGRICULTURE SECTOR IN INDIA IMPORTANCE AND CHALLENGES"

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

SETTI DEVI

Regd.No.:1911044

Under the Esteemed Guidance of

Ms.G.PAVANI DEVI

Lecturer in Economics

DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada 533002.

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)

Kakinada 533002.

DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"AGRICULTURE SECTOR IN INDIA IMPORTANCE AND CHALLENGES"** is a benefited record of the main project done by **SETTI DEVI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge

A.S.D.GOVT.DEGREE COLLEGE (W)
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KAKINADA

20/7/22

Head of the Department

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

(Autonomous) Kakinada 533002.

GOODS AND SERVICES TAX IN INDIA:ADVANTAGES AND CHALLENGES

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

YADALA KOWSALYA

Regd.No.:1911050

Under the Esteemed Guidance of

Ms.G.PAVANI DEVI

Lecturer in Economics

DEPARTMENT OF ECONOMICS

A.S.D.GOVT DEGREE COLLEGE FOR WOMEN, (Autonomous) Kakinada

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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)

Kakinada 533002.

DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"GOODS AND SERVICES TAX IN INDIA:ADVANTAGES AND CHALLENGES"** is a benefited record of the main project done by **YADALA KOWSALYA** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22

Project In-Charge
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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN,

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NEW AGRICULTURAL STRATEGY

A Main Project Report

Submitted in partial fulfillment of the requirements for the award of the Degree in

IN

BACHELOR OF ARTS

By

PEMMADI NAGA LAKSHMI

Regd.No.:1911010

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Lecturer in Economics

DEPARTMENT OF ECONOMICS

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DEPARTMENT OF ECONOMICS

CERTIFICATE

This is to certified that main project titled **"NEW AGRICULTURAL STRATEGY"** is a benefited record of the main project done by **PEMMADI NAGA LAKSHMI** submitted in partial fulfillment of the requirement for the award of the degree of the Bachelor of Economics from **A.S.D.GOVT DEGREE COLLEGE FOR WOMEN(A), Kakinada.**

20/7/22
Project In-Charge
A.S.D.GOVT.DEGREE COLLEGE (W)
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KAKINADA

20/7/22
Head of the Department
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A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A)Kakinada.

InDEX

నూతన వ్యవసాయ వ్యూహం

స్వాతంత్ర్యం వచ్చిన ప్రారంభంలో ఆహార ధాన్యాలకై విదేశాలపై ఆధారపడాల్సి వచ్చేది. అమెరికా నుండి PL 430 క్రింద ఆహార ధాన్యాలను (గోధుమ) దిగుమతి చేసుకోవాల్సి వచ్చేది

మెక్సికోలో 1960 దశకంలో హరిత విప్లవం ప్రారంభమైనది. అమెరికా వ్యవసాయ శాస్త్రవేత్త నార్మన్ బోర్లాగ్ "రాక్ ఫెల్లర్" ఫౌండేషన్ స్కాలర్‌షిప్ సహకారంతో మెక్సికోలో అధిక దిగుబడి గోధుమ వంగడాలపై పరిశోధన చేసెను. ఫలితంగా అధిక దిగుబడినిచ్చే గోధుమ వంగడాలు రూపొందించబడినవి. అందుచే "నార్మన్ బోర్లాగ్"ని ప్రపంచ హరిత విప్లవ పితామహునిగా పిలుస్తారు. ఇటువంటి కృషి భారతదేశంలో ఎం. ఎస్. స్వామినాథన్ ఆధ్వర్యంలో జరగడం వలన స్వామినాథన్ భారతదేశ హరిత విప్లవ పితామహునిగా పిలుస్తారు. 1968 సంవత్సరంలో అంతర్జాతీయ అభివృద్ధి సమావేశంలో వ్యవసాయ ఉత్పత్తిలో వచ్చిన ఈ ఆకస్మిక పెరుగుదలను సూచిస్తూ విలియం ఎస్. గాడ్ హరిత విప్లవం అనే పదాన్ని ఉపయోగించెను.

C. Subramaniam [1910-2000] :- వ్యవసాయ శాఖ మంత్రిగా

భారత ఆర్థిక, రక్షణ, వ్యవసాయ శాఖ మంత్రిగా పనిచేసెను. నార్మన్ బోర్లాగ్, బి. శివరామన్, ఎం.ఎస్. స్వామినాథన్ (లు)

కలిపి ఆహార ఉత్పత్తిలో స్వయం సమృద్ధికి బాటవేసిన హరిత విప్లవ కార్యక్రమంలో పాల్గొనెను. 1998లో హరిత విప్లవం చేసిన కృషికి గాను, భారతరత్న అవార్డును కూడా పొందెను. భారత ఆధునిక వ్యవసాయపు అభివృద్ధి విధాన నిర్ణయంలో స్వామినాథన్, శివరామన్ లతో పాటు సి. సుబ్రహ్మణ్యం కూడా కీలకపాత్ర పోషించెను. 1964-66 మధ్య అధిక దిగుబడినిచ్చే వంగడాలను ప్రవేశ పెట్టడంలో కీలకపాత్ర పోషించెను. "వ్యవసాయ రంగంలో మార్పు తెచ్చు సమయంలో సి. సుబ్రహ్మణ్యం పాత్ర చెప్పుకోదగినదని" నార్మన్ బోర్లాగ్ కూడా వ్యాఖ్యానించెను.

నేషనల్ డెయిరీ డెవలప్‌మెంట్ బోర్డు ప్రెసిడెంట్‌గా వర్గీస్ కురియన్‌ను సుబ్రహ్మణ్యమే నియమించెను (కురియన్ శ్వేత విప్లవానికి బాటవేసెను. స్వర్ణసింగ్ తర్వాత సుబ్రహ్మణ్యం వ్యవసాయ మంత్రిగా (1964-66), సుఖిర్ తర్వాత ప్రణాళిక సంఘం డిప్యూటీ ప్రెసిడెంట్‌గా (1971-72), చవాన్ తర్వాత ఆర్థిక మంత్రిగా (1975-77), జగ్జీవన్‌రామ్ తర్వాత రక్షణ మంత్రిగా (1979-80), మహారాష్ట్ర గవర్నర్‌గా వివిధ పదవులు నిర్వహించెను.

నార్మన్ బోర్లాగ్ తయారు చేసిన గోధుమ విత్తనాలు ప్రపంచవ్యాప్తంగా వివిధ ప్రాంతాలలో పరీక్షించబడ్డాయి. వాటిలో భాగంగా ఇండియన్ అగ్రికల్చరల్ రీసెర్చ్ ఇన్స్టిట్యూట్ పూసా, న్యూఢిల్లీ వారు కూడా వాటిని పరీక్షించెను. 1962లో ఎం.ఎస్. స్వామినాథన్ కోరికపై వ్యవసాయ పరిశోధనా సంస్థ, బోర్లాగ్ భారత సందర్శనను

[illegible] 1963లో [illegible] ఫౌండేషన్ వారు, మెక్సికో [illegible]

[illegible] 1965లో [illegible]

The new Strategy in Indian Agriculture
the first Decade and after C. Subramaniam

విశ్లేషణ:-

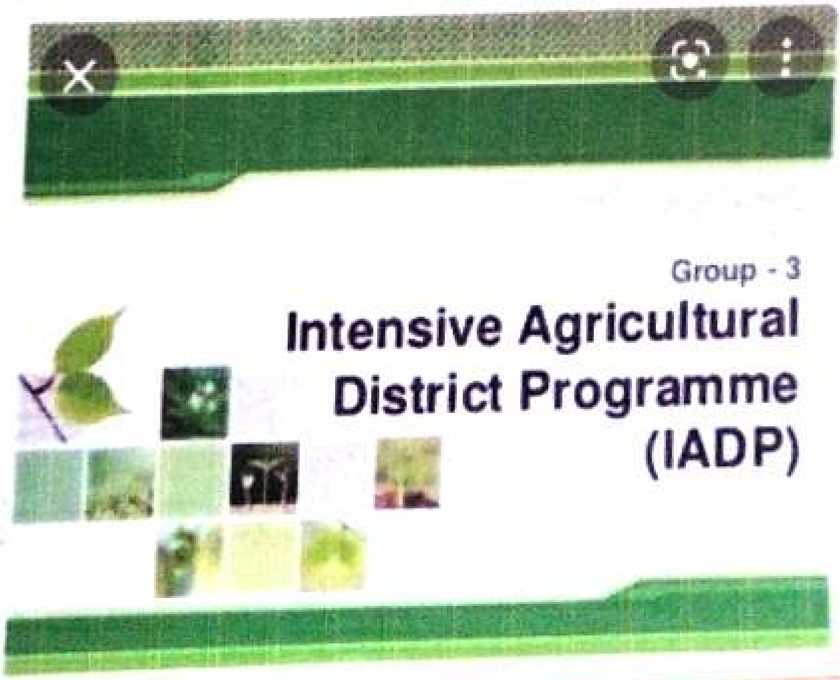
వ్యవసాయ రంగంలో [illegible]

-[illegible] ఇతర వ్యవసాయ [illegible]

[illegible]

-[illegible]

సాంద్ర వ్యవసాయ జిల్లాల పథకం:- (IADP- Intensive Agricultural District Programme) (1960-61):-



రెండవ పంచవర్ష ప్రణాళిక చివరిలో భారత ప్రభుత్వం వ్యవసాయ ఉత్పత్తి, ఉత్పాదకతను పెంచేందుకు ఫోర్డ్ ఫౌండేషన్ కమిటీని భారతదేశానికి ఆహ్వానించింది. ఈ బృందం India's Food Crisis and Steps to meet (1959) అనే పేరుతో నివేదికను సమర్పించింది.

ఈ నివేదిక ఆధారంగా ఎంపిక చేసిన ప్రాంతాలలో అధిక ఉత్పాదకత గల విత్తనాలు, రసాయన ఎరువులు మొదలగు ఉత్పాదకాలను అందించడం ద్వారా ఉత్పత్తిని, ఉత్పాదకతను పెంచాలని సూచించింది. ఈ కమిటీ సూచనల మేరకు 1960 సంవత్సరంలో సూచించింది. ఈ కమిటీ సూచనల మేరకు అధిక దిగుబడి విత్తనాలు, 7 జిల్లాల్లో IADP ని ప్రారంభించారు. అధిక దిగుబడి విత్తనాలు, నీటి పారుదల సౌకర్యాలు, రసాయన ఎరువులు, సస్యరక్షణ మందులు, ఆధునిక వ్యవసాయ పనిముట్లు, పరపతి సదుపాయాలను అందించడం ద్వారా 7 జిల్లాల్లో మొదట రంగంలో అధిక ఉత్పత్తిని సాధించడానికి 7 జిల్లాల్లో ప్రణాళికను ప్రారంభించింది.

వరి:-

A.P.లోని ముఖ్య సేద్య పంట.

బెంగాల్ లోని ...

పశ్చిమ బెంగాల్ లోని ...

తమిళనాడు లోని ...

జాపూర్

గోధుమ

గోధుమ : పంజాబ్‌లోని లూథియానా
ఉత్తరప్రదేశ్‌లోని మీరట్

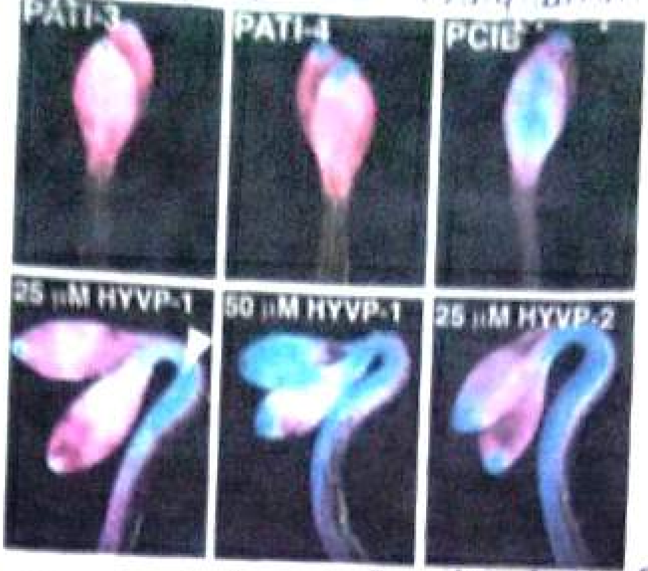
మిల్లెట్స్ : రాజస్థాన్‌లోని పాళీలను పండిస్తారు.

ఇక్కడ వ్యవసాయ ఉత్పాదకాలు అన్నింటిని ఒక ప్యాకేజీ
పథకంలో ఉండటం వలన దీనిని ప్యాకేజ్ ప్రోగ్రాం అని అంటారు.
పైలెట్ కార్యక్రమంలో గోధుమ పంటలో అధిక వృద్ధిని సాధించడం
జరిగింది.

ఇంటెన్సివ్ వ్యవసాయ ప్రాంతాల కార్యక్రమం (IAAP) :- [Intensive Agricultural Areas Programme]:-

అధిక దిగుబడి వంగడాల కార్యక్రమం

CHYVP : High Yielding Varieties Programme :



1960 దశకం మధ్యలో నార్మన్ బోర్లాగ్ బృందం మెక్సికోలో అభివృద్ధి చేసిన గోధుమ వంగడాల వలన ఎకరానికి దిగుబడి 5000 నుండి 6000 కిలోలకు పెరిగెను. (ఉదా) లెర్మారోజో, సోనారా-64, కళ్యాణ్, PV-18 వంటి గోధుమ వంగడాలు అభివృద్ధి చేయబడినవి. ఫలితంగా గోధుమ దిగుబడి పెరుగుదలను మెక్సికో తన అవసరాలను తీర్చుకోవడమే కాక గోధుమలను ఎగుమతి చేసే స్థాయికి చేరెను.

ఈ నూతన వ్యవసాయ వ్యూహాన్ని భారతదేశం కూడా అనుసరించింది. 1966 ఖరీఫ్ సీజన్లో "CHYVP) High yeilding Varieties Programme" ప్రారంభించెను.

* తైవాన్లో తైచుంగ్ నేటివ్, సిలోన్లో H-4 మలేషియాలో మసూరి వంటి వరి వంగడాలు అభివృద్ధి చేయబడినవి.

* IR-8, IR-3, IR-67 వంటి వరి వంగడాలను అంతర్జాతీయ వరి పరిశోధన సంస్థ.


Public health threat of chemi
Sugar and fermented chemic
Lokal Telugu · Lokal App
Daily GK in Telugu
6:11
YouTube

A PROJECT REPORT

On

ONLINE BAKERY SHOP

A project report submitted in partial fulfilment of requirement

for the award of the degree of Bachelor of Commerce

B.Com (Computer Applications)

Submitted by

NAME	REGD NO
R. Ramya	1923003
B. Joshna Durga	1923014
N. Rama Tulasi	1923023
B. Nooka Ratnam	1923012
D. Sunitha Devi	1923016

Under the esteemed guidance of

Smt.G.Satya Suneetha

Lecturer in Computer Applications

DEPARTMENT OF COMPUTER SCIENCE

A.S.D GOVT DEGREE COLLEGE FOR WOMEN

AUTONOMOUS

Affiliated to Adikavi Nannaya University, Rajamahendravram

JAGANNAICPUR, KAKINADA

2021-2022

A.S.D.GOVT.DEGREE COLLEGE FOR WOMEN (A)
DEPARTMENT OF COMPUTERS SCIENCE

CERTIFICATE

This is to certify that the Project Report entitled **"ONLINE BAKERY SHOP"** was submitted by

R. Ramya	1923003
B. Joshna Durga	1923014
N. Rama Tulasi	1923023
B. Nooka Ratnam	1923012
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Sunetha
Project Guide &
Head of the Department

V. Anyanta Lakshmi
Principal

External Examiner 30/6

A PROJECT REPORT

on

AUTOMATIC PLANT WATERING SYSTEM

A Project Report submitted in partial fulfilment of requirement for
the award of the Degree of Bachelor of Commerce
B.Com Computer Applications

Submitted by

Name	**Regd.No**
K.BHARATHI	1923008
M.LAYA MUNNISHA	1923009
K.ANUSHA	1923019
B.SUMATHI	1923013
K. MALLESWARI	1923007

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CERTIFICATE

This is to certify that the Project Report entitled **"AUTOMATIC PLANT WATERING SYSTEM"** was submitted by

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K.ANUSHA	1923019
B.SUMATHI	1923013
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Project Guide & **Principal** **External Examiner**

Head of the Department

A PROJECT REPORT

on

WORKING OF AUTOMATIC ROOM LIGHT CONTROLLER

A Project Report submitted in partial fulfillment of requirement
for the award of degree of Bachelor of Commerce
B.Com., Computer Application

Submitted by

	Name	Regd.No
1.	K. Parimla	1923002
2.	B. Durga Bhavani	1923004
3.	G. Anantha Lakshmi	1923005
4.	P. Devi Mounika	1923011
5.	Ch. Lakshmi Sowjanya	1923015

Under the esteemed Guidance of

Smt. G. Satya Suneetha

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Jagannaickpur,Kakinada

2021-2022

A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN(A)

DEPARTMENT OF COMPUTER SCIENCE

CERTIFICATE

This is to certify that the project report entitled **"Automatic Room Light Controller"** was submitted by

Name	Regd.No
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2. B. Durga Bhavani	1923004
3. G. Anantha Lakshmi	1923005
4. P. Devi Mounika	1923011
5. Ch. Lakshmi Sowjanya	1923015

III B COM (COMPETER APPLICATION) Under the Guidance of **SMT G. Satya Suneetha** DEPARTMENT OF COMPUTER SCIENCE Lecturer in DEPARTMENT OF COMPUTER SCIENCE **A.S.D. GOVERNMENT DEGREE COLLEGE FOR WOMEN(A)** Jagannaickpur, Kakinada inpartial fulfillment of requirement for the award of degree of **Bachelor of Computer Applications.** The project work is completed in a systematic way

Project guide **Head of the Department** **Principal** **External examiner**

A PROJECT REPORT

On

SMOKE & GAS DETECTOR

A Project Report submitted in partial fulfillment of requirement for the award of the Degree of Bachelor of Commerce
B.Com Computer Applications

Submitted by

Name	Regd.No
P.SRIMOUNIKA	1923010
P.PADMALATHA	1923024
K.N.H.JYOTHI	1923021
P.PAVITHRA	1923025
G.APARNA	1923006
J.NARMADA	1923018

Under the esteemed guidance of

Smt. G. Satya Suneetha

Lecturer in Computer Applications

DEPARTMENT OF COMPUTER SCIENCE

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Affiliated to Adikavi Nannaya University, Rajahmahendravaram

Jagannaikpur, Kakinada

2021-2022

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A)
DEPARTMENT OF COMPUTER SCIENCE

CERTIFICATE

This is to certify that the Project Report entitled **"SMOKE & GAS DETECTOR"** was submitted by

P.SRIMOUNIKA	1923010
P.PADMALATHA	1923024
K.N.H.JYOTHI	1923021
P.PAVITHRA	1923025
G.APARNA	1923006
J.NARMADA	1923018

III B.Com (Computer Applications) under the able guidance of **Smt.G.Satya Suneetha**, Lecturer in Computer Applications,**A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A)**, Jagannaickpur, Kakinada, in the partial fulfillment of the requirement for the award of **Bachelor of Commerce in Computer Applications.** The project work is completed in a systematic way.

Project Guide &

Head of the Department

Principal

External Examiner

A PROJECT REPORT

on

SMART BLIND STICK

A Project Report submitted in partial fulfilment of requirement for
the award of the Degree of Bachelor of Commerce
B.Com Computer Applications

Submitted by

Name	Regd. No
M. SONIA	1923022
S. BHAGYA SRI	1923027
J. SASHI REKHA	1923017
K. THANUJA	1923020
K. VEERA MANI	1923026

Under the esteemed guidance of

Smt. G. Satya Suneetha

Lecturer in Computer Applications

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A.S.D GOVT DEGREE COLLEGE FOR WOMEN AUTONOMOUS

Affiliated to Adikavi Nannaya University, Rajahmahendravaram Jagannaikpur, Kakinada

2021-2022

A.S.D. GOVT. DEGREE COLLEGE FOR WOMEN (A)
DEPARTMENT OF COMPUTER SCIENCE

CERTIFICATE

This is to certify that the Project Report entitled **"SMART BLIND STICK"** was submitted by

M. SONIA	1923022
S. BHAGYA SRI	1923027
J. SASHI REKHA	1923017
K. THANUJA	1923020
K. VEERA MANI	1923026

III B.Com (Computer Applications) under the able guidance of **Smt. G.Satya Suneetha**, Lecturer in Computer Applications, **A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A),** Jagannaickpur, Kakinada, in the partial fulfillment of the requirement for the award of **Bachelor of Commerce in Computer Applications.** The project work is completed in a systematic way.

Project Guide &
Head of the Department

Principal

External Examiner

ACKNOWLEDGEMENT

We are thankful to our Principal, **Smt. Dr.V.Anantha Lakshmi, M.Sc., M.Phil., Ph.D.** For her permission to select this project and for her continuous encouragement and valuable suggestions.

We are thankful to our Vice Principal, **Smt**.**M.Suvarchala**, **M.Sc., M.Ed. (Ph.D.)** for her ultimate support in the conclusion of this project.

We are also thankful to our lecturer and Project Guide **Smt. G. Satya Suneetha M.Tech.(Ph.D.)** for her continuous and constant motivation towards completion of this project. We wish to express our gratitude to **Smt. N.Naga Subrahmanyeswari M.Tech.(Ph.D.)** for her timely suggestions and encouragement.

We are also thank to our lab programmer, parents and friends who have directly and indirectly helped us in the completion of the project

P.SRIMOUNIKA	1923010
P.PADMALATHA	1923024
K.N.H.JYOTHI	1923021
P.PAVITHRA	1923025
G.APARNA	1923006
J.NARMADA	1923018

DECLARATION

We hereby declare that the project work entitled "**SMOKE & GAS DETECTOR**" submitted to the A.S.D.GOVT DEGREE COLLEGE FOR WOMEN (A), KAKINADA is a record of an original work done by us under the guidance of **Smt.G.Suneetha**, lecturer in computer applications and this project work is submitted in the partial fulfilment of the requirements for the award of the degree of B.Com. (Computer Applications). The results embodied in this report have not been submitted to any other University or Institute for the award of any degree or diploma.

Name of the member	**Signature**
P.SRIMOUNIKA	
P.PADMALATHA	
K.N.H.JYOTHI	
P.PAVITHRA	
G.APARNA	
J.NARMADA	

1. ABSTRACT

In today's world, everyone is busy in their own life that people rarely take care of using resources effectively. We know gas is a useful component in environment. Some gases do not cause any harm if emitted in excess amount but some do. Gas like LPG is used household purpose for cooking food. Not only in household purpose but also in hotels, restaurants, hospitals, etc. where there is human interaction. Also we can see CNG operated vehicles. If there is any amount of leakage of these type gases it can cause a huge loss to life and property. So what if we get a way to reduce or abandon the chances of this loss.

A Smoke detector is a fire protection device that automatically detects smoke/gases and also gives us warning to be aware of it, with some protection system to handle the situation. Many fire accidents occur in our surrounding due to absence of human in right place at the right time. That is the importance of the project, it can minimize such accidents. Thus it got immense importance in our practical Life.

The impact of smoke alarms on the reduction in fire related deaths are discussed. The arrival and use of domestic heat alarms can serve to increase the level of protection in dwellings. Various types of smoke detectors include: ionization chamber detector, optical smoke detector, domestic heat alarms and carbon monoxide detectors. It is suggested that mains-powered products must be installed by knowledgeable electricians that help ensure that they will be correctly located in accordance with regulations.

2. INTRODUCTION

When there is a fire a lot of gas particles are produced. The sensor detects these and turns the electricity supply on. It can be used to detect the presence of carbon monoxide gas (CO). ... The sensor detects the gas and the alarm is set off. Fire hazards are not uncommon. In order to avoid damage from fire accidents, smoke detectors are installed at high-security places. These smoke detectors detect smoke as the fire breakout and invoke an early alarm. This way, before the fire spreads to other parts of the building, people can be evacuated and countermeasures can be done immediately. In this project also a smoke detector has been designed

The smoke detector developed in this project not only invokes an alarm but also activates an exhaust fan so that smoke could be removed with immediate action. For the demonstration purpose instead of the actual exhaust fan. The concentration of smoke is detected by the MQ-2 sensor and displayed on and display. When the concentration of smoke reaches a dangerous level that can be an indication of a fire breakout, a alarm indicator is activated.

The project is built on Arduino Pro Mini and MQ-135 gas sensor is used to detect smoke. The MQ135gas sensor detects the concentration of gas in ppm and outputs analog value which can be converted to digital measure using inbuilt Analog to Digital Convertor of Arduino. The value of the digital measure will be 10-bit long and varies from 0 to 1023. The project allows the user to set the dangerous level for leakage based on the same digital measure. When the value set by the user matches with that of the value detected by the sensor, it invokes the alarm. The MQ135 sensor can be calibrated by interfacing a load resistance of fixed value with the sensor.

Smoke detectors are amazing inventions, because of the protection they provide to countless families. Smoke detectors save thousands of lives each year. There are two main types of smoke detectors, the photoelectric detector and the ionization detector. All smoke detectors have two basic parts: a sensor and a very loud electronic horn. The sensor senses smoke and the horn awakens people.

2.1 Introduction to the Internet of Things

The Internet of Things (IoT) is a new, but at the same time an old term. It was already mentioned by Kevin Ashton in 1999, while holding a presentation at Proctor & Gamble. He used the term to link the idea of radio frequency identification (RFID) to the then new topic Internet. Since then the use of this term has blossomed and major companies predicted an increase in IoT. One prediction is that the number of connected things in the world will have a thirtyfold increase between 2009 and 2020, thus by 2020 there will be 26 billion things that are connected to the Internet. The reason IoT has become so huge depends partly on two things: Moore's law and Koomey's law. Moore's law states that the number of transistors on a chip doubles approximately every two years. This has enabled people to develop more powerful computers on the same sized chip. Intel, a well-known semiconductor chip maker had during 1971, 2300 transistors on a processor and by 2012 their current processors contained 1.4 billion transistors. This is an increase of approximately 610 000 % and it is expect that this trend will continue.

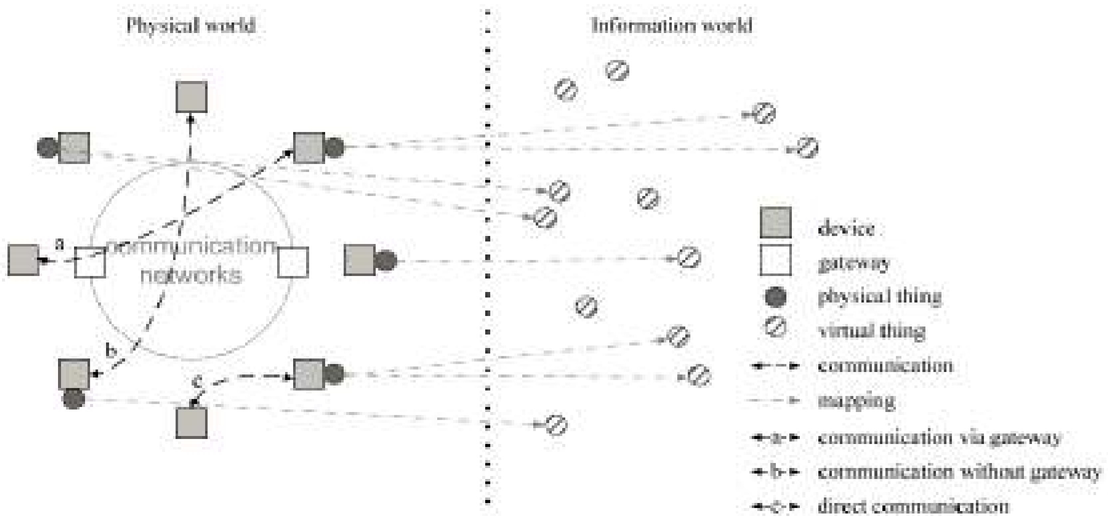
Koomey's law explains that the number of computations per kilowatt-hour roughly doubles every one and a half years. Kevin Ashton states that these two laws have together enabled us to create powerful and energy efficient computers. By turning the graph for Moore's law upside down it can be interpreted as the size of a computer (of a fixed capacity) is halved every two years. Doing the same thing to Koomey's law can be interpreted as the amount of energy needed to perform a computation is dropping at a rapid rate. Combining these interpretations tells us that we can perform the same amount of computations on increasingly a smaller chip, while consuming decreasing amounts of energy - hence computations are becoming more energy efficient. The potential result is a small, powerful, and energy efficient computer which enables us to provide more advanced services using less chip area and at a lower energy that what has been possible before.

Defining the term IoT can be somewhat difficult because it has many definitions depending on who is defining the term. The basic concept of IoT is to connect things together, thus enabling these "things" to communicate with each other and enabling people to communicate with them]. What these things are varies depending on which context the term is used and the aim of using the thing. In this thesis we have chosen to follow the definition of IoT proposed by ITU's Telecommunication Standardization Sector (a United Nations agency which specializes in ICT): "… a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies". Interconnecting the physical world with the virtual world and applying this concept to all things opens up new possibilities in the sense of being able to at any time access anything from any place. Providing new possibilities will also generate new threats, security risks, and expose vulnerabilities in the unexplored world of interconnected everything. "Things" in the physical world are objects that physically exist and from the perspective of IoT we are able to sense, operate, and connect to these things, while in the virtual world "things" are objects that can be stored, accessed, and processed.

IoT involves sensors in order to collect information. Sensors are already being used in daily life, however most people may not realize it. Smartphone's contain different kind of sensors, such as accelerometers, cameras, and GPS receivers. Built-in sensors are nothing new in today's society. Kevin Ashton said that IoT is already happening, but we might not see it compared to Smartphone's which can both be seen and touched. RFID is such an IoT-technology that exists but is not necessarily seen; so the development of IoT might progress a long way before it is visible for everyone.

2.2 Background for the Internet of Things

The most vital part of achieving IoT is communication, because in order to interconnect different devices they must be able to communicate. All other properties, such as sensing, maneuvering, being able to capture, store, and process data are unnecessary; unless your device specifically requires one of these properties. However, the ability to communicate is essential when labeling a device as an IoT device. How this communication is performed is less important, since the actual physical and link layer communication within IoT can be realized in many ways.



Shows that devices are not always required to communicate through a communication network. For example, if two devices are close to each other it might be simpler to directly communicate via for example radio using technologies such as Bluetooth or ZigBee (protocols which both enable direct communication). In contrast, in Case a in Figure 1—1 a device might communicate via a gateway using one protocol (such a IPv6 over Low power Wireless Personal Area Networks (6LoWPAN)) and then the gateway could communicate using another protocol (e.g. IPv4) over a communication network such as the Internet. Case B in Figure 1—1 illustrates two devices which are directly communicating with one another without requiring a gateway where both devices are directly connected to the communication network and thus are able to communicate even if they are located in different places.

A physical thing can be mapped into the information world via one or more virtual things, while virtual things do not necessarily need to be associated with any physical thing and can exist independently of any physical existence. For example, a physical thing might execute multiple applications and thereby have multiple identities in the virtual world. Similarly a virtual thing might also have many identities in the virtual world. For example, a virtual thing could be a video (file) on a USB-drive. Such a file might have multiple file names that refer to it and it might even have multiple instances (copies), potentially these "copies" might have different encodings, resolutions, etc.

2.3 Characteristics of the Internet of Things

Characteristics	Description
Interconnectivity	Everything can be connected to the global information and communication infrastructure
Things-related services	Provides things-related services within the constraints of things, such as privacy and semantic consistency between physical and virtual thing.
Heterogeneity	Networks but they can still interact with other devices through different networks.
Dynamic changes	The state of a device can change dynamically, thus the number of devices can vary. (Device states: connected, disconnected, waking up, and sleeping)
Enormous scale	The number of devices operating and communica -ting will be larger than the number of devices in the current Internet. Most of this communication will be device to device instead of human to device.

2.4 Advantages of IOT

The Internet of Things, called the IoT for short, is a new interconnection of technology heralded as the next industrial revolution—implying radical change, disruption, and an entirely new paradigm for the planet. Specifically, the Internet of Things is an extension of the existing connections between people and computers to include digitally-connected “things.”

These things measure and report data this data can be simple numbers from a stationary or mobile sensor (such as a temperature sensor), or more complex findings from devices that measure and report multiple data streams at once. These advanced devices can even actuate or effect the data they’re measuring (a connected thermostat is an easy example.).

IOT or Internet of Things is a burning topic these days. Like every fresh concept, the masses are not too familiar with this novel idea. So, what exactly is IOT? Said in the simplest manner, it refers to a virtual internet connection from things, processes, people, animals and almost everything that we see around. It describes a situation where everything in our surrounding environment is made capable of automatically communicating with each other without any inter-human or human-to-machine interaction. Apart from the fact that it is a path-breaking discovery, it can also prove to be extremely beneficial in facilitating our lives to manifolds.

Every new technology faces a million challenges in its initial phases. Internet of Things also poses some grave issues that need to be tackled well in order to utilize its fullest potential. But let’s leave the threats aside for the time being and focus only on the positives in this post. Before we understand the impact IoT can have on our way of living, it’s important to go through its advantages and disadvantages:

2.5 Advantages

Communication

IoT encourages the communication between devices, also famously known as Machine-to-Machine (M2M) communication. Because of this, the physical devices are able to stay connected and hence the total transparency is available with lesser inefficiencies and greater quality.

Automation and Control

Due to physical objects getting connected and controlled digitally and centrally with wireless infrastructure, there is a large amount of automation and control in the workings without human intervention, the machines are able to communicate with each other leading to faster and timely output.

Information

It is obvious that having more information helps making better decisions. Whether it is mundane decisions as needing to know what to buy at the grocery store or if your company has enough widgets and supplies, knowledge is power and more knowledge is better.

Monitor

The second most obvious advantage of IoT is monitoring. Knowing the exact quantity of supplies or the air quality in your home, can further provide more information that could not have previously been collected easily. For instance, knowing that you are low on milk or printer ink could save you another trip to the store in the near future. Furthermore, monitoring the expiration of products can and will improve safety.

Time

As hinted in the previous examples, the amount of time saved because of IoT could be quite large. And in today's modern life, we all could use more time.

Money

The biggest advantage of IoT is saving money. If the price of the tagging and monitoring equipment is less than the amount of money saved, then the Internet of Things will be very widely adopted. IoT fundamentally proves to be very helpful to people in their daily routines by making the appliances communicate to each other in an effective manner thereby saving and conserving energy and cost. Allowing the data to be communicated and shared between devices and then translating it into our required way, it makes our systems efficient.

Automation of daily tasks leads to better monitoring of devices

The IoT allows you to automate and control the tasks that are done on a daily basis, avoiding human intervention. Machine-to-machine communication helps to maintain transparency in the processes. It also leads to uniformity in the tasks. It can also maintain the quality of service. We can also take necessary action in case of emergencies.

Efficient and Saves Time

The machine-to-machine interaction provides better efficiency, hence; accurate results can be obtained fast. This results in saving valuable time. Instead of repeating the same tasks every day, it enables people to do other creative jobs.

Saves Money

Optimum utilization of energy and resources can be achieved by adopting this technology and keeping the devices under surveillance. We can be alerted in case of possible bottlenecks, breakdowns, and damages to the system. Hence, we can save money by using this technology.

Better Quality of Life

All the applications of this technology culminate in increased comfort, convenience, and better management, thereby improving the quality of life.

2.6 Future of iot

In a span of ten years, from 2020 to 2030, IOT devices will grow from 75 billion to more than 100 billion, and the improvement from 4G to 5G in terms to grow IOT is most important. Today's 4G network can support up to 5500 to 6000 NB-IOT devices on a single cell.

The future of IOT has the potential to be limitless. Advances to the industrial internet will be accelerated through increased network agility, integrated artificial intelligence (AI) and the capacity to deploy, automate, orchestrate and secure diverse use cases at hyper scale.

3. Literature review

A smoke detector is a device that senses smoke typically as an indicator of fire or non-smoking zone in order to ensure human safety and safeguard property against fire in both domestic and commercial settings, different solutions for smoke detection have been developed. These designs vary depending on the method of smoke detection.

However, the different designs are derived from the two basic types of smoke detectors, namely: 1.The photoelectric smoke detector

2. The ionization chamber smoke detector (ICSD) The photoelectric smoke detector uses an optical beam to search for smoke. When smoke particles cloud the beam, a photoelectric cell senses the decrease in light intensity and triggers an alarm. This type of smoke detector reacts most quickly to smoldering fires that release relatively large amounts of smoke.

On the other hand, the ionization chamber smoke detector is quicker at sensing flaming fires that produce little smoke. It employs a radioactive material to ionize the air in a sensing chamber; the presence of smoke affects the flow of the ions between a pair of electrodes, which triggers the alarm in a typical system, the radioactive material emits alpha particles that strip electrons from the air molecules, creating positive oxygen and nitrogen ions. The electrons attach themselves to other air molecules, forming negative oxygen and nitrogen ions. Two oppositely charged electrodes within the sensing chamber attract the positive and negative ions, setting up a small flow of current in the air space between the electrodes, but when the smoke particles enter the chamber, they attract some of the ions, disrupting the current flow. There is usually a similar chamber constructed so that no smoke particles can enter, so that the smoke detector constantly compares the current flow in the sensing chamber to the flow in the reference chamber; if a significant difference develops, an alarm is triggered. This is the most commonly used design for domestic smoke detection.

3.1 History of smoke& gas detector

The first automatic electric fire alarm was patented in 1890 by Francis Robbins Upton, an associate of Thomas Edison. George Andrew Darby patented the first European electrical heat detector in 1902 in Birmingham, England. In the late 1930s Swiss physicist Walter Jaeger tried to invent a sensor for poison gas. He expected that gas entering the sensor would bind to ionized air molecules and thereby alter an electric current in a circuit in the instrument. His device did not meet its purpose: small concentrations of gas did not effect on the sensor's conductivity. Frustrated, Jaeger lit a cigarette and was soon surprised to notice that a meter on the instrument had registered a drop in current. Smoke particles from his cigarette had done what poison gas could not. Jaeger's experiment was one of the advances that paved the way for the modern smoke detector. In 1939 Swiss physicist Ernst

Meili devised an ionization chamber device capable of detecting combustible gases in mines. He also invented a cold cathode tube that could amplify the small signal generated by the detection mechanism to strength sufficient to activate an alarm.

Ionization smoke detectors were first sold in the United States in 1951; they were used only in major commercial and industrial facilities in the next several years due to their large size and cost. In 1955 simple home "fire detectors" for homes were developed, detecting high temperatures. The United States Atomic Energy Commission (USAEC) granted the first license to distribute smoke detectors using radioactive material in 1963. The first low-cost smoke detector for domestic use was developed by Duane D. Pearsall and Stanley B. Peterson in 1965, an individual replaceable battery-powered unit that could be easily installed. The "Smoke Guard 700" was a beehive-shaped, strong fire-resistant steel unit that used an ion chamber to detect smoke. The smoke broke the ion circuit causing the alarm to go off. The only way to turn the alarm off was to clear the ion chamber by blowing through it. The battery at this time was not easily accessible and also was proprietary to Statitrol Corporation. The company began mass-producing these units in 1975.Stanley Peterson’s son, Daniel B. Peterson, invented the Slide Line for mass production for the internal circuit works. Studies in the 1960s determined that smoke detectors respond to fires much faster than heat detectors.

The first single-station smoke detector was invented in 1970 by Stanley Bennett Peterson and made public the next year. It was an ionization detector powered by a single 9-volt battery. Several technological developments occurred between 1971 and 1976, including the replacement of cold-cathode tubes with solid-state electronics, which greatly reduced the detectors' cost, sizes and made it possible to monitor battery life. The previous alarm horns, which required specialty batteries, were replaced with horns that were more energy-efficient, enabling the use of commonly available batteries. These detectors could also function with smaller amounts of radioactive source material, and the sensing chamber and smoke detector enclosure were redesigned for more effective operation. The rechargeable batteries were often replaced by a pair of AA batteries along with a plastic shell encasing the detector. The 10-year-lithium-battery-powered smoke alarm was introduced in 1995.

The photoelectric (optical) smoke detector was invented by Donald Steele and Robert Emmark of Electro Signal Lab and patented in 1972

3.2 Gas and smoke detector

A smoke detector is a device that senses smoke, typically as an indicator of fire. Commercial security devices issue a signal to a fire alarm control panel as part of a fire alarm system, while household smoke detectors, also known as smoke alarms, generally issue a local audible or visual alarm from the detector itself or several detectors if there are multiple smoke detectors interlinked.

Smoke detectors are housed in plastic enclosures, typically shaped like a disk or square about 150 millimetres (6 in) in diameter and 25 millimetres (1 in) thick, but shape and size vary. Smoke can be detected either optically (photoelectric) or by physical process (ionization); detectors may use either, or both, methods. Sensitive alarms can be used to detect, and thus deter, smoking in areas where it is banned. Smoke detectors in large commercial, industrial, and residential buildings are usually powered by a central fire alarm system, which is powered by the building power with a battery backup. Domestic smoke detectors range from individual battery-powered units, to several interlinked mains-powered units with battery backup; with these interlinked units, if any unit detects smoke, all trigger even if household power has gone out.

The risk of dying in a home fire is cut by 1/4th in homes with working smoke alarms. The US National Fire Protection Association reports 0.53 deaths per 100 fires in homes with working smoke alarms compared to 1.18 deaths without (2009–2013). Some homes do not have any smoke alarms, some alarms do not have working batteries; sometimes the alarm fails to detect the fire

An ionization smoke detector uses a radioisotope, typically americium-241, to ionize air; a difference due to smoke is detected and an alarm is generated. Ionization detectors are more sensitive to the flaming stage of fires than optical detectors, while optical detectors are more sensitive to fires in the early smouldering stage.

The smoke detector has two ionization chambers, one open to the air, and a reference chamber which does not allow the entry of particles. The radioactive source emits alpha particles into both chambers, which ionizes some air molecules. There is a potential difference (voltage) between pairs of electrodes in the chambers; the electrical charge on the ions allows an electric current to flow. The currents in both chambers should be the same as they are equally affected by air pressure, temperature, and the ageing of the source. If any smoke particles enter the open chamber, some of the ions will attach to the particles and not be available to carry the current in that chamber. An electronic circuit detects that a current difference has developed between the open and sealed chambers, and sounds the alarm. The circuitry also monitors the battery used to supply or back up power, and sounds an intermittent warning when it nears exhaustion. A user-operated test button simulates an imbalance between the ionization chambers, and sounds the alarm if and only if power supply, electronics, and alarm device are functional. The current drawn by an ionization smoke detector is low enough for a small battery used as sole or backup power supply to be able to provide power for months or years without the need for external wiring.

Ionization smoke detectors are usually cheaper to manufacture than optical detectors. They may be more prone to false alarms triggered by non-hazardous events than photo electric detectors, and are much slower to respond to typical house fires.Americium-241 is an alpha emitter with a half-life of 432.6 years. Alpha particle radiation, as opposed to beta (electron) and gamma (electromagnetic) radiation, is used for two additional reasons: alpha particles have high ionization, so sufficient air particles will be ionized for the current to exist, and they have low penetrative power, meaning they will be stopped, safely, by the plastic of the smoke detector or the air. About one present of the emitted radioactive energy of 241 am is gamma radiation. The amount of elemental americium-241 is small enough to be exempt from the regulations applied to larger sources. It includes about 37 kbq or 1 µci of radioactive element americium-241 (241Am), corresponding to about 0.3 µg of the isotope. This provides sufficient ion current to detect smoke, while producing a very low level of radiation outside the device.

The americium-241 in ionizing smoke detectors poses a potential environmental hazard, albeit a very small one. Disposal regulations and recommendations for smoke detectors vary from region to region. The amount of radioactive material contained in ionizing smoke detectors is very small and thus doesn't represent a significant radiological hazard. If the americium is left in the ionization chamber of the alarm the radiological risk is insignificant because the chamber acts as a shield to the alpha radiation. A person would have to open the sealed chamber and ingest or inhale the americium for the risk to be significant. The radiation risk of exposure to an ionic smoke detector operating normally is much smaller than natural background radiation.

Some European countries, including France, and some US states and municipalities have banned the use of domestic ionic smoke alarms because of concerns that they are not reliable enough as compared to other technologies. Where an ionizing smoke detector has been the only detector, fires in the early stages have not always been effectively detected.

4. METHODOLOGY

A methodology for predicting smoke detector response with computational fluid dynamics is presented. The general phenomena associated with the overall smoke detection process are provided. The overall smoke detection process has been organized into five categories; property generation, bulk property transport, local property transport, sensor modulation, and alarm condition. Each component of the smoke detection process is discussed in terms of available methods for quantifying the associated variables. Introduction the accurate prediction of smoke detector response is an important consideration in assessing the performance of a detection system. As occupant and fire department notification can be dependent upon smoke detector response, more realistic objectives in terms of occupant evacuation times and fire department operations may be possible with reliable predictions of detector response. nist's fire dynamics simulator software, which is available for free and can be run on a pc, has removed some of the traditional barriers to using cfd in fire protection engineering. Therefore, the elements of a methodology for predicting smoke detector response with computational fluid dynamics are suggested. The objectives of this methodology are to provide a reference for predicting smoke detector response that can be used by fire protection engineers and practitioners as well as to serve as a stimulus for future research. Overall detector response methodology property generation the production of detectable properties by a fire is critical to predicting detector response. The most sophisticated and accurate predictive tool is of little value without proper inputs. Therefore, it is of primary importance to identify the combustion precursors or byproducts that influence the response of the sensor. In general terms, property generation is primarily influenced by the chemical composition of the fuel, local oxygen concentration, combustion mode, and heat release rate.

5. Design & implementation of smoke & gas detector

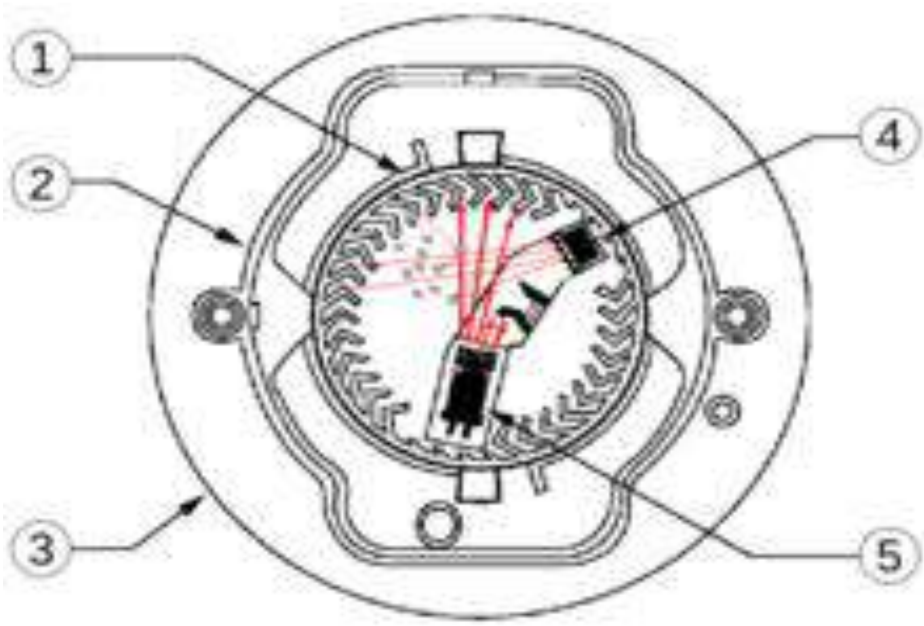


Fig- 5.1

Optical smoke detector

1. Optical chamber
2. Cover
3. Case moulding
4. Photodiode (transducer)
5. Infrared LED

A photoelectric, or optical smoke detector contains a source of infrared, visible, or ultraviolet light — typically an incandescent light bulb or light-emitting diode (LED) — a lens, and a photoelectric receiver — typically a photodiode. In spot-type detectors, all of these components are arranged inside a chamber where air, which may contain smoke from a nearby fire, flows. In large open areas such as atria and auditoriums, optical beam or projected-beam smoke detectors are used instead of a chamber within the unit: a wall-mounted unit emits a beam of infrared or ultraviolet light which is either received and processed by a separate device or reflected to the receiver by a reflector. In some types, particularly optical beam types, the light emitted by the light source passes through the air being tested and reaches the photo sensor. The received light intensity will be reduced due to scattering from particulates of smoke, air-borne dust, or other substances; the circuitry detects the light intensity and generates the alarm if it is below a specified threshold, potentially due to smoke. In other types, typically chamber types, the light is not directed at the sensor, which is not illuminated in the absence of particles. If the air in the chamber contains particles (smoke or dust) the light is scattered and some of it reaches the sensor triggering the alarm.

According to the National Fire Protection Association (NFPA), "photoelectric smoke detection is generally more responsive to fires that begin with a long period of soldering". Studies by Texas A&M and the NFPA cited by the City of Palo Alto, California state, "Photoelectric alarms react slower to rapidly growing fires than ionization alarms, but laboratory and field tests have shown that photoelectric smoke alarms provide adequate warning for all types of fires and have been shown to be far less likely to be deactivated by occupants."

Although photoelectric alarms are highly effective at detecting soldering fires and do provide adequate protection from flaming fires, fire safety experts and the National Fire Protection Agency recommend installing what are called combination alarms, which are alarms that either detect both heat and smoke or use both the ionization and photoelectric processes. Some combination alarms may include a carbon monoxide detection capability.

The type and sensitivity of light source and photoelectric sensor and type of smoke chamber differ between manufacturers.

Circuit diagram

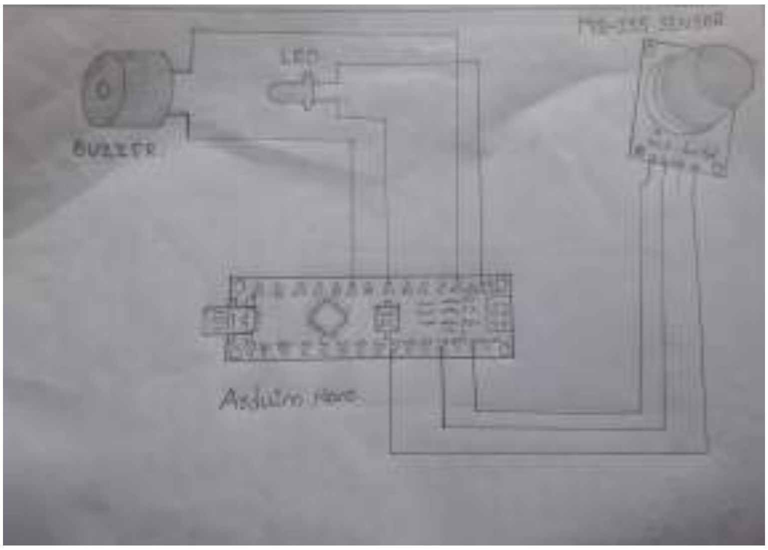


Fig- 5.2

Code

```
int redLed = 2;
Int greenLed = 3;
Int buzzer = 7;
Int smokeA0 = A5;
// your threshold value
int sensorThres = 50;
void setup() {
PinMode(redLed, OUTPUT);
pinMode(greenLed, OUTPUT);
pinMode(buzzer, OUTPUT);
pinMode(smokeA0, INPUT);
Serial.begin(9600);
}

void loop() {
int analog Sensor = analogRead(smokeA0);
Serial.print("Pin A0: ");
Serial.println(analogSensor);
// Checks if it has reached the threshold value
if (analogSensor > sensorThres)
{
digitalWrite(redLed, HIGH);
digitalWrite(greenLed, LOW);
tone(buzzer, 3000, 300);
}
else
{
digitalWrite(redLed, LOW);
digitalWrite(greenLed, HIGH);
noTone(buzzer);
}
delay(100);
}
```

Working diagram

Fig- 5.3

5.1 Types of gas and smoke detector

There are three available types of household smoke detectors — ionization, optical (photoelectric), and combined. They are very cheap and are available everywhere.

The combined detectors are effective at detecting slow-burning as well as flaming fires, both common types of fire in the home. The NFPA recommends a combination of both ionization and photoelectric technologies for maximum protection.

The devices are either battery or mains electricity-powered, or both. Some are inter-connectable so that smoke detected at one point can raise the alarm at all others, while others have additional facilities, such as emergency lights and silence buttons, for use where false alarms can be a nuisance, such as during cooking.

5.2 Gas detector

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system. This type of equipment is used to detect a gas leak or other emissions and can interface with a control system so a process can be automatically shut down. A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave. This type of device is important because there are many gases that can be harmful to organic life, such as humans or animals.

Gas detectors can be used to detect combustible, flammable and toxic gases, and oxygen depletion. This type of device is used widely in industry and can be found in locations, such as on oil rigs, to monitor manufacture processes and emerging technologies such as photovoltaic. They may be used in fire fighting.

Gas leak detection is the process of identifying potentially hazardous gas leaks by sensors. Additionally a visual identification can be done using a thermal camera These sensors usually employ an audible alarm to alert people when a dangerous gas has been detected. Exposure to toxic gases can also occur in operations such as painting, fumigation, fuel filling, construction, excavation of contaminated soils, landfill operations, entering confined spaces, etc. Common sensors include combustible gas sensors, photo ionization detectors, infrared point sensors, ultrasonic sensors, electrochemical gas sensors, and metal-oxide-semiconductor sensors (MOS sensors). More recently, infrared imaging sensors have come into use. All of these sensors are used for a wide range of applications and can be found in industrial plants, refineries, pharmaceutical manufacturing, fumigation facilities, paper pulp mills, aircraft and shipbuilding facilities, hazmat operations, waste-water treatment facilities, vehicles, indoor air quality testing and homes.

5.3 Types of gas Detector

Gas detectors can be classified according to the operation mechanism (semiconductors, oxidation, catalytic, photo ionization, infrared, etc.). Gas detectors come packaged into two main form factors: portable devices and fixed gas detectors.

Portable detectors are used to monitor the atmosphere around personnel and are either hand-held or worn on clothing or on a belt/harness. These gas detectors are usually battery operated. They transmit warnings via audible and visible signals, such as alarms and flashing lights, when dangerous levels of gas vapours are detected.

Fixed type gas detectors may be used for detection of one or more gas types. Fixed type detectors are generally mounted near the process area of a plant or control room, or an area to be protected, such as a residential bedroom. Generally, industrial sensors are installed on fixed type mild steel structures and a cable connects the detectors to a SCADA system for continuous monitoring. A tripping interlock can be activated for an emergency situation.

There are two types of detectors you absolutely need to have in your home: smoke alarms and carbon monoxide detectors. Both smoke alarms and carbon monoxide detectors can save your life, as they can detect an issue before you can. When it comes to fire and carbon monoxide, every minute matters. It’s also important to know where carbon monoxide detectors should be placed. Many smoke alarms also include carbon monoxide detectors today, but you may be wondering whether a carbon monoxide detector can detect a gas leak.

5.4 Recommended for use Industrial units and factories

A gas detector is a device which detects the presence of various gases within an area, usually as part of a safety system. Highly sensitive, they can be used to detect combustible, flammable, and toxic gases and oxygen depletion and are widely used in industry. Catalytic and infrared sensors detect combustible gases, and electrochemical and metal oxide semiconductor technologies generally detect toxic gases.

Gas detectors may be battery-operated, portable, or fixed units and work by monitoring and alerting people audibly or visibly to the presence of dangerous levels of a variety of gases. They are very efficient in confined spaces that are not continuously occupied, such as tanks, pits, vessels, and storage bins.

5.5 The Importance of Smoke Alarms

Smoke alarms are life-saving devices that are too often neglected. Many homes have one fitted but forget to test it periodically and replace the batteries yearly. Some houses don’t have any alarms installed, or do have them, but have removed the batteries. It needs to be emphasized how important it is that houses have at least one smoke alarm on each floor, and that they are kept in sound working order.

5.6 Smoke Alarm

The smoke that permeates smoke detectors is made by carbon. Americium is what detects the smoke. Smoke particles float around and then reach the inside of the smoke detector. The smoke gets near the sensor and then the electric horn is activated. When the horn is activated it's an early warning telling you to get out of the house before the fire starts all the way. If you're not sure there's a fire, go near the smoke detector to see if there is some smoke. Then tell your parents if you see smoke. You and your family should always plan a fire escape route and be prepared. You should not panic if there is a fire because panicking will make it harder to concentrate. Smoke alarms save lives. Smoke alarms that are properly installed and maintained play a vital role in reducing fire deaths and injuries. If there is a fire in your home, smoke spreads fast and you need smoke alarms to give you time to get out.

5.7 Smoke Alarm Facts and Stats

- In 2009-2013, smoke alarms sounded in more than half (53%) of the home fires reported to U.S. fire departments.
- Three of every five home fire deaths resulted from fires in homes with no smoke alarms (38%) or no working smoke alarms (21%).

- The death rate per 100 reported home fires was more than twice as high in homes that did not have any working smoke alarms compared to the rate in homes with working smoke alarms (1.18 deaths vs. 0.53 deaths per 100 fires).
- In fires in which the smoke alarms were present but did not operate, almost half (46%) of the smoke alarms had missing or disconnected batteries.
- Dead batteries caused one-quarter (24%) of the smoke alarm failures.

5.8 Smoke Alarm Safety

- A closed door may slow the spread of smoke, heat and fire. Install smoke alarms in every sleeping room and outside each separate sleeping area. Install alarms on every level of the home.
- Smoke alarms should be interconnected. When one sounds, they all sound.
- Large homes may need extra smoke alarms.
- Test your smoke alarms at least once a month. Press the test button to be sure the alarm is working.
- There are two kinds of alarms. Ionization smoke alarms are quicker to warn about flaming fires. Photoelectric alarms are quicker to warn about smoldering fires. It is best to use of both types of alarms in the home.
- When a smoke alarm sounds, get outside and stay outside.
- Replace all smoke alarms in your home every 10 years.
- Smoke alarms are not expensive and are worth the lives they can help save.
- A smoke alarm with a dead or missing battery is the same as having no smoke alarm at all. A smoke alarm only works when it is properly installed and regularly tested. Take care of your smoke alarms according to the manufacturer’s instructions.

5.9 Statistics

- There are around 500 fire-related deaths in the UK each year, and most of these happen when people are sleeping, between 12am and 6am.
- Approximately 590,000 UK house fires occur each year, with the majority caused by misused cooking appliances.
- You are 4 times more likely to die in a fire if you don’t have a working smoke alarm.
- Your home can be engulfed by flames in less than 4 minutes.
- Smoke is by far the biggest killer in household fires.

The facts are scary. You have just minutes to escape from a burning house; the smoke alarm provides the early vital warning that should give you enough time to round up your family and get out of the house. If there is no working alarm and a fire starts at the peak incidence time when you’re asleep, your chances of survival are greatly reduced. Smoke is thick, heavy and toxic and the faster you are alerted to the danger, the better your chance of survival.

5.6 HARDWARE REQUIREMENTS USED

- **ARDUINO NANO**
- **GAS SENSOR: MQ -135**
- **BUZZER ALARAM**
- **MALE & FEMALE WIRES**
- **SNAP CONNECTORS**
- **9 VOLTS BATTERY**
- **LED LIGHT**
- **CONNECTING RESISTORS**

5.7 ARDUINO NANO

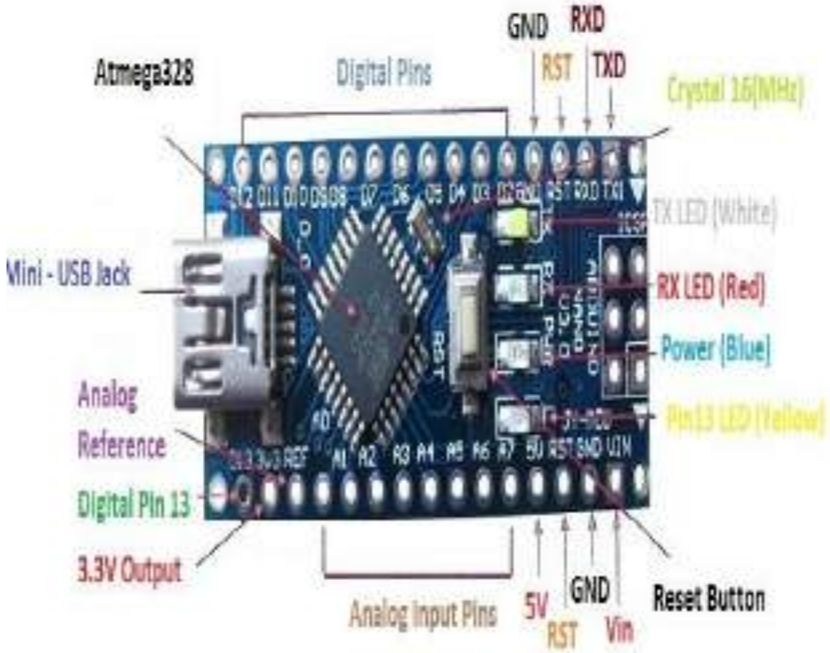


Fig- 5.4

5.8 GAS SENSOR MQ -135

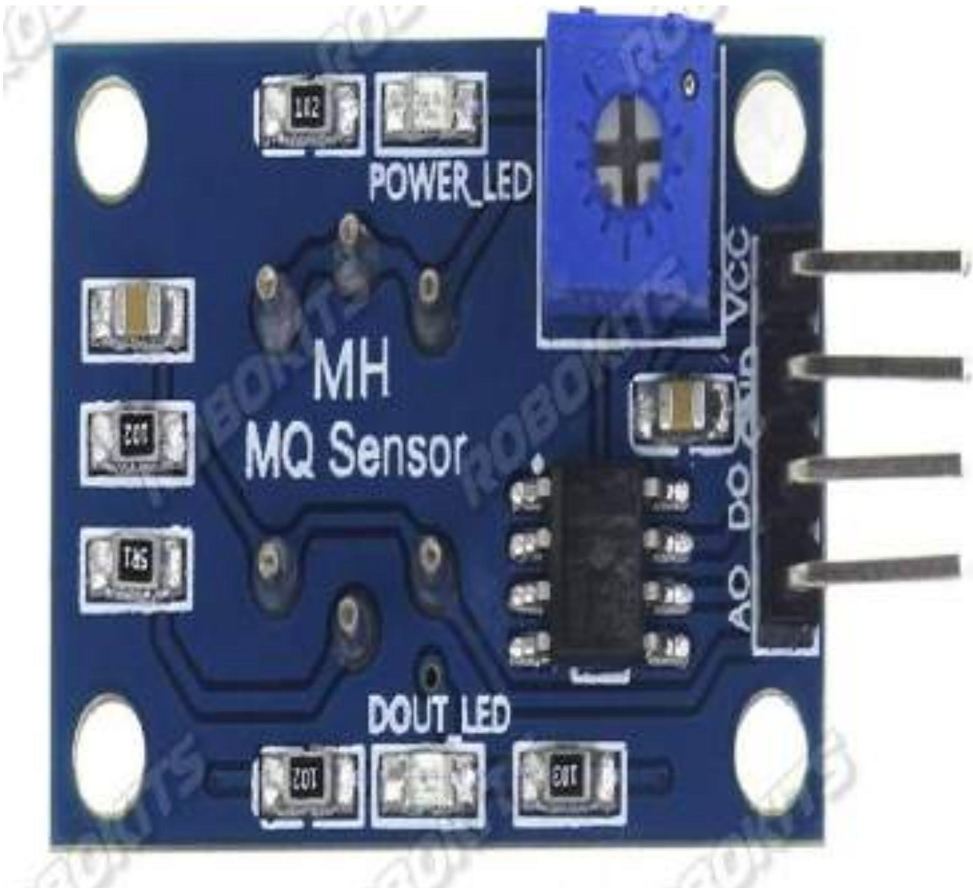


Fig-5.5

5.9 BUZZER

Fig-5.6

5.10 MALE & FEMALE WIRES

Fig-5.7

5.11 Snap connectors

Fig-5.8

5.12 volts battery

Fig-5.9

5.13 Led light

Fig-5.10

5.14 Connecting resistors

Fig-5.11

5.15 SENSOR

A device that detects the changes in electrical or physical or other quantities and thereby produces an output as an acknowledgement of change in the quantity is called as a Sensor. Generally, this sensor output will be in the form of electrical or optical signal.

Different types of sensors

We live in a World of Sensors You can find different types of Sensors in our homes, offices, cars etc. working to make our lives easier by turning on the lights by detecting our presence, adjusting the room temperature, detect smoke or fire, make us delicious coffee, open garage doors as soon as our car is near the door and many other tasks.

All these and many other automation tasks are possible because of Sensors. Before going in to the details of What is a Sensor, What are the Different Types of Sensors and Applications of these different types of Sensors, we will first take a look at a simple example of an automated system, which is possible because of Sensors (and many other components as well).

Different Types of Sensors

The following is a list of different types of sensors that are commonly used in various applications. All these sensors are used for measuring one of the physical properties like Temperature, Resistance, Capacitance, Conduction, Heat Transfer etc.

- **Temperature Sensor**
- **Eye blink sensor**
- **Proximity Sensor**
- **Accelerometer**
- **IR Sensor (Infrared Sensor)**
- **Pressure Sensor**
- **Light Sensor**
- **Ultrasonic Sensor**
- **Smoke, Gas and Alcohol Sensor**
- **Touch Sensor**
- **Color Sensor**
- **Humidity Sensor**
- **Tilt Sensor**
- **Flow and Level Sensor**

5.16 Real Time Application sensors

The example we are talking about here is the Autopilot System in aircrafts. Almost all civilian and military aircrafts have the feature of Automatic Flight Control system or sometimes called as Autopilot.

An Automatic Flight Control System consists of several sensors for various tasks like speed control, height, position, doors, obstacle, fuel, maneuvering and many more. A Computer takes data from all these sensors and processes them by comparing them with pre-designed values.

The computer then provides control signal to different parts like engines, flaps, and rudders etc. that help in a smooth flight. The combination of Sensors, Computers and Mechanics makes it possible to run the plane in Autopilot Mode.

All the parameters i.e. the Sensors (which give inputs to the Computers), the Computers (the brains of the system) and the mechanics (the outputs of the system like engines and motors) are equally important in building a successful automated system. But in this tutorial, we will be concentrating on the Sensors part of a system and look at different concepts associated with Sensors (like types, characteristics, classification etc.).

5.17 Sensor

There are numerous definitions as to what a sensor is but I would like to define a Sensor as an input device which provides an output (signal) with respect to a specific physical quantity (input).

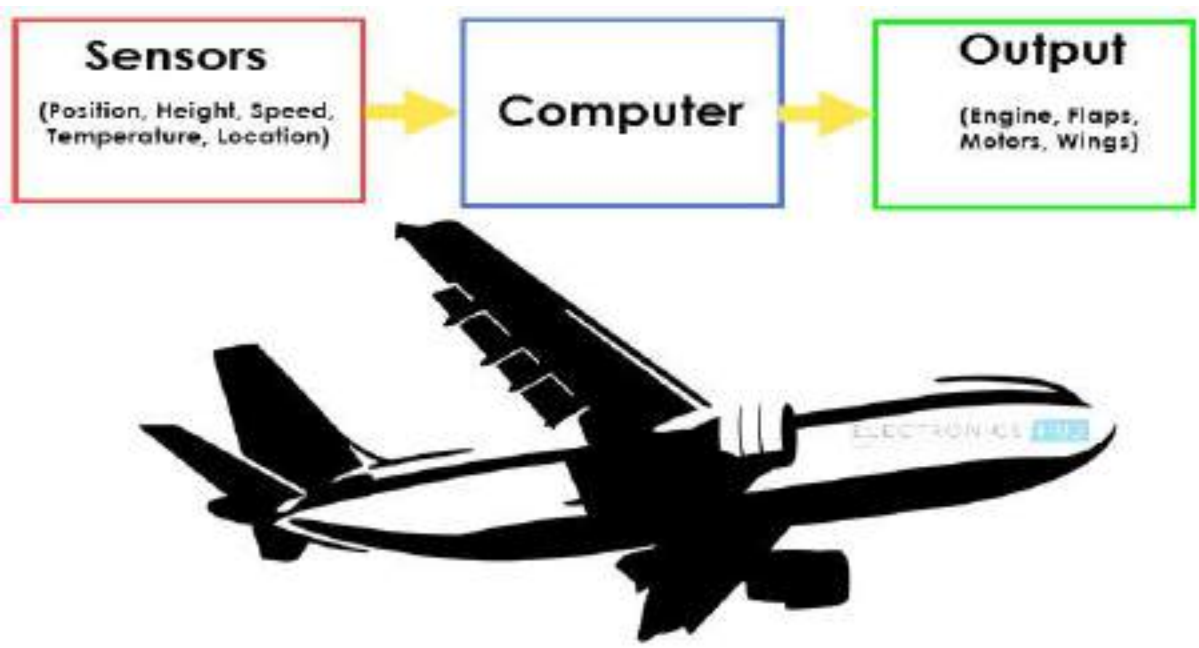


Fig- 5.12

The term “input device” in the definition of a Sensor means that it is part of a bigger system which provides input to a main control system (like a Processor or a Microcontroller).

Another unique definition of a Sensor is as follows: It is a device that converts signals from one energy domain to electrical domain. The definition of the Sensor can be understood if we take an example in to consideration the simplest example of a sensor is an LDR or a Light Dependent Resistor. It is a device, whose resistance. Varies according to intensity of light it is subjected to. When the light falling on an LDR is more, its resistance becomes very less and when the light is less, well, the resistance of the LDR becomes very high.

We can connect this LDR in a voltage divider (along with other resistor) and check the voltage drop across the LDR. This voltage can be calibrated to the amount of light falling on the LDR. Hence, a Light Sensor Now that we have seen what a sensor is, we will proceed further with the classification of Sensors.

5.18 Classification of Sensors

There are several classifications of sensors made by different authors and experts. Some are very simple and some are very complex. The following classification of sensors may already be used by an expert in the subject but this is a very simple classification of sensors.

In the first classification of the sensors, they are divided in to Active and Passive. Active Sensors are those which require an external excitation signal or a power signal. Passive Sensors, on the other hand, do not require any external power signal and directly generates output response. The other type of classification is based on the means of detection used in the sensor. Some of the means of detection are Electric, Biological, and Chemical, Radioactive etc.

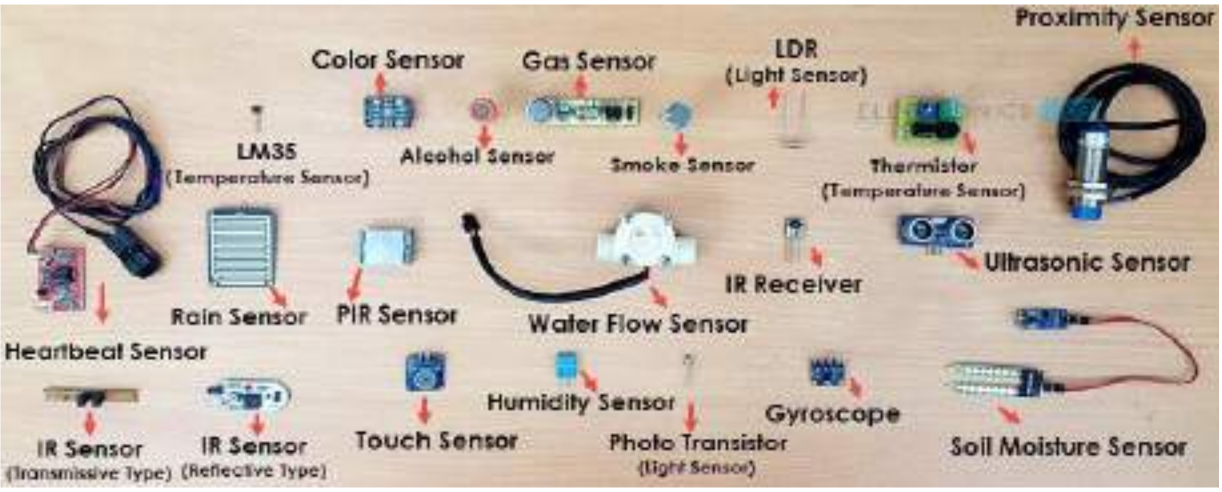


Fig- 5.13

The next classification is based on conversion phenomenon i.e. the input and the output. Some of the common conversion phenomena are Photoelectric, Thermoelectric, Electrochemical, Electromagnetic, Thermo optic, etc. The final classifications of the sensors are Analog and Digital Sensors. Analog Sensors produce an analog output i.e. a continuous output signal with respect to the quantity being measured. Digital Sensors, in contrast to Analog Sensors, work with discrete or digital data. The data in digital sensors, which is used for conversion and transmission, is digital in nature.

5.19Arduino Nano

The Arduino Nano is a small, complete, and breadboard-friendly board based on the ATmega328P (Arduino Nano 3... It has more or less the same functionality of the Arduino Duemilanove, but in a different package. It lacks only a DC power jack, and works with a Mini-B USB cable instead of a standard one.

- Arduino Nano is a small, compatible, flexible and breadboard friendly Microcontroller board, developed by Arduino.cc in Italy, based on ATmega328p (Arduino Nano V3.x) / Atmega168 (Arduino Nano V3.x).
- It comes with exactly the same functionality as in Arduino UNO but quite in small size.
- It comes with an operating voltage of 5V; however, the input voltage can vary from 7 to 12V.
- Arduino Nano Pin out contains 14 digital pins, 8 analog Pins, 2 Reset Pins & 6 Power Pins.
- Each of these Digital &Analog Pins is assigned with multiple functions but their main function is to be configured as input or output.
- They are acted as input pins when they are interfaced with sensors, but if you are driving some load then use them as output.
- Functions like pin Mode () and digital Write () are used to control the operations of digital pins while analog Read () is used to control analog pins.
- The analog pins come with a total resolution of 10bits which measure the value from zero to 5V.
- Arduino Nano comes with a crystal oscillator of frequency 16 MHz It is used to produce a clock of precise frequency using constant voltage.
- There is one limitation using Arduino Nano i.e. it doesn’t come with DC power jack, means you cannot supply external power source through a battery.

- This board doesn’t use standard USB for connection with a computer, instead, it comes with Mini USB support.
- Tiny size and breadboard friendly nature make this device an ideal choice for most of the applications where a size of the electronic components is of great concern.
- Flash memory is 16KB or 32KB that all depends on the at mega board i.e. Atmega168 comes with 16KB of flash memory while Atmega328 comes with a flash memory of 32KB. Flash memory is used for storing code. The 2KB of memory out of total flash memory is used for a boot loader.

5.20 Arduino Nano Features

- ATmega328P Microcontroller is from 8-bit AVR family
- Operating voltage is 5V
- Input voltage (Vin) is 7V to 12V
- Input/output Pins are 22
- Analog i/p pins are 6 from A0 to A5
- Digital pins are 14
- Power consumption is 19 mA
- I/O pins DC Current is 40 mA
- Flash memory is 32 KB
- SRAM is 2 KB
- EEPROM is 1 KB
- CLK speed is 16 MHz
- Weight-7g
- Size of the printed circuit board is 18 X 45mm
- Supports three communications like SPI, IIC, & USART

5.21 Arduino Nano Pin out

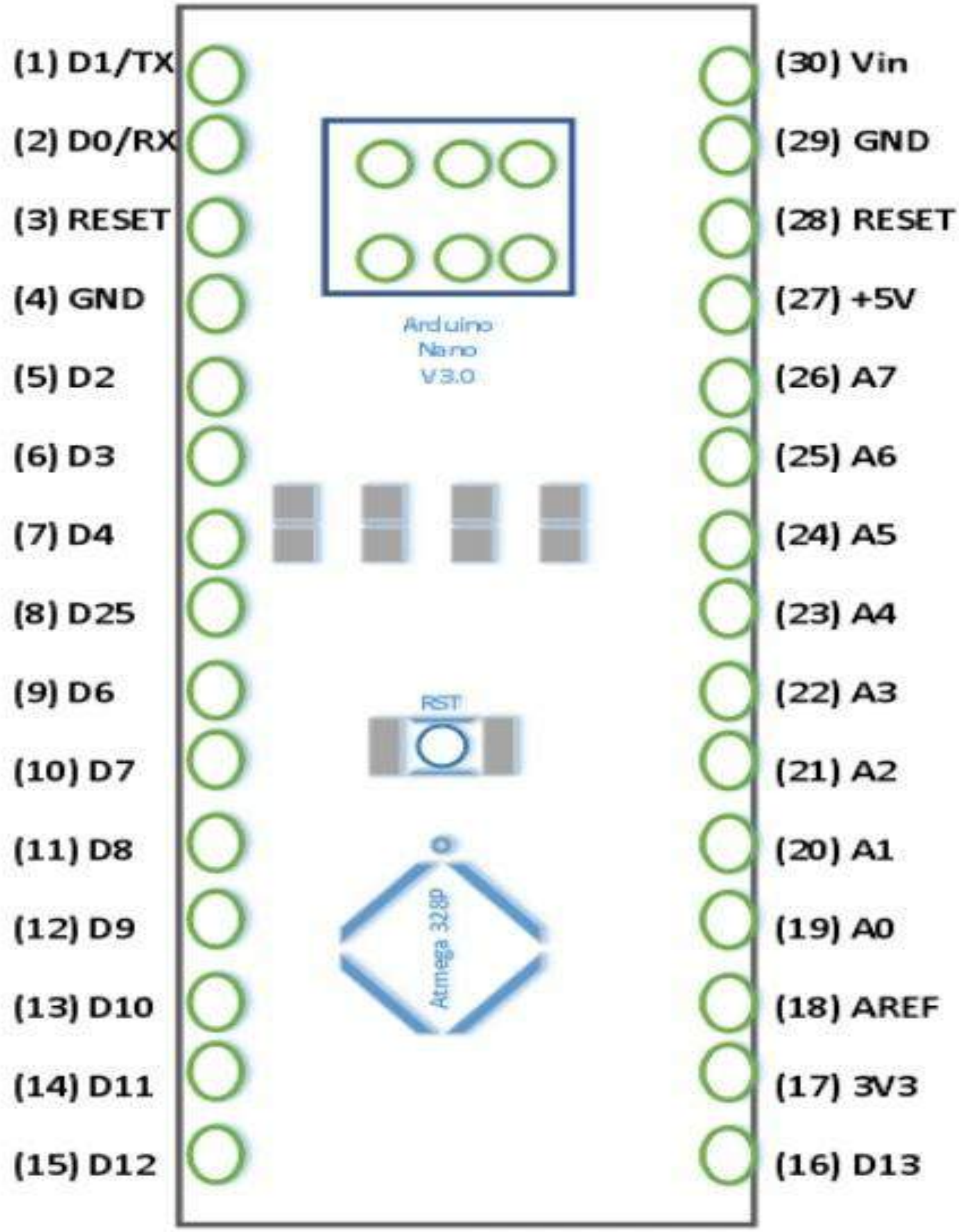


Fig- 5.14

- Power Pin (VIN, 3.3V, 5V, GND): These pins are power pins
- Analog Pins (A0-A7): These pins are used to calculate the analog voltage of the board within the range of 0V to 5V
- I/O Pins (Digital Pins from D0 – D13): These pins are used as an i/p otherwise o/p pins. 0V & 5V
- Serial Pins (TX, Rx): These pins are used to transmit & receive TTL serial data.
- External Interrupts (2, 3): These pins are used to activate an interrupt.
- PWM (3, 5, 6, 9, 11): These pins are used to provide 8-bit of PWM output.
- SPI (10, 11, 12, & 13): These pins are used for supporting SPI communication.
- Inbuilt LED (13): This pin is used to activate the LED.
- IIC (A4, A5): These pins are used for supporting TWI communication.
- AREF: This pin is used to give reference voltage to the input voltage

5.22 Difference between Arduino UNO and Arduino Nano

The Arduino Nano board is similar to an Arduino UNO board including similar microcontroller like Atmega328p. Thus they can share a similar program. The main difference between these two is the size. Because Arduino Uno size is double to Nano board So Uno boards use more space on the system. The programming of UNO can be done with a USB cable whereas Nano uses the mini USB cable. The main differences between these two are listed in the following table.

Difference-between-Arduino-UNO-and-Arduino-Nano

Specifications	Arduino Uno	Arduino Nano
Processor	ATmega328P	ATmega328P
Input Voltage	5V / 7-12V	5V / 7-12V
Speed of CPU	16 MHz	16 MHz
Analog I/O	6 / 0	8 / 0
Digital IO/PWM	14 / 6	14 / 6
EEPROM / SRAM [kB]	1 / 2	1 / 2
Flash	32	32
USB	Regular	Mini
USART	1	1

5.23 Arduino Nano Communications

The communication of an Arduino Nano board can be done using different sources like using an additional Arduino board, a computer, otherwise using microcontrollers. The microcontroller using in Nano board (ATmega328) offers serial communication (UART TTL). This can be accessible at digital pins like TX, and RX. The Arduino software comprises of a serial monitor to allow easy textual information to transmit and receive from the board.

The TX & RX LEDs on the Nano board will blink whenever information is being sent out through the FTDI & USB link in the direction of the computer. The library-like Software Serial allows serial communication on any of the digital pins on the board. The microcontroller also supports SPI & I2C (TWI) communication.

5.24 Arduino Nano Programming

The programming of an Arduino Nano can be done using the Arduino software. Click the Tools option and select the Nano board. Microcontroller ATmega328 over the Nano board comes with preprogrammed with a boot loader. This boot loader lets to upload new code without using an exterior hardware programmer. The communication of this can be done with the STK500 protocol. Here the boot loader can also be avoided & the microcontroller program can be done using the header of in-circuit serial programming or ICSP with an Arduino ISP.

5.25 Applications of Arduino Nano

These boards are used to build Arduino Nano projects by reading inputs of a sensor, a button, or a finger and gives an output by turning motor or LED ON, or and some of the applications are listed below.

- ❖ Samples of electronic systems and products
- ❖ Automation
- ❖ Several DIY projects
- ❖ Control systems
- ❖ Embedded systems
- ❖ Robotics
- ❖ Instrumentation

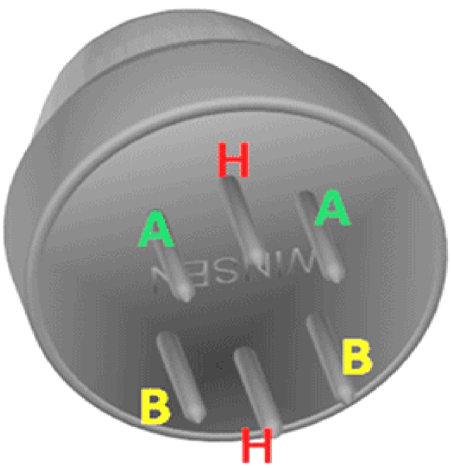
5.26 MQ135 SENSOR

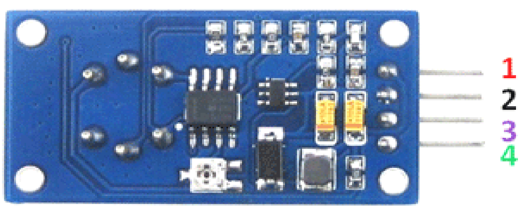
Description - Air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases.

The MQ series of gas sensors utilizes a small heater inside with an electro chemical sensor these sensors are sensitive to a range of gasses are used at room temperature. MQ135 alcohol sensor is a Sno2 with a lower conductivity of clean air. When the target explosive gas exists, then the sensor's conductivity increases more increasing more along with the gas concentration rising levels By using simple electronic circuits, it convert the charge of conductivity to correspond output signal of gas concentration

Fig- 5.15

The MQ135 Air Quality Sensor consists of small sensing material whose conductivity is lower in clean air and higher in polluted air, thus making the sensor very useful while detecting dangerous gases. The sensor ionizes the gases which come in its contact, making changes in the resistance of the sensing material.





Pin No.	Pin Name
1	Vcc(+5V)
2	Ground
3	Digital Out
4	Analog out

Fig- 5.16

Pin No:	Pin Name:	Description
For Module		
1	Vcc	Used to power the sensor, Generally the operating voltage is +5V.
2	Ground	Used to connect the module to system ground.
3	Digital Out	You can also use this sensor to get digital output from this pin, by setting a threshold value using the potentiometer.
4	Analog Out	This pin outputs 0-5V analog voltage based on the intensity of the gas.
For Sensor		
1	H –Pins	Out of the two H pins, one pin is connected to supply and the other to ground
2	A-Pins	The A pins and B pins are interchangeable. These pins will be tied to the Supply voltage.
3	B-Pins	20.A pins and B pins are interchangeable. One pin will act as output while the other will be pulled to ground.

5.27 MQ-135 Sensor Features

- Wide detecting scope
- Fast response and High sensitivity
- Stable and long life
- Operating Voltage is +5V
- Detect/Measure NH3, NOx, alcohol, Benzene, smoke, CO2, etc.
- Analog output voltage: 0V to 5V
- Digital output voltage: 0V or 5V (TTL Logic)

- Preheat duration 20 seconds
- Can be used as a Digital or analog sensor
- The Sensitivity of Digital pin can be varied using the potentiometer

5.28 Alternative MQ Gas sensors

Sensor Name	**Gas to measure**
MQ-2	Methane, Butane, LPG, Smoke
MQ-3	Alcohol, Ethanol, Smoke
MQ-4	Methane, CNG Gas
MQ-5	Natural gas, LPG
MQ-6	LPG, butane
MQ-7	Carbon Monoxide
MQ-8	Hydrogen Gas
MQ-9	Carbon Monoxide, flammable gasses
MQ131	Ozone
MQ135	Air Quality
MQ136	Hydrogen Sulphide gas
MQ137	Ammonia
MQ138	Benzene, Toluene, Alcohol, Propane, Formaldehyde gas, Hydrogen
MQ13514	Methane, Natural Gas

MQ13516	Natural gas, Coal Gas
MQ303A	Alcohol, Ethanol, smoke
MQ306A	LPG, butane
MQ307A	Carbon Monoxide
MQ309A	Carbon Monoxide, flammable gas

5.29 Selecting between sensor and module

When it comes to measuring or detecting a particular Gas the MQ series Gas sensors are the most inexpensive and commonly used ones. MQ135 is available as a module or as just the sensor alone. If you are trying to only detect (not measuring PPM) the presence of a gas then you can buy it as a module since it comes with an op-amp comparator and a digital output pin. But if you planning to measure the PPM of a gas it is recommend buying the sensor alone without module.

5.30 Where to use MQ-135 Gas sensor

The MQ-135 Gas sensors are used in air quality control equipment's and are suitable for detecting or measuring of NH3, NOx, Alcohol, Benzene, Smoke, and CO2. The MQ-135 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. If you need to measure the gases in PPM the analog pin need to be used. The analog pin is TTL driven and works on 5V and so can be used with most common microcontrollers.

5.31 Using of MQ-135 Sensors to detect gases

You can either use the digital pin or the analog pin to do this. Simply power the module with 5V and you should notice the power LED on the module to glow and when no gas it detected the output LED will remain turned off meaning the digital output pin will be 0V. Remember that these sensors have to be kept on for pre-heating time (mentioned in features above) before you can actually work with it. Now, introduce the sensor to the gas you want to detect and you should see the output LED to go high along with the digital pin, if not use the potentiometer until the output gets high. Now every time your sensor gets introduced to this gas at this particular concentration the digital pin will go high (5V) else will remain low (0V).You can also use the analog pin to achieve the same thing. Read the analog values (0-5V) using a microcontroller, this value will be directly proportional to the concentration of the gas to which the sensor detects. You can experiment with this values and check how the sensor reacts to different concentration of gas and develop your program accordingly.

5.32 Using of MQ-135 sensor to measure PPM

MQ-135 gas sensor applies SnO2 which has a higher resistance in the clear air as a gas-sensing material. When there is an increase in polluting gases, the resistance of the gas sensor decreases along with that. To measure PPM using MQ-135 sensor we need to look into the (Rs/Ro) v/s PPM graph taken from the MQ135 datasheet.

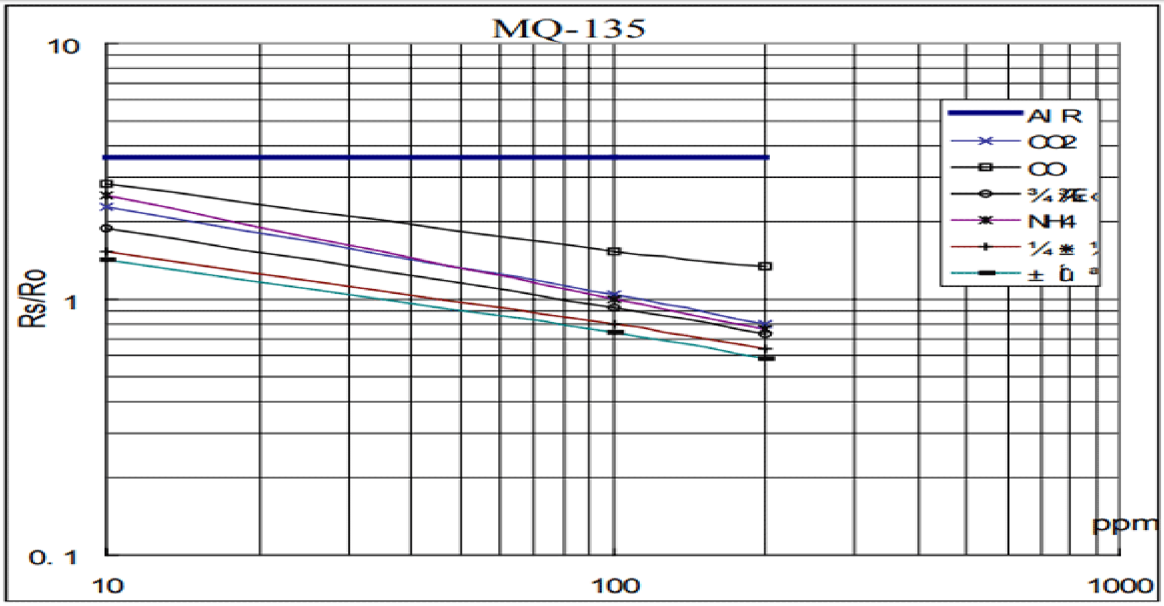


Fig- 5.16

The above figure shows the typical sensitivity characteristics of the MQ-135 for several gases. In their: Temp: 20, Humidity: 65%, O2 concentration 21%, RL=20kΩ,

Ro: sensor resistance at 100ppm of NH3 in the clean air.

Rs: sensor resistance at various concentrations of gases.

The value of Ro is the value of resistance in fresh air (or the air with we are comparing) and the value of Rs is the value of resistance in Gas concentration. First you should calibrate the sensor by finding the values of Ro in fresh air and then use that value to find Rs using the below formula:

Resistance of sensor(Rs): Rs=(Vc/VRL-1)×RL

Once we calculate Rs and Ro we can find the ratio and then using the graph shown above we can calculate the equivalent value of PPM for that particular gas.

5.33 Applications

- Used to detect leakage/excess of gases like Ammonia, nitrogen oxide, alcohols, aromatic compounds, sulfide and smoke.
- Air quality monitors.

5.34 2D model of MQ-135 Gas sensor

Use the following MQ135 sensor dimensions to create your own PCB for your application.

Description - Air quality sensor for detecting a wide range of gases, including NH3, NOx, alcohol, benzene, smoke and CO2. Ideal for use in office or factory.MQ135 gas sensor has high sensitivity to Ammonia, Sulfide and Benze steam, also sensitive to smoke and other harmful gases.

The MQ135 Air Quality Sensor consists of a small sensing material whose conductivity is lower in clean air and higher in polluted air, thus making the sensor very useful while detecting dangerous gases. The sensor ionizes the gases which come in its contact, making changes in the resistance of the sensing material.

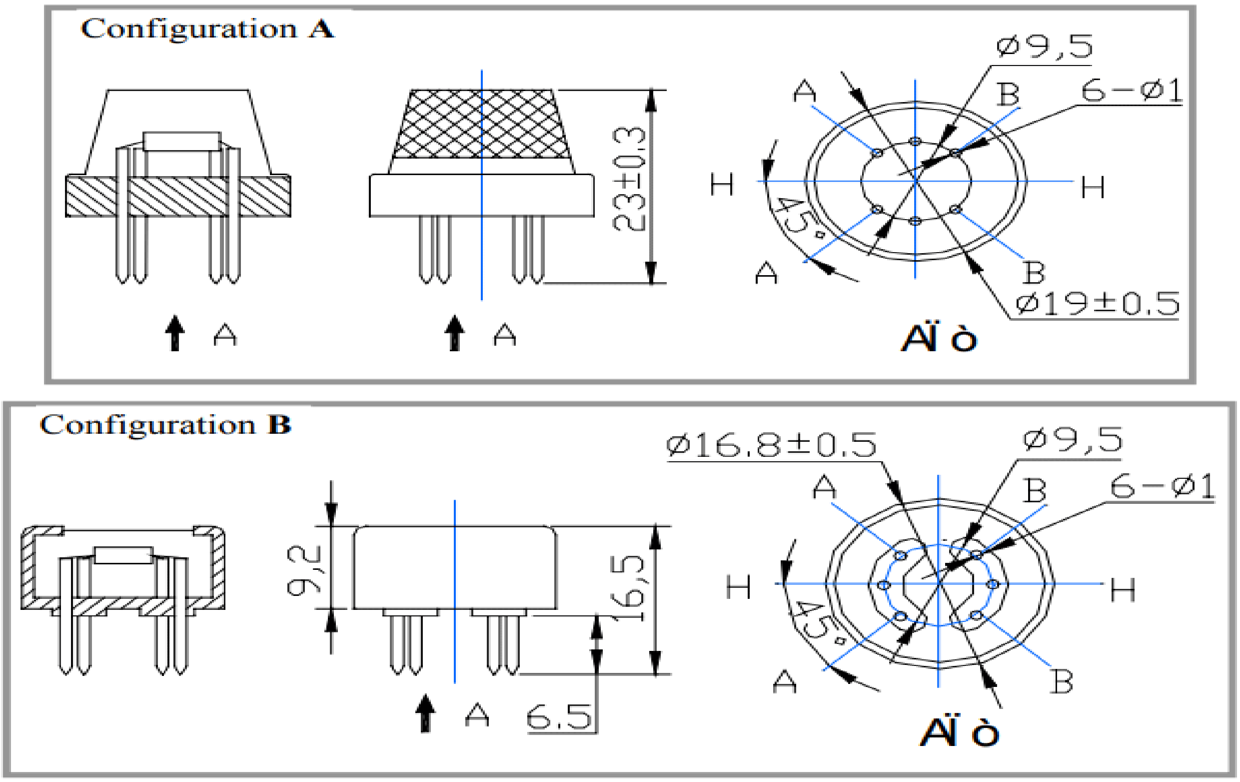


Fig- 5.17

5.35 SMOKE SENSOR

A smoke sensor is a device that sensors smoke & its level. They have been use for a long period of time. However, with the development of Iot, they are now even more effective, as they are now even more plugged into a system that immediately notifies the user about any problem that occurs in different industries.

5.36 GAS SENSOR

Gas sensor are similar to the chemical ones, but are specifically used to monitor changes of the air quality and detect the presence of various gases.

5.37 Working of smoke &gas sensor

When tin dioxide (semiconductor particles) is heated in air at high temperature, oxygen is adsorbed on the surface. In clean air, donor electrons in tin dioxide are attracted toward oxygen which is adsorbed on the surface of the sensing material. This prevents electric current flow.

In the presence of reducing gases, the surface density of adsorbed oxygen decreases as it reacts with the reducing gases. Electrons are then released into the tin dioxide, allowing current to flow freely through the sensor.

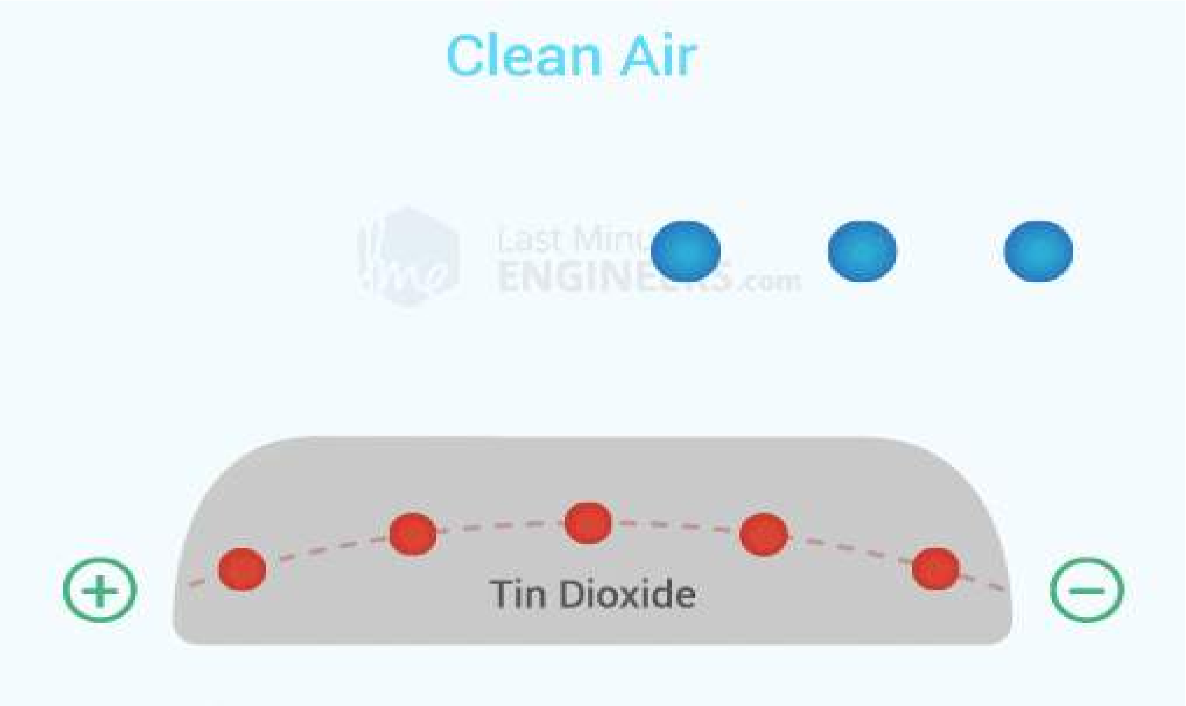


Fig-5.18

5.38 Overview – MQ135 Gas Sensor Module

Since MQ135 Gas Sensor is not breadboard compatible, we do recommend this handy little breakout board. It's very easy to use and comes with two different outputs. It not only provides a binary indication of the presence of combustible gases but also an analog representation of their concentration in air.

Fig-5.19

The analog output voltage provided by the sensor changes in proportional to the concentration of smoke/gas. The greater the gas concentration the higher is the output voltage; while lesser gas concentration results in low output voltage. The following animation illustrates the relationship between gas concentration and output voltage.

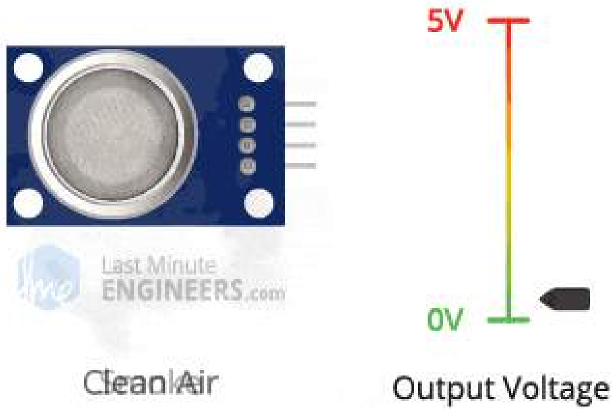


Fig-5.20

The analog signal from MQ135 Gas sensor is further fed to LM393 High Precision Comparator (soldered on the bottom of the module), of course to digitize the signal. Along with the comparator is a little potentiometer you can turn to adjust the sensitivity of the sensor. You can use it to adjust the concentration of gas at which the sensor detects it.

5.39 Calibrate MQ135 Gas Sensor Module

To calibrate the gas sensor you can hold the gas sensor near smoke/gas you want to detect and keep turning the potentiometer until the Red LED on the module starts glowing. Turn the screw clockwise to increase sensitivity or anticlockwise to decrease sensitivity.

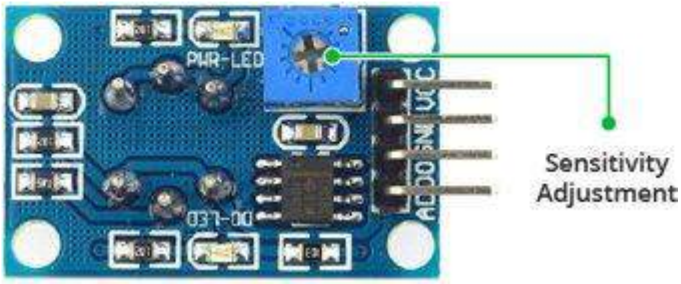


Fig-5.21

The comparator on the module continuously checks if the analog pin (A0) has hit the threshold value set by potentiometer. When it crosses the threshold, the digital pin (D0) will go HIGH and signal LED turns on. This setup is very useful when you need to trigger an action when certain threshold is reached. For example, when the smoke crosses a threshold, you can turn on or off a relay or instruct your robot to blow air/sprinkle water. You got the idea!

5.40 MQ135 Gas Sensor Module Pin out

VCC supplies power for the module. You can connect it to 5V output from your Arduino Nano. ... D0 provides a digital representation of the presence of combustible gases. A0 provides analog output voltage in proportional to the concentration of smoke/gas.

Fig-5.22

5.41 WORKING

The Arduino NANO sketch manages to read sensor data from the MQ-2 gas sensor, invoke alarm in response to intense smoke the voltage that the sensor outputs changes accordingly to the smoke/gas level that exists in the atmosphere. The sensor outputs a voltage that is proportional to the concentration of smoke/gas.

In other words, the relationship between voltage and gas concentration is the following:

- The greater the gas concentration, the greater the output voltage
- The lower the gas concentration, the lower the output voltage

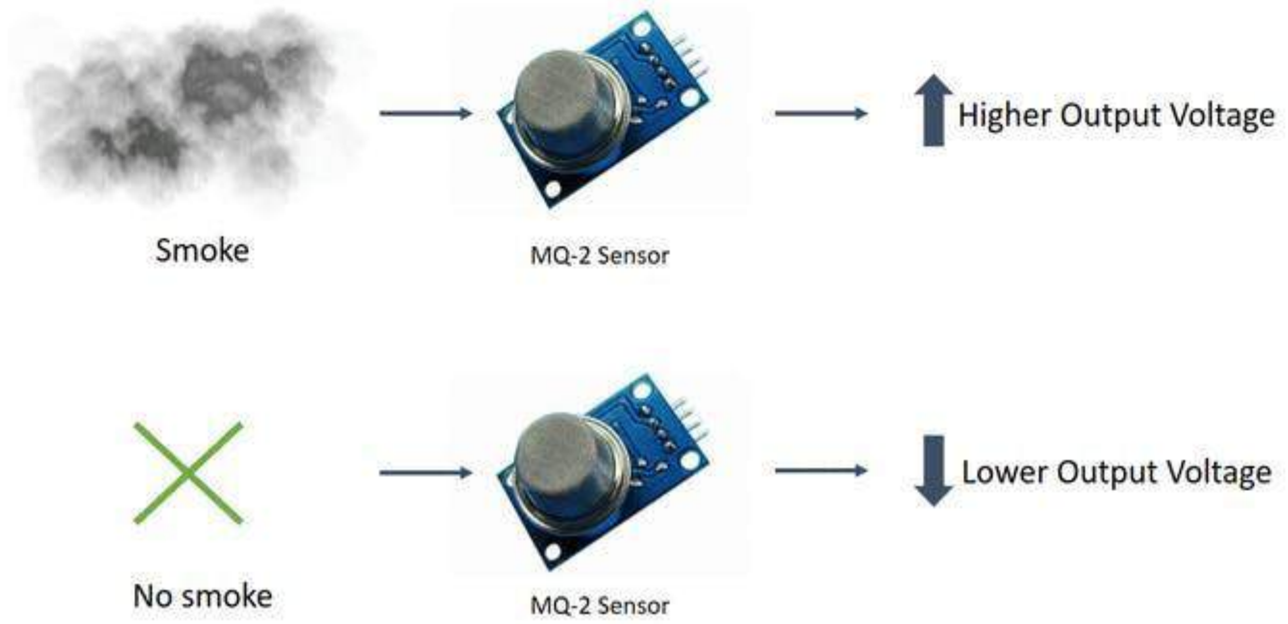


Fig-5.23 Working Mechanisms

The output can be an analog signal (A0) that can be read with an analog input of the Arduino or a digital output (D0) that can be read with a digital input of the Arduino Nano.

5.42 Pin Wiring

The MQ-135 sensor has 4 pins.

Pin-------------------------------------Wiring to Arduino Nano

A0-------------------------------------Analog pins

D0-------------------------------------Digital pins

GND-----------------------------------GND

VCC------------------------------------5V

So, before jumping into the coding part, let's check whether we've assembled all the necessary hardware components.

5.43 MQ135 Gas Sensor Working and Its Applications

Sensors are the electronic devices used for interaction with the outer environment. There are various types of sensors available that can detect light, noise, smoke, proximity etc… With the advent in technology, these are available as both analog and digital forms. Besides forming a communication with the outer environment, sensors are also a crucial part of safety systems. Fire sensors are used to detect the fire and take appropriate precautions on time. For smooth functioning of control systems and sensitive electronics, humidity sensors are used for maintaining humidity in the unit. One of such sensor used in safety systems to detect harmful gases is MQ135 Gas sensor.

5.44 MQ135 Gas Sensor

MQ135 gas sensor is an electronic sensor used for sensing the concentration of gases in the air such as LPG, propane, methane, hydrogen, alcohol, smoke and carbon monoxide.

MQ135 gas sensor is also known as Chemiresistors. It contains a sensing material whose resistance changes when it comes in contact with the gas. This change in the value of resistance is used for the detection of gas.

Fig-5.24

MQ135 is a metal oxide semiconductor type gas sensor. Concentrations of gas in the gas is measured using a voltage divider network present in the sensor. This sensor works on 5V DC voltage. It can detect gases in the concentration of range 200 to 10000ppm.

5.45 Working Principle

- This sensor contains a sensing element, mainly aluminum-oxide based ceramic, coated with Tin dioxide, enclosed in a stainless steel mesh. Sensing element has six connecting legs attached to it. Two leads are responsible for heating the sensing element; the other four are used for output signals.

- Oxygen gets adsorbed on the surface of sensing material when it is heated in air at high temperature. Then donor electrons present in tin oxide are attracted towards this oxygen, thus preventing the current flow.
- When reducing gases are present, these oxygen atoms react with the reducing gases thereby decreasing the surface density of the adsorbed oxygen. Now current can flow through the sensor, which generated analog voltage values.
- These voltage values are measured to know the concentration of gas. Voltage values are higher when the concentration of gas is high.

5.46 Applications

- These sensors are used to detect the presence of gases in the air such as methane, butane, LPG and smoke but they are unable to distinguish between gases. Thus, they cannot tell which gas it is.
- Module version of this sensor can be used without interfacing to any microcontroller and is useful when detecting only one particular gas. This can only detect the gas. But if ppm has to be calculated then the sensor should be used without module.
- This sensor is also used for Air quality monitoring, Gas leak alarm and for maintaining environmental standards in hospitals. In industries, these are used to detect the leakage of harmful gases.

5.47 CONNECTOR

MALE CONNECTOR

A male connector is a connector attached to a wire, cable, or piece of hardware, having one or more exposed, unshielded electrical terminal s, and constructed in such a way that it can be inserted snugly into a receptacle (female connector) to ensure a reliable physical and electrical connection

FEMALE CONNECTORS

A female connector is a connector attached to a wire, cable, or piece of hardware, having one or more recessed holes with electrical terminals inside, and constructed in such a way that a plug with exposed conductors (male connector) can be inserted snugly into it to ensure a reliable physical and electrical ...

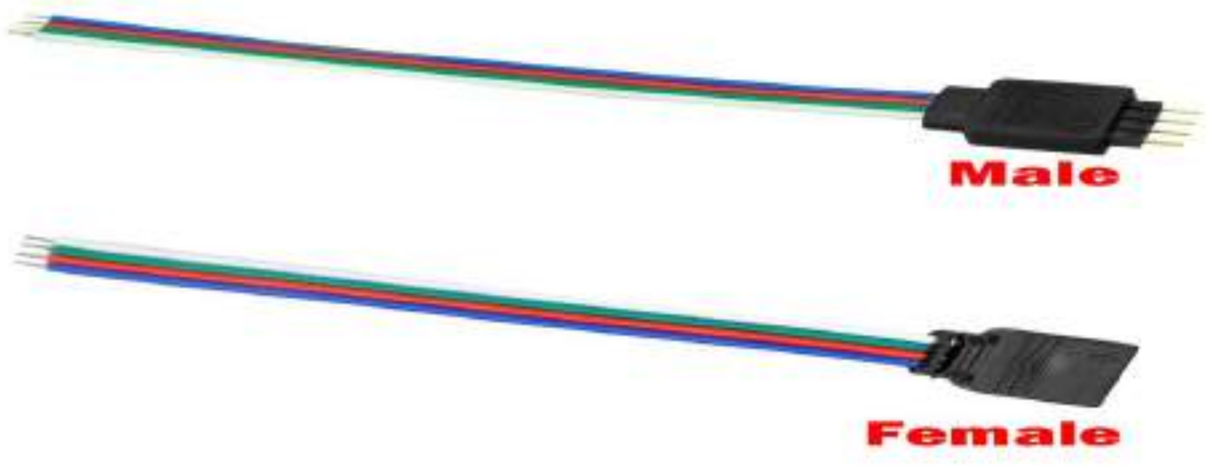


Fig-5.25

5.48 DIFFERECE BETWEEN MALE & FEMALE CONNECTORS

The difference between Male and Female connectors is simple. Just like people the Male has a sticking out "pin" which he plugs into something. The Females on the other hand have a "hole" in which to receive something, usually a "pin"!

5.49 REASONS FOR CALLING AS MALE & FEMALE CONNECTORS

The analogy of the plugs being male and female is obvious: the male has a sticking out part that goes inside the hole of the female part. ... The analogy of the plugs being male and female is obvious: the male has a sticking out part that goes inside the hole of the female part.

5.50 BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

5.51 Advantages of piezoelectric buzzers

1. Piezoelectric buzzers are more widely used

   In terms of the scope of use, this kind of buzzer can be used in the following products, such as gas alarm, burglar alarm, speed alarm, navigator, car audio and car equipment, but also can be used in various household appliances, such as air conditioning, microwave oven, microcomputer control, toys, and teaching appliances.

2. It can make more sounds

   Because the piezoelectric buzzer is controlled by electronic circuits, it can produce a variety of pleasant sounds and analog sound, intermittent sound. Pure timbre not easily covered by noise.

3. It saves power

   Piezoelectric buzzer is driven by voltage, so the current consumption is 20mA not more than 100mA

Fig-5.26

5.52 BATTERIES

This is general 9v Battery for all your project and application needs. Whether you need a new battery for your applications like a Flashlight, Portable Phone Charger, Wireless doorbell, Wireless audio transmitter-receiver systems or your kid's toys, etc. or even if you are looking for a long-lasting, reliable option for your sensor devices like a smoke detector, everyone needs a good 9-volt battery every once in a while. It's also a great idea to keep extra 9 volt batteries around in case of an emergency. That's why we've found one of the best 9-volt batteries available.

Batteries are used either as sole or as backup power for residential smoke detectors. Mains-operated detectors have disposable or rechargeable batteries; others run only on 9-volt disposable batteries. When the battery is exhausted a battery-only smoke detector becomes inactive; most smoke detectors chirp repeatedly if the battery is low. It has been found that battery-powered smoke detectors in many houses have dead batteries. It has been estimated that in the UK over 30% of smoke alarms may have dead or removed batteries. In response public information campaigns have been created to remind people to change smoke detector batteries regularly. In Australia, for example, a public information campaign suggests that smoke alarm batteries should be replaced on April Fools' Day every year. In regions using daylight saving time, campaigns may suggest that people change their batteries when they change their clocks or on a birthday.

Some mains-powered detectors are fitted with a non-rechargeable lithium battery for backup with a life of typically ten years, after which it is recommended that the detector be replaced. User-replaceable disposable 9-volt lithium batteries, which last at least twice as long as alkaline batteries are available.

The US National Fire Protection Association recommends that home-owners replace smoke detector batteries with a new battery at least once per year, when it starts chirping (a signal that the battery is low), or when it fails a test, which the NFPA recommends to be carried out at least once per month by pressing the "test" button on the alarm.

Fig-5.27

5.53 Safety Precautions

Avoid short-Circuit the battery terminals.

Do not put it beside the high-temperature condition.

Don’t throw it into the fire or Water after use

Features

- Constant 9V Output till lasts.
- Metal Jacket Body.
- Good Built Quality and hence Leak proof.
- Easy to install and Replace.
- Corrosion frees Connector Point for long-term use.
- 0% Mercury and Cadmium. Environment-friendly OEM Compatible.

5.54 Advantages of batteries

- In a traditional solar power setup, you'd normally have the solar panels on your roof and your home backed up to the grid. This means that if you're not producing enough energy from your own solar panels, you'll still have power fed to your home from the grid. On the other hand, if you make more power than you consume, you'll generally be able to sell the excess back to the grid, meaning your electricity bills will sometimes be credited or discounted.
- However these fees in selling back to the grid have changed quite substantially over the years and can change at any time. Depending on your location, you may find the sell-back rate varies from another area, which doesn't seem fair at all. It's the same sun after all, isn't it? Residential battery storage means that you can control and store all of your excess power. If you have a solar panel system that's giving you more power than what you need to use, you can use these batteries.
- This is especially useful if you live in an area where your local grid power can sometimes be unstable, or if your area has encountered natural conditions that have left the power down for a few hours or days. Food will go off if you don't have sufficient cooling coming from your fridge, and of course you're left with a very inconvenient wait while your power supply is back up and running. If you have solar panels you may be able to survive until your power runs out and the grid takes over. However if the grid is down then you're left with no power once again. Having the battery backup means that in a time when all power isn't working or available, as long as there is power left in your batteries you can continue using your home's electricity.
- Get power even with no grid connection there are some areas in rural Australia where there may not be access to a grid connection.
- Reduce your carbon footprint removing your home completely off the grid and making it self-sufficient is a great way to reduce your carbon footprint. It used to be seen that 'being green' was not a reliable way of making your way through your day, especially if it came to energy sources. Newer technologies and tried and tested products have now meant that greener options like the battery backup system to your solar power are both earth-friendly while still being reliable.

5.55 SNAP CONNECTORS

The Snap connector is for connecting 9V Batteries. This is a T-type connector which means the wires are perpendicular to the batteries. This can be used with many projects connecting to 9V Battery source that allows portability without the power outlets and cables holding you back!

Fig-5.28

Features

- Excellent material.
- Fine workmanship.
- It is an environmental 9V battery buckle.
- T- Fonts, with red and black connecting lines.
- Save power and protect the environment.
- Good electrical conductivity and comfortable sense of touch.

5.56 LED LIGHTS

A light-emitting diode (LED) is a semiconductor light source that emits light when current flows through it. Electrons in the semiconductor recombine with electron holes, releasing energy in the form of photons. The color of the light (corresponding to the energy of the photons) is determined by the energy required for electrons to cross the band gap of the semiconductor. White light is obtained by using multiple semiconductors or a layer of light-emitting phosphor on the semiconductor device.

Fig-5.29

Appearing as practical electronic components in 1962,the earliest LEDs emitted low-intensity infrared light. Infrared LEDs are used in remote-control circuits, such as those used with a wide variety of consumer electronics. The first visible-light LEDs were of low intensity and limited to red. Modern LEDs are available across the visible, ultraviolet, and infrared wavelengths, with high light output.

Early LEDs were often used as indicator lamps, replacing small incandescent bulbs, and in seven-segment displays. Recent developments have produced high-output white light LEDs suitable for room and outdoor area lighting. LEDs have led to new displays and sensors, while their high switching rates are useful in advanced communications technology.

LEDs have many advantages over incandescent light sources, including lower energy consumption, longer lifetime, improved physical robustness, smaller size, and faster switching. LEDs are used in applications as diverse as aviation lighting, automotive adlamps, advertising, general lighting, traffic signals, camera flashes, lighted wallpaper, horticultural grow lights, and medical devices.

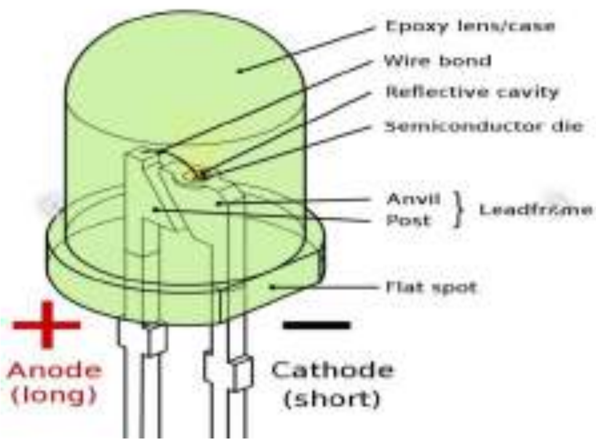


Fig-5.30

Light-emitting diode (LED)

The current in an L*ED* or other diodes rises exponentially with the applied voltage (see Shockley diode equation), so a small change in voltage can cause a large change in current. Current through the LED must be regulated by an external circuit such as a constant current source to prevent damage. Since most common power supplies are (nearly) constant-voltage sources, LED fixtures must include a power converter, or at least a current-limiting resistor. In some applications, the internal resistance of small batteries is sufficient to keep current within the LED rating.

More Light, Less Heat

Light-emitting diodes (LED) are semiconductors. As electrons pass through this type of semiconductor, it turns into light. Compared to incandescent and CFL bulbs, LED lights are more efficient at turning energy into light. Therefore, less of the energy radiates from the bulb as heat. This is why LED bulbs are cooler during operation than incandescent and CFL bulbs

Fig-5.31

Features of led

1) Environmentally Friendly

LED lighting is non-toxic and contains no mercury, lead or cadmium, and is recyclable

2) Energy Efficient

Immediate reduction of power consumption from much lower wattage requirements = lower utility bills.

3) Maintenance & Safety

Reduced recycling costs required to dispose of hazardous bulbs and ballast. Better color rendering for security cameras compared to low-pressure sodium lighting.

4) Durable Quality

LEDs are extremely durable and built with sturdy components that are highly rugged and can withstand even the roughest conditions.

5) Design Flexibility

Individual LEDs can be dimmed, resulting in a dynamic control of light, color and distribution.

6) Save Money, Use LED Lighting

Over the lifetime of one LED light, you will save $265 or more on your electricity cost alone. Image the savings if every light in your home was an LED light

5.57 RESISTOR CONNECTORS

A resistor is a passive two-terminal electrical component that pelmets electrical resistance as a circuit element. In electronic circuits, resistors are used to reduce current flow, adjust signal levels, to divide voltages, bias active elements, and terminate transmission lines, among other uses. High-power resistors that can dissipate many watts of electrical power as heat may be used as part of motor controls, in power distribution systems, or as test loads for generators. Fixed resistors have resistances that only change slightly with temperature, time or operating voltage. Variable resistors can be used to adjust circuit elements (such as a volume control or a lamp dimmer), or as sensing devices for heat, light, humidity, force, or chemical activity.

Resistors are common elements of electrical networks and electronic circuits and are ubiquitous in electronic equipment. Practical resistors as discrete components can be composed of various compounds and forms. Resistors are also implemented within circuits. The electrical function of a resistor is specified by its resistance**:** common commercial resistors are manufactured over a range of more than nine orders of magnitude. The nominal value of the resistance falls within the manufacturing tolerance, indicated on the component.

Fig-5.32

5.58 Advantages of connection of resistors

- To control the current in a circuit, series connection is useful. On connecting the resistors in series the total circuit resistance increases and thus the current decreases.
- Damage of electrical appliance and short circuit can be prevented by connecting the fuse in series with the mains as well as the electrical appliance.
- Resistors are very cheap. Hence, it is easy to replace them. Resistors do not depend on the external source of voltage. Hence, external voltage or energy is not needed for operating the resistors.

5.59 Factors of resistors

- The type of material of which the resistor is made.
- The length of the resistor.
- The thickness of the resistor.
- The temperature of the conductor.

6. Conclusion

Overall the project was successful. The milestones and deliverables were done on time and within the schedule of the original Gantt chart. The performance of the project met the original technical problem, which was to build a circuit that would sound an alarm when the heat in the atmosphere reaches a hazardous temperature. Also the project was well under the overall project cost projected, making the project a good product since the application was successfully demonstrated and the circuit price was reasonable.

Firefighters are sworn to protect and serve the people in their community. Home safety visits are a powerful and effective tool to protect and serve. When you respond to a fire and the people are waiting for you outside, they are safe and you and the other firefighters are safer too. Remember, every home you go into represents a family that potentially could be saved from injury or death from a fire or accident. Understand that each home safety visit is unique and will require you to address issues that are particular to the residents' needs. When you leave a home, make sure that you left it equipped with the tools needed for that family to effectively reduce the likelihood of a fire or fire injury. And remember to take all your trash with you. Residents really appreciate this. Take the empty smoke alarm boxes, leaving the instruction manual with the residents. There have been rare reports of residents attempting to return smoke alarms in the original packaging for a refund.

Smoke detectors are great because they save lives. You should place a smoke detector at least 6 to 12 inches away from a wall. Smoke detectors should always be in a house or an apartment. There are different shapes of smoke detectors, but the ones that are a circle shape are those that are in most homes. There are also smoke detectors shaped as noses, to smell for smoke. There should be at least 2 or 3 smoke detectors in your home. You should install a smoke detector on every floor of a house. Always have a smoke detector in your home for your own safety.

The main objective of this project has been to design a circuit that detects smoke and consequently triggers an alarm. This objective was met since the systems works effectively. This system can be of great in domestic as well as industrial settings to detect smoke and alert people on an impending fire since smoke is a precursor for fire, instead of relying on heat/temperature sensors which sounds alarm when the fire has already started. This can go a long way in helping to save human life. This system can also be used to detect and deter smokers in areas where smoking is prohibited. The cost of implementing this system is relatively low since the components used are relatively cheap and are easily available in the market. The single microcontroller can be used to interface several sensors with alarms located in different locations as long as more pins are freed for multiple inputs multiple outputs.

This system comes with a power supply that can be directly plugged to the mains (240V AC) source and give the appropriate operating voltage.

Human safety is a very crucial aspect in both domestic and industrial setting hence use of smoke sensors is inevitable in addition to other more sophisticated security systems.

This system should be placed in a cool and dry place in order to ensure a longer life span. It should also be placed in a high place in the room and in the direction of the window where there is most likely to be the direction of the wind to facilitate the contact of the sensor with the smoke. The visual alarms should be positioned a few meters above the ground on an easily visible place. The audio alarm should be as well positioned in a place that its alarm can be easily heard.

Lastly, the method of relaying the alarm remotely has not been explored in this project due to time constraint. GSM and GPS modules can be employed in this case to automatically send a message to a control room to notify operator on the presence of smoke and the exact location of smoke.

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A PROJECT REPORT
On
E-LIBRARY MANAGEMENT SYSTEM

A Project Report submitted in partial fulfilment of requirement
for the award of the Degree of Bachelor of Science
B.Sc. Computer Science

Submitted by

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2021-2022

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CERTIFICATE

This is to certify that the Project on "**E-LIBRARY MANAGEMENT SYSTEM**" was taken up by students of III.B.Sc (Computer Science) under the able guidance of Mrs.N.NagaSubrahmanyeswari, Department of Computer Science, A.S.D GOVT. DEGREE COLLEGE FOR WOMEN (A), Jagannaickpur,Kakinada. The project work is completed in a systematic way.

N.N.S. Eswari
Project Guide 18/6/22
&
Head of the Department

Principal 18/6/22

External Examiner 30/6

A PROJECT REPORT
On

EYE BLINK SPECTS

A Project Report submitted in partial fulfilment of requirement
for the award of the Degree of Bachelor of Science
B.Sc. Computer Science

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CERTIFICATE

This is to certify that the project on "EYE BLINK SPECTS" was taken up by students of B.SC (Computer science) under the able guidance of Mrs.**N.NagaSubrahmanyeswari** ,Department of computer science , **A.S.D GOVT DEGREE COLLEG FOR WOMEN(A)**, Jagannaickpur, Kakinada . The project work is completed by systematic way.

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Project Guide
&
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A PROJECT REPORT
ON
SMART STICK

స్త్రీవిద్యాప్రవర్ధతాం

A project report submitted in partial fulfillment of requirement
for the award of the degree of Bachelor of Science
B.Sc. Computer Science

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2021-2022

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A PROJECT REPORT
On

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A Project Report submitted in partial fulfilment of requirement
for the award of the Degree of Bachelor of Science
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A PROJECT REPORT

ON

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Index

ABSTRACT

ABSTRACT

The main aim of the project is to implement a simple method of detecting the obstacle by using an ultrasonic sensor that can detect an object with in a maximum range about 2 meters. As, blind people can’t see, they face many problems while doing their daily life routines. This project will help the blind people and people with vision related problems to live their life freely. The Smart Stick has several features that surely can help this kind of people to detect the obstacles in an easier manner. The user just need to use the stick which is embedded with Ultra sonic sensor used to detect the obstacles. This stick detects the objects which are in the way and gives response to the user through a beep sound with the help of Arduino.

INTRODUCTION

CHAPTER 1

INTRODUCTION

1.1 Smart Stick

The smart blind stick for the blind as the name suggests is a device for the visually impaired to guide the user to respective destination and avoiding to collide with the obstacles.it uses two ultrasonic sensors HC SR 04 to detect the depth below or the obstacles in between.

1.2 Introduction

Nowadays, visually impaired person suffer from serious visual impairments preventing them from travelling independently. Accordingly, they need to use a wide range of tools and techniques to help them in their mobility. One of these techniques is orientation and mobility specialist who helps the visually impaired and blind people and trains them to move on their own independently and safely depending on their other remaining senses. Recently, many techniques have been developed to enhance the mobility of blind people that rely on signal processing and sensor technology.

According to the literature, the mainly classified into two major aspects: sonar input (infrared signals, or ultrasonic signals). The way these devices operate just like the radar system that uses ultrasonic fascicle or sonar to detect the obstacle of fixed and moving objects. The distance between the person and the obstacles is measured by the time of the wave travel. However, all existing systems inform the blind of the presence of an object at a specific distance in front of or near to him. Information about the object characteristics can create additional knowledge to enhance space manifestation and memory of the blind. To overcome the abovementioned limitations, this work offers a simple, efficient, configurable electronic guidance system for the blind and visually impaired persons to help them in their mobility regardless of where they are, outdoor or indoor.

The originality of the proposed system is that it utilizes an embedded vision system of three simple ultrasonic sensors and brings together all reflective signals in order to codify an obstacle through PIC microcontroller (Arduino Uno R3).

1.3 Objective

A. To develop a prototype hardware for modern blind stick.

B. To help the blind people navigate the route at their best.

C. To reduce the risk of injuries and lost for the visually impaired person.

D. To creating a suitable software for the visually impaired person.

1.4 Problem Statement

a. Blind people can't easily recognize obstacles or stairs while using normal blind stick.

b. No safety features on the normal blind stick.

c. Can't locate the location of the normal blind stick user when they are having an emergency problem or lost in a public area.

1.5 Significance of Project

- To prevent and reduce the risk of injuries and lost of the visually impaired person.

1.6 Scope of Project

- Visual impaired person that having trouble to navigate.

1.7 Overview

The purpose of this project is to detecting the obstacle and route by using ultrasonic sensor that can detect a stair with maximum range about 2 meters. With our idea, we want to help this kind of people to live their life freely. This modern blind stick have a several feature that surely can help this blind people to navigate and detect an obstacle that surely can make their life routines easier. The user just need to use the blind the normal blind stick, the different is, visually impaired person can detect a stair more faster and easily.

1.8 IOT Definition

The Internet of things is a system of interrelated computing devices, mechanical and digital machines are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

The definition of the Internet of things has evolved due to the convergence of multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), and others all contribute to enabling the internet of things. In the consumer market, technology is most synonymous with products pertaining to the concept of the “smart home”, covering devices and appliances(such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers.

The Internet of things is an important part of the new generation of information technology. As the name suggests, “the Internet of Things” are the things those connected to each other via the Internet. The Internet of things come into existence when multiple technologies, real-time analytics, machine learning, commodity sensors, and embedded systems came into existence.

It has two parts, first, the core and foundation of the Internet of things is the Internet, which is a global network that connects millions of devices each other. For example, the Facebook social media hosted on the server of Facebook (company) servers but you can load and use it on your local smartphone or computer using the worldwide network called the Internet. Second is Things (object or devices) extends and extends to any item used to exchange and communicate using the Internet. Therefore, the definition of the Internet of Things is it a network of multiple devices such as Physical devices, home appliances, Vehicle and other embedded devices those communicate each other to connect and collect data using different mediums such as infrared sensor, radio frequency identification, laser scanner, global positioning system, and other information equipment.

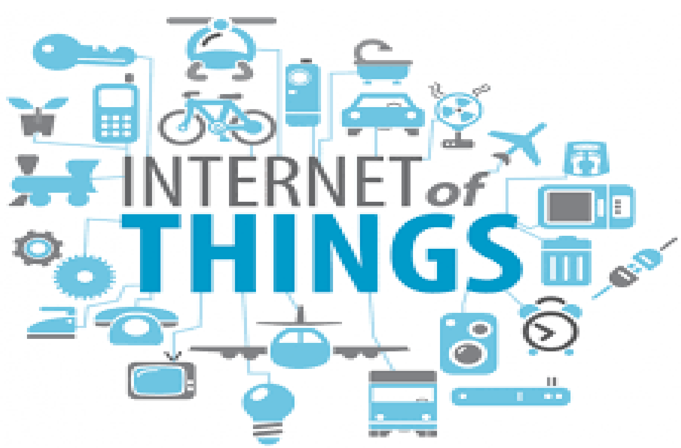


Fig 1.1 Internet of Things

1.8.1 Examples of the Internet of things

For example, Smart homes, this concept comes under the IOT with a sense of Home automation. As the IOT becomes more mature your all home appliances become enough smart those can save energy by automatically turning theme selves on or off when they are not it use. In the Medical world, different sensors used in different applications such as heart rate monitor to collect the data in order to analyze, research and monitor them to provide smart healthcare system. For example pacemakers, electronic wristbands, or advanced hearing aids.

Another example: Suppose, in a hot day of the summer, you are coming back to your home from office but before reached; you want that your AC should get ON and start cooling the room. So, when you will reach you can easily relax. In this scenario, the AC is connected to the Internet and can control it remotely.

Applications:

Internet of things applications promise to bring immense value into our lives. With newer wireless networks, superior sensors and revolutionary computing capabilities, the Internet of things could be the next frontier in the race for its share of the wallet.

- Wearable's
- Smart Home Applications
- Health Care
- Smart Cities
- Agriculture
- Industrial Automation

Transportation

The IoT can assist in the integration of communications, control, and information processing across various Transportation systems. Application of the IoT extends to all aspects of transportation systems (i.e. the vehicle, the infrastructure, and the driver or user). Dynamic interaction between these components of a transport system enables inter- and intra-vehicular communication, smart traffic control, smart parking, electronic toll collection systems, logistics and fleet management, vehicle control, safety, and road assistance.

Manufacturing

The IoT can connect various manufacturing devices equipped with sensing, identification, processing, communication, actuation, and networking capabilities. Network control and management of manufacturing equipment, asset

and situation management, or manufacturing process control allow IoT to be used for industrial applications and smart manufacturing. IoT intelligent systems enable rapid manufacturing and optimization of new products, and rapid response to product demands.
Digital control systems to automate process controls, operator tools and service information systems to optimize plant safety and security are within the purview of the IoT. IoT can also be applied to asset management via predictive maintenance, statistical evaluation and measurements to maximize reliability. Industrial management systems can be integrated with smart grids, enabling energy optimization. Measurements, automated controls, plant optimization, health and safety management, and other functions are provided by networked sensors.

In addition to general manufacturing, IoT is also used for processes in the industrialization of construction.

LITERATURE REVIEW

CHAPTER 2

LITERATURE REVIEW

Currently there are thousands of blind people all over the globe. These include people from low sight-seeing to complete lost of visual. They find it very difficult while crossing the road or reaching to their respective destination with the help any other individual. The traditional stick cannot help to detect the obstacles in front in the way. It is outdated. Hence there is a need to update it using today's technology.

The Technology

The smart stick for the blind as the name suggests is a device for the visually impaired to guide the user to respective destination and avoiding to collide with the obstacles. It uses two ultrasonic sensors HC SR04 to detect the depth below or the obstacles in between. Along with that it uses Arduino as the main controller.

2.1 Smart Walking Stick Using Ultrasonic Sensors and Arduino.

In this Smart stick there is a sensor which senses the walls from 1 or half meter range then this stick makes buzz sound. This Smart Stick warns the blind person that there is an obstacle or wall in-front of him/her. Then that person will be warned from wall.

The main objective of the project is to help blind people to walk with ease and to be warned whenever their walking path is obstructed with a stair. As a warning signal via buzzer, whose frequency of beep changes according to the distance of the object. The closer the distance of obstruction, the more will be the buzzer beep frequency.

2.2 Radio frequency identification (RFID) Tags.

RFID tags are a type of tracking system that uses radio frequency to search, identify, track, and communicate with items and people. Essentially, RFID tags are smart labels that can store a range of information from serial numbers, to a short description, and even pages of data. Some RFID tags include cryptographic security features for a high level of verification and authentication. RFID tags are usually identified by their radio frequencies: low frequency (LF), high frequency (HF), and ultra-high frequency (UHF).

RFID tags contain an integrated circuit and antenna which transmit data to the RFID reader (also called an interrogator). The reader then converts the radio waves to a more usable from of data. Information collected from the tags is then transferred through a communications interface to a host computer system, where the data can be stored in a database and analyzed at a later time.

The most common use of RFID tags is in identification badges for access control. The badge only needs to be held close to the reader to authenticate the holder.

- LF systems have a range between 30 and 300 KHz and a read range up to 10 cm. These systems are more frequently used in applications like access control and livestock monitoring.

- HF systems have a range between 3 and 30 MHz and a read range from 10 cm to 1 m (3 ft). These systems are commonly used for electronic tickets, payments, or user experience applications.

- UHF systems have a range between 300 MHz and 3 GHz and a read range up to 12 m (39 ft). These are the systems most commonly used in retail inventory tracking, parking garages, door access, and asset management.

2.2.1 Passive vs. Active RFID Tags

There are two types of RFID tags — passive and active. Passive RFID tags are the most common; they do not require a direct line of sight to a reader but do have a much shorter read range, and are smaller in size and lightweight.

2.2.2 Passive RFID tags are ideal for:

- Supply chain and inventory management
- Asset and personnel tracking
- Logistics
- Industrial and manufacturing
- Brand protection and anti-counterfeiting
- Real-time location systems (RTLS) using 3D orientation insensitive design
- Gate and perimeter access control
- Pharmaceutical and healthcare
- Entertainment and travel

- Apparel and retail

Active RFID Tags are less common and require their own transmitter and power source. These tags tend to be bulkier, rugged, durable, and more expensive. An example of an active RFID tag is a beacon used for RTLS, constant medical monitoring, or theme park attendance.

2.2.3 Relation between RFID and IOT

In simple words, the relation between RFID and IOT can be defined and formed if we connect RFID tags to our daily life products, then they will get ambient intelligence and can be identified or monitored through a computing device. Moreover, the establishment of specific communication protocol in RFID technology empowers the RFID readers to transfer RF signals to any device.
We can conclude from the above definition that RFID technology is the base of IOT architecture and all the objects or things could become part of IOT infrastructure through RFID technology enabler.
To simply put, the power of passive RFID tag can connect any type of object, asset, thing to Internet and allow them to communicate with each other.

Difference between RFID and IOT sensors:

Radio frequency identification tag is a wireless (contactless) communication technology for communication between a tag and a reader. RFID is most often used with passive tags over a few meters' range. Internet of things sensors can be either active or passive and they usually have a range of up to a few kilometers.

Radio frequency identification system (RFID) is an automatic technology and aids machines or computers to identify objects, record metadata or control individual target through radio waves. Connecting RFID reader to the terminal of Internet, the readers can identify, track and monitor the objects attached with tags globally, automatically, and in real time, if needed. This is the so-called Internet of Things (IoT). RFID is often seen as a prerequisite for the IoT.

METHODOLOGY

CHAPTER 3

METHODOLOGY

In this smart stick there is a sensor which senses the walls from 1 or half meter range than this stick makes buzzer sound. This smart stick warns the blind person that there is a wall in front of him/her. Than that person will be warned from the wall.

3.1 Concept behind Smart Stick using Arduino

The main concept behind the Smart Stick using Arduino project is object Detection. I have already used Ultrasonic Sensor in Object Avoiding Robot, where upon detecting an object, the Robot will change its course of direction. A similar methodology is implemented here, where the ultrasonic sensor is placed on the bottom of the Stick and when the sensor detects any object, than this stick makes buzzer sound.

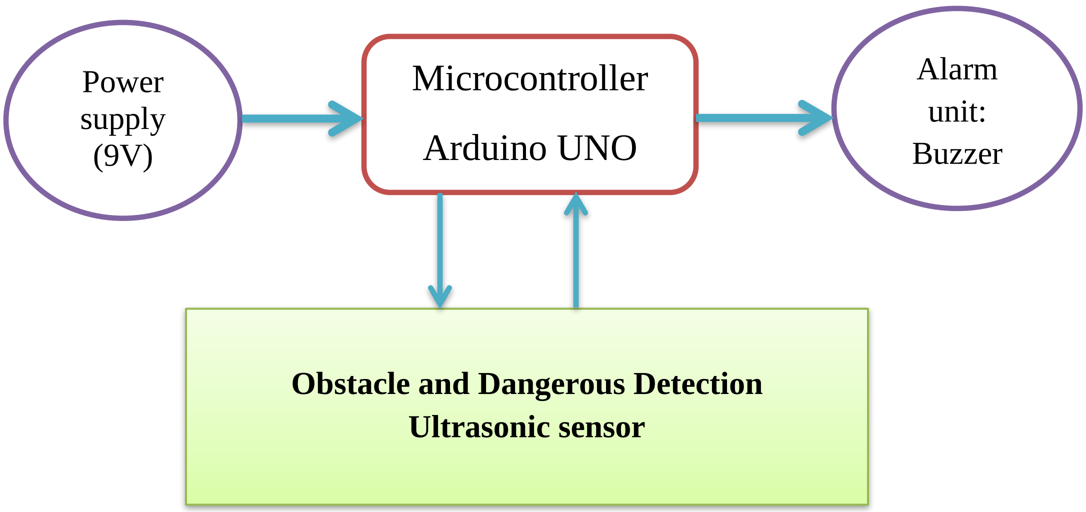
3.2 Build a Smart Stick using Arduino

Now, let me take you through the actual step and build process of the Smart Stick using Arduino.

Steps to make this project

- Take Arduino UNO, Buzzer, Ultrasonic sensor, battery, jumper wires and a wooden stick or a plastic pipe.
- Take stick and place ultrasonic sensor on it. Connect the jumper wires on it.
- Then place Buzzer on the stick. Connect the jumper wires to buzzer.
- Do connections from circuit diagram.
- Place the Arduino UNO, Battery on the stick.
- Upload the code
- After uploading the code, now check for the Blind stick.

3.3 BLOCK DIAGRAM



3.4 Circuit Diagram:

The following image shows the circuit diagram of the Smart Stick using Arduino. It is a very simple design as the project involves only two components other than Arduino.

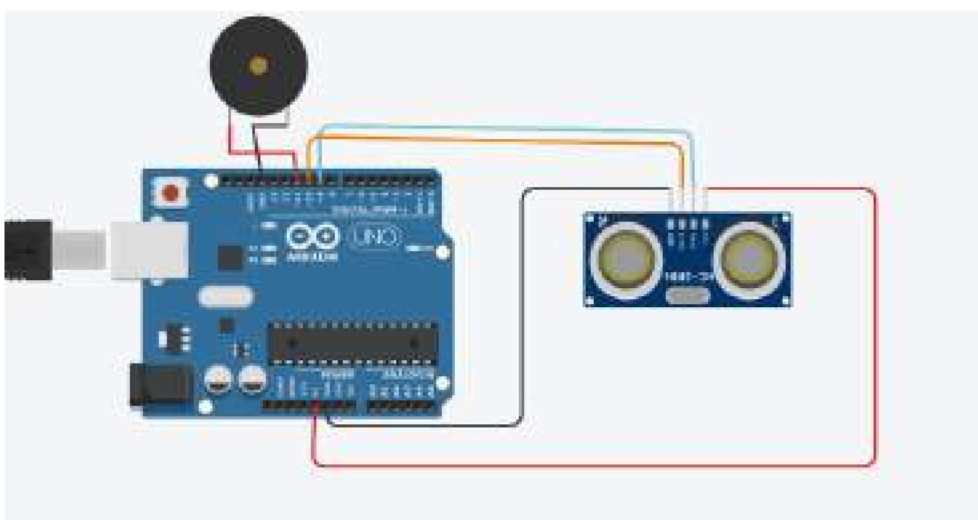
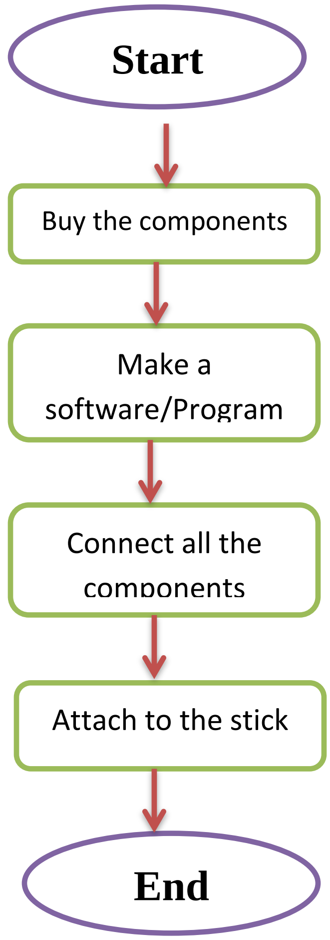


Fig 3.1 Circuit Diagram

3.5 Flow Chart



3.6 Hardware Requirements

1. Arduino UNO R3
2. Buzzer
3. Ultrasonic Sensor
4. Jumper Wires
5. Battery 9V

3.6.1 Arduino UNO R3

The Arduino UNO is the best board to get started with electronics and coding. If this is your first experience tinkering with the platform, the UNO is the most robust board you can start playing with. The UNO is the most used and documented board of the whole Arduino family.

Fig 3.2 Arduino UNO

Arduino UNO R3 is a microcontroller board based on a removable, dual-inline-package (DIP) **ATmega328P** AVR microcontroller. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics. The R3 is the third and latest revision of the Arduino UNO.

General Specifications

- **LED:** There is a built-in LED driven by digital pin 13. When the pin is high value, the LED is on, when the pin is low, it is off.
- **VIN:** The input voltage to the Arduino board when it is using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or if supplying voltage via the power jack, access it through this pin.
- **5V:** This pin outputs a regulated 5V from the regulator on the board. The board can be supplied with power either from the DC power jack(7-20V), the USB connector (5V), or the VIN pin of the board (7-20V). Supplying voltage via the 5V or 3.3V pins bypasses the regulator, and can damage the board.

3.6.2 Buzzer

Fig 3.3 Buzzer

A buzzer is a small yet efficient component to ad sound features to our project/system. It is very small and compact 2-pin structure hence can be easily used on breadboard, Perf Board and even on PCB which makes this a widely used component in most electronic applications. This Buzzer can be used by simply powering it using DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply.

Buzzer Features and Specifications:

- Rated Voltage: 6V DC.
- Operating Voltage: 4-9V DC.
- Rated current: <30mA.
- Sound Type: Continuous Beep.
- Resonant Frequency: 2300HZ.
- Small and neat sealed package.
- Breadboard and Perf board friendly.

3.6.3. Ultrasonic Sensor

Fig 3.4 Ultrasonic Sensor

The HC-SR04 ultrasonic sensor uses SONAR to determine the distance of an object just like the bats do. It offers excellent non-contact range detection with high accuracy and stable readings in an easy-to-use package from 2 cm to 400 cm or 1” to 13 feet. The operation is not affected by sunlight or black material, although acoustically, soft materials like cloth can be difficult to detect. It comes complete with ultrasonic transmitter and receiver module.

Ultrasonic Sensors also known as transceivers when they both send and receive work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object.

Specifications:

Power Supply: +5V DC
Quiescent Current: <2mA
Working Current: 15mA
Effectual Current: <15°
Ranging Distance: 2cm-400 cm/1” -13ft
Resolution: 0.3 cm
Measuring Angles: 30 degree
Trigger Input Pulse width: 10uS
Dimension: 45mm x 20mm x 15mm

3.6.4 Jumper Wires

Fig 3.5 Jumper Wires

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

Individual jump wires are fitted by inserting their "end connectors" into the slots provided in a breadboard, the header connecter of a circuit board, or a piece of test equipment.

There are different types of jumper wires. Some have the same type of electrical connector at both ends, while others have different connectors.

3.6.5. Battery 9V

Fig 3.6 Battery

A nine-volt battery, either disposable or rechargeable, is usually used in **smoke** alarms, smoke detectors, walkie-talkies, transistor radios, test and instrumentation devices, medical batteries, LCD displays, and other small portable appliances.

When a battery is supplying power , its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high energy reactants to lower energy products, and the free energy difference is delivered to the external circuit as electrical energy.

Historically the term “battery” specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

IMPLEMENTATION

CHAPTER 4

IMPLEMENTATION

Several solutions for waste management equipped with IOT facilities have been proposed and invented in the literature to help solid based management authorities improve the quality of service delivery.

4.1 Hardware Requirements

1. Arduino UNO R3
2. Buzzer
3. Ultrasonic Sensor
4. Jumper Wires
5. Battery 9V

ARDUINO UNO

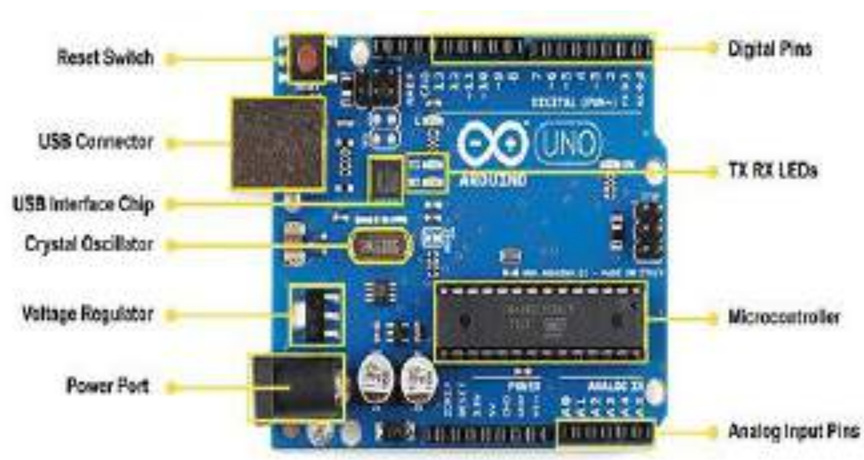


Fig 4.1 Arduino Uno board

The ArduinoUno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by Arduino.cc. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a

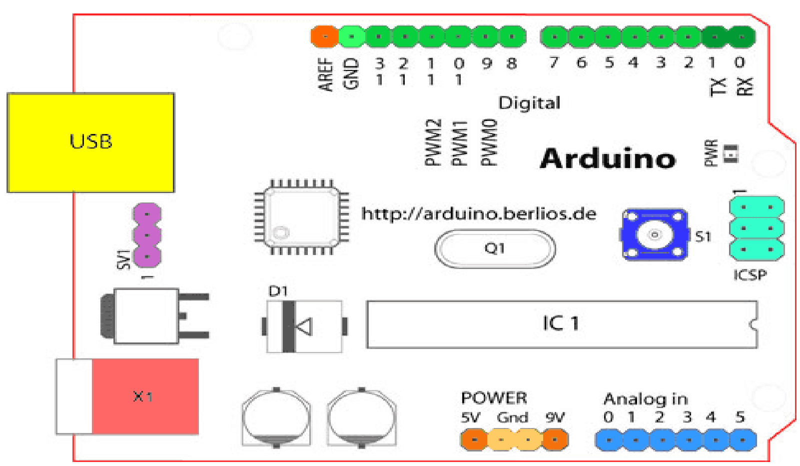
Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

The word "Uno" means "one" in Italian and was chosen to mark the initial release of Arduino Software. The Uno board is the first in a series of USB-based Arduino boards. it and version 1.0 of the Arduino IDE were the reference versions of Arduino, which have now evolved to newer releases.[4] The ATmega328 on the board comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer.

While the Uno communicates using the original STK500 protocol, it differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it uses the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Overview of the Arduino Uno components

Looking at the board from the top down, this is an outline of what you will see (parts of the board you might interact with in the course of normal use are highlighted):



Starting clockwise from the top center:

- Analog Reference pin (orange)
- Digital Ground (light green)
- Digital Pins 2-13 (green)

- Digital Pins 0-1/Serial In/Out - TX/RX (dark green) - These pins cannot be used for digital I/O (digital Read and digital Write) if you are also using serial communication (e.g. Serial. Begin).
- Reset Button - S1 (dark blue)
- In-circuit Serial Programmer (blue-green)
- Analog In Pins 0-5 (light blue)
- Power and Ground Pins (power: orange, grounds: light orange)
- External Power Supply In (9-12VDC) - X1 (pink)
- Toggles External Power and USB Power (place jumper on two pins closest to desired supply) - SV1 (purple)
- USB (used for uploading sketches to the board and for serial communication between the board and the computer; can be used to power the board) (yellow)

Microcontroller

ATmega328p (used on most recent boards)

- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6 (DIP) or 8 (SMD)
- DC Current per I/O Pin: 40 mA
- Flash Memory: 32 KB
- SRAM: 2 KB
- EEPROM: 1KB

ATmega168 (used on most Arduino Decimal and early Duemilanove)

- Digital I/O Pins: 14 (of which 6 provide PWM output)
- Analog Input Pins: 6 (DIP) or 8 (SMD)
- DC Current per I/O Pin: 40 mA
- Flash Memory 16 KB:
- SRAM: 1 KB
- EEPROM: 512 bytes

ATmega8 (used on some older board)

- Digital I/O Pins: 14 (of which 3 provide PWM output)
- Analog Input Pins: 6
- DC Current per I/O Pin: 40 mA
- Flash Memory: 8 KB
- SRAM: 1 KB
- EEPROM: 512 bytes

Digital Pins

In addition to the specific functions listed below, the digital pins on an Arduino board can be used for general purpose input and output via the Pin mode(), digital read(),and digital write() commands. Each pin has an internal pull-up resistor which can be turned on and off using digital Write() (w/ a value of HIGH or LOW, respectively) when the pin is configured as an input. The maximum current per pin is 40 mA.

- Serial: 0 (RX) and 1 (TX). Used to receive (RX) and transmit (TX) TTL serial data. On the Arduino Decimal, these pins are connected to the corresponding pins of the FTDI USB-to-TTL Serial chip. On the Arduino BT, they are connected to the corresponding pins of the WT11 Bluetooth® module. On the Arduino Mini and Lily Pad Arduino, they are intended for use with an external TTL serial module (e.g. the Mini-USB Adapter).
- External Interrupts: 2 and 3. These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value. See the attach Interrupt() function for details.
- PWM: 3, 5, 6, 9, 10, and 11. Provide 8-bit PWM output with the analog Write() function. On boards with an ATmega8, PWM output is available only on pins 9, 10, and 11.
- BT Reset: 7. (Arduino BT-only) Connected to the reset line of the Bluetooth® module.
- SPI: 10 (SS), 11 (MOSI), 12 (MISO), 13 (SCK). These pins support SPI communication, which, although provided by the underlying hardware, is not currently included in the Arduino language.
- LED: 13. On the Decimal and Lily Pad, there is a built-in LED connected to digital pin 13. When the pin is HIGH value, the LED is on, when the pin is LOW, it's off.

Analog Pins

In addition to the specific functions listed below, the analog input pins support 10-bit analog-to-digital conversion (ADC) using the analog Read function. Most of the analog inputs can also be used as digital pins: analog input 0 as digital pin 14 through analog input 5 as digital pin 19. Analog inputs 6 and 7 (present on the Mini and BT) cannot be used as digital pins.

- I2C: 4 (SDA) and 5 (SCL). Support I2C (TWI) communication using the wire library (documentation on the Wiring website).

Power pins

- VIN (sometimes labeled "9V"). The input voltage to the Arduino board when it's using an external power source (as opposed to 5 volts from the USB connection or other regulated power source). You can supply voltage through this pin, or, if supplying voltage via the power jack, access it through this pin. Note that different boards accept different input voltages ranges, please see the documentation for your board. Also note that the Lily Pad has no VIN pin and accepts only a regulated input.
- 5V. The regulated power supply used to power the microcontroller and other components on the board. This can come either from VIN via an on-board regulator, or be supplied by USB or another regulated 5V supply.
- 3V3. (Decimal-only) A 3.3 volt supply generated by the on-board FTDI chip.
- GND. Ground pins.

Other pins

- AREF. Reference voltage for the analog inputs. Used with .
- Reset. (Decimal-only) Bring this line LOW to reset the microcontroller. Typically used to add a reset button to shields which block the one on the board.

BUZZER

Fig 4.2 Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric (piezo for short). Typical uses of buzzer and beepers include alarm devices, timers, train and confirmation of user input such as a mouse click or keystroke.

Electromechanical

Early devices were based on an electromechanical system identical to an electric bell without the metal gong. Similarly, a relay may be connected to interrupt its own actuating current, causing the contacts to buzz(the contacts buzz at line frequency if powered by alternating current)often these units were anchored to a wall or ceiling to use it as a sounding board. The word “buzzer” comes from the rasping noise that electromechanical buzzers made.

Mechanical

A joy buzzer is an example of a purely mechanical buzzer and they require drivers. Other examples of them are doorbells.

Piezoelectric

A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

A piezoelectric buzzer/beeper also depends on acoustic cavity resonance to produce an audible beep.

Ultrasonic Sensor

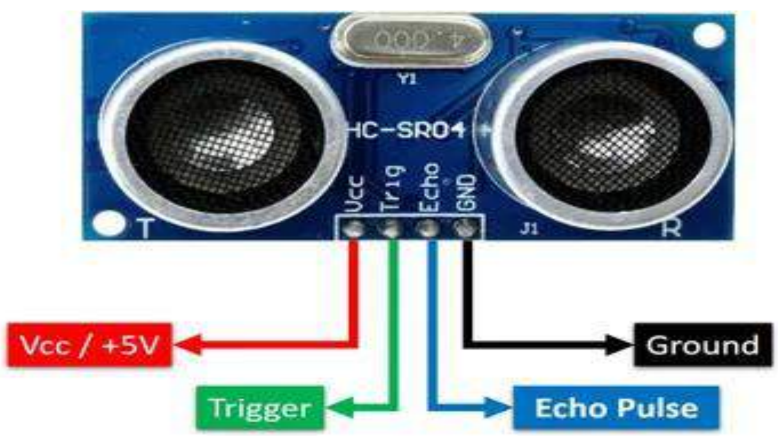


Fig 4.3 Ultrasonic Sensor

Ultrasonic Sensors also known as transceivers when they both send and receive work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring: wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed. The technology is limited by the shapes of surfaces and the density or consistency of the material. For example foam on the surface of a fluid in a tank could distort a reading.

- HC-SR04 is an ultrasonic sensor mainly used to determine the distance of the target object.
- It measures accurate distance using a non-contact technology. A technology that involves no physical contact between sensor and object.
- Transmitter and receiver are two main parts of the sensor where former converts an electrical signal to ultrasonic waves while later converts that ultrasonic signal back to electrical signals.
- These ultrasonic waves are nothing but sound signals that can be measured and displayed at the receiving end.
- More accurate measurements occur when the object distance is centered to the center of the unit.
- The minimum usable distance is 3 cm.

Jumper Wire

Jumper wires are extremely handy components to have no hand, especially when prototyping. But when are they

Fig 4.4 Jumper Wires colors

Jumper wires colors mean

Though jumper wires come in a variety of colors, the colors don't actually mean anything. This means that a red jumper wire is technically the same as a black one. But the colors can be used to your advantage in order to differentiate between types of connections, such as ground or power.

Types of Jumper Wires

Jumper wires typically come in three versions: male-to-male, male-to-female and female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things into. Male-to-male jumper wires are the most common and what you likely will use most often. When connecting two ports on a breadboard, a male-to-male wire is what you'll need. Jumper wires typically come in three versions: male-to-male, male-to-female, female-to-female. The difference between each is in the end point of the wire. Male ends have a pin protruding and can plug into things, while female ends do not and are used to plug things.

Male-to-male jumper wire

Fig 4.5 Male-to-Male Jumper Wires

These are Jumper wire male to male, used in connecting female header pin of any development board (like Arduino) to other development board or breadboard. Also you can combine it with our Female jumper wire to create Male to Female jumper wire.

Male-to-Female jumper wires

Fig 4.6 Male-to-Female Jumper Wires

These are Jumper wire male to female, used in connecting female header pin of any development board (like Arduino) to other development board having male connector.

Female-to-Female Jumper wires

Fig 4.7 Female-to-Female Jumper Wires

Jumper wires are small wire ducts that can be used to connect components to each other on bread boards or elsewhere. The female and female heads of this product, with plastic heads, can provide easier connection without need to soldering.

There are different types of jumper wires. Some have the same type of electrical connector at both ends, while others have different connectors. Some common connectors are:

Solid tips – are used to connect on/with a breadboard or female header connector. The arrangement of the elements and ease of insertion on a breadboard allows increasing the mounting density of both components and jump wires without fear of short-circuits. The jump wires vary in size and color to distinguish the different working signals.

Crocodile tips – are used, among other applications, to temporarily bridge sensors, buttons and other elements of prototypes with components or equipment that have arbitrary connectors, wires, screw terminals etc.

Banana Connectors – are commonly used on test equipment for DC and low-frequency AC signals.

Registered Jack (RJnn) – are commonly used in telephone (RJ11) and computer networking (RJ45).

RCA connectors – are often used for audio, low-resolution composite video signals, or other low-frequency applications requiring a shielded cable..

RF connectors –are used to carry radio frequency signals between circuits, test equipment, and antennas.

RF jumper cables - Jumper cables is a smaller and more bendable corrugated cable which is used to connect antennas and other components to network cabling. Jumpers are also used in base stations to connect antennas to radio units. Usually the most bendable jumper cable diameter is 1/2"

Battery

Fig 4.8 Battery

A battery is an electrochemical cell (or enclosed and protected material) that can be charged electrically to provide a static potential for power or released electrical charge when needed. A battery consist of an anode, a cathode, and an electrolyte.

A nine-volt battery, either disposable or rechargeable, is usually used in smoke alarms, smoke detectors, walkie-talkies, transistor radios, test and instrumentation devices, medical batteries, LCD displays, and other small portable appliances.

When a battery is supplying power , its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal. When a battery is connected to an external electric load, a redox reaction converts high energy reactants to lower energy products, and the free energy difference is delivered to the external circuit as electrical energy.

Historically the term “battery” specifically referred to a device composed of multiple cells, however the usage has evolved to include devices composed of a single cell.

Batteries have much lower specific energy (energy per unit mass) then common fuels such as gasoline. In automobiles, this is somewhat offset by the higher efficiency of electric motors in converting electrical energy to mechanical work, compared to combustion engines.

Circuit diagram of Smart Stick

Currently there are thousands of blind people all over the globe. These include people from low sightseeing to complete lost of visual. They find it very difficult while crossing the road or reaching to their respective destination with the help any other individual. The traditional stick cannot help to detect the obstacles in front or the potholes in the way. It is outdated. Hence there is a need to update it using today's technology.

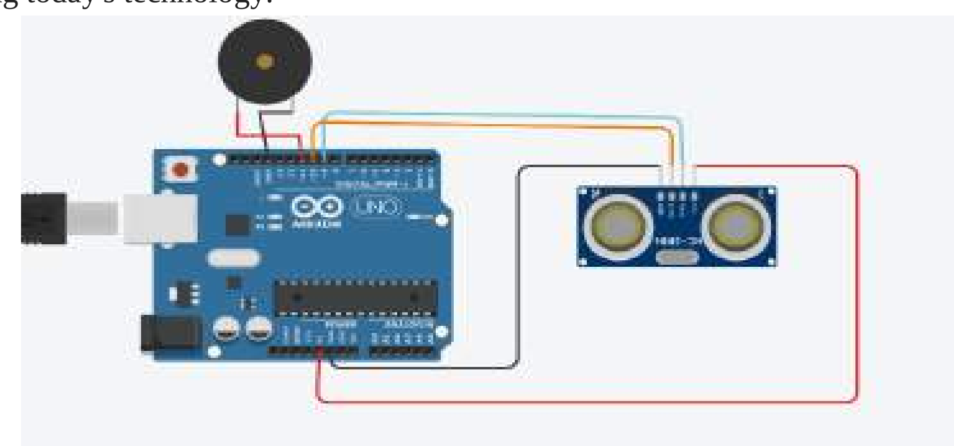


Fig 4.9 Implementation of Circuit Diagram

4.2 Discussion

Based on the theory, Visual impaired person or also known as vision impairment or vision loss, is a decreased ability to see to a degree that causes problems not fixable by usual means, such as glasses some also include those who have a decreased ability to see because they do not have access to glasses or contact lenses. Visual impairment is often defined as a best corrected visual acuity of worse than either 20/40 or 20/60. The term blindness is used for complete or nearly complete vision loss.[6] Visual impairment may cause people difficulties with normal daily activities such as driving, reading, socializing, and walking.

The most common causes of visual impairment globally are uncorrected refractive errors (43%), cataracts (33%), and glaucoma (2%). Refractive errors include nearsightedness, far-sightedness, presbyopia, and astigmatism. Cataracts are the most common cause of blindness. Other disorders that may cause visual problems include age-related macular degeneration, diabetic retinopathy, corneal clouding, childhood blindness, and a number of infections.

Visual impairment can also be caused by problems in the brain due to stroke, premature birth, or trauma among others. These cases are known as cortical visual impairment. Screening for vision problems in children may improve future vision and educational achievement. Screening adults without symptoms is of uncertain benefit. Diagnosis is by an eye exam.

The World Health Organization (WHO) estimates that 80% of visual impairment is either preventable or curable with treatment. This includes cataracts, the infections river blindness and trachoma, glaucoma, diabetic retinopathy, uncorrected refractive errors, and some cases of childhood blindness. Many people with significant visual impairment benefit from vision rehabilitation, changes in their environment, and assistive devices.

As of 2015 there were 940 million people with some degree of vision loss. 246 million had low vision and 39 million were blind. The majority of people with poor vision are in the developing world and are over the age of 50 years. Rates of visual impairment have decreased since the 1990s. Visual impairments have considerable economic costs both directly due to the cost of treatment and indirectly due to decreased ability to work.

The solution for visually impaired person to walking is by using ‘White Cane’. A white cane is a device used by many people who are blind or visually impaired. A white cane primarily allows its user to scan their surroundings for obstacles or orientation marks, but is also helpful for onlookers in identifying the user as blind or visually impaired and taking appropriate care. The latter is the reason for the cane's white color, which in many jurisdictions is mandatory.

While the white cane is commonly accepted as a "symbol of blindness", different countries still have different rules concerning what constitutes a "cane for the blind". In the United Kingdom and also in Malaysia, the white cane indicates that the individual has a visual impairment but normal hearing; with red bands added, it indicates that the user is deaf blind.

Many visually impaired people suffer from serious visual impairments preventing them from travelling independently. They need to use a wide range of tools and techniques to help them in their mobility. One of these techniques is orientation and mobility specialist who helps the visually impaired and blind people and trains them to move on their own independently and safely depending on their other remaining senses.

Nowadays, as a parent or guardian, we don’t want our children or our care’s get into trouble when walking at public or somewhere else. Vision loss has a significant impact on their lives for those who experience it as well as on their families, their friends, and society. The complete loss or the deterioration of existing eyesight can feel frightening and overwhelming, leaving those affected to wonder about their ability to maintain their independence, pay for needed medical care, retain employment, and provide for themselves and their families. It’s a high risk to live in a lifetime.

This product can be helpful to the visually impaired person. The Modern Blind Stick function is to help the visually impaired person walk more easier and more independent. Modern Blind Stick also can help this blind people to navigate routes and detect an obstacle that surely can make their life routines easier. The user just need to use the blind the normal blind stick , the different is , blind people can detect a hole or stair more faster and easily.

4.3 Significance of the system

The main advantage of the system is that it helps the blind people in both indoor and outdoor. The devices placed in the stick makes it comfortable and easy to handle. The smart stick helps in detecting obstacles placed at a distance in front of the user. The system is suitable for both indoor and outdoor environment. The information regarding obstacles is given through voice alerts, eliminates the difficulty of understanding vibration patterns which was used in earlier systems.

4.4 Code

```
//defines pins numbers
  const int trigPin=9;
  const int echoPin=10;
  const int buzzer=11;
  const int ledPin=13;
//defines variables
   long duration;
   int distance;
   int safetyDistance;

void setup(){
  pinMode(trigPin,OUTPUT);
  //sets the trigp[in as an otput
  pinMode(echoPin, INPUT);
  //set the echopin as an input
  pinMode(buzzer, OUTPUT);
  pinMode(ledPin,OUTPUT);
  Serial.begin(9600);//
// Starts the serial communication

}


void loop(){
  //Clears the trigPin
  digitalWrite(trigPin,LOW);
  delayMicroseconds(2);

 //Sets the trigPin on HIGH
 digitalWrite(trigPin,HIGH);
 delayMicroseconds(10);
 digitalWrite(trigPin,LOW);

 //Reads the echoPin,
// returns the sound wave travel time in microseconds
 duration=pulseIn(echoPin,HIGH);

// Calucalting the distance
distance=
```

```
duration*0.034/2;

safetyDistance=distance;
if (safetyDistance <=5){
    digitalWrite(buzzer,HIGH);
    digitalWrite(ledPin,HIGH);
}
else{
  digitalWrite(buzzer,LOW);
  digitalWrite(ledPin,LOW);
}

// Prints the distance on the Serial monitor
Serial.print("Distance:");
Serial.println(distance);
}
```

4.5 Smart Stick

Fig 4.10 Smart Stick

CONCLUSION

CHAPTER 5
CONCLUSION

5.1 Conclusion

In the end of this project, it can be concluded that this project can reduce the number of risk and injuries for the visually impaired person while walking in the public. This smart stick can be used easily. The number of risk and injuries increasing rapidly, the blind person will loos their spirit to walk independently.

The Modern Blind Stick acts as a basic platform for the coming generation of more aiding devices to help the visually impaired to navigate safely both indoor and outdoor. It is effective and affordable. It leads to good results in detecting the obstacles on the path of the user in a range of two meters. Though the system is hard-wired with sensors and other components, it's light in weight. Further aspects of this system can be improved via wireless connectivity between the system components, thus, increasing the range of the ultrasonic sensor and implementing a technology for determining the speed of approaching obstacles.

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CHAPTER 6
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ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

A

PROJECT REPORT

ON

PERFORMANCE EFFICIENCY OF

SOLAR COOKER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT

FOR THE AWARD OF DEGREE OF

BACHELOR OF SCIENCE IN PHYSICS

Submitted to the

ADIKAVI NANNAYYA UNIVERSITY, RAJAMAHENDRAVARAM

Under The Guidance of

Sri K.VENKATESWARA RAO M.sc, B.Ed

&

Smt K.KRANTHI M.SC, M.Phil

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By

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CERTIFICATE

This is to Certified that the Project Work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" is a Bonafidework Carried out by M.Divya Bharathi, P.Chandana, T.V.V. Satya durga
Regd No.1932049, 1932053, 1932055 Year III rd B.Sc (M.P.Cs) 2021 - 2022
in partial fulfilment for the Award of Undergraduation in PHYSICS, of **Adikavi Nannayya university, Rajamahendravaram** during the Year 2021-22.

It is certified that all Corrections/ Suggestions indicated for Internal Assesment have been incorporated in the report .This project report have been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor Degree in PHYSICS.

Signature of the Guide

K. Venkat 27/6/22
Signature of the HOD

Signature of the Principal

Signature of the Examiners
30 June 2022

ACKNOWLEDGEMENT

We are the Students of III B.SC (M.P.CS) PHYSICS Cluster in ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN(A),KAKINADA are preparing a finalyear **project "PERFORMANCE EFFICIENCY OF SOLAR COOKER".We whole heartedly express our Sincere Gratitude to SRI K.VENKATESWARA RAO & Smt. K.KRANTHI who guided us for the completion of this final year project. We are also thankful to our principal Smt V.ANANTHA LAKSHMI garu for giving us an opportunity to do this project.**

1) M.Divya bharathi (1932049)
2) P.Chandana(1932053)
3)TVV.Satya durga(1932055)

DECLARATION

We M.Divya bharathi (1932049), P.Chandana(1932053) , TVV.Satya durga(1932055)

students of 6 Semester B.SC(MPC) PHYSICS CLUSTER , ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A) , KAKINADA here by declare that the project work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" Submitted to the Adikavi Nannayya university, Rajamahendravaram during the academic year 2021-22 , is a Record of original work done by us under the Guidance of Sri **K.VENKATESWARA RAO & Smt. K.KRANTHI, Department PHYSICS,** ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A),KAKINADA .

This project work is submitted in partial fulfillment of the requirement for the Award of Degree of **BACHELOR OF SCIENCE IN PHYSICS. This results and works Embodied in this Thesis have not been submitted to any other University(or) Institute for the award of any Degree.**

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Introduction

Cooking food with free, decentralized and non-emitting solar energy helps break the cycle of poverty.

Women, children and community members breathe cleaner air, save trees and soil, save money for food and education, and stay safe from violence. Solar cooking improves the quality of life and allows you to adapt to a changing world.

Up to 1.3 billion USD = Total potential cash saved by reducing CO_2 emissions with solar cookers.

Solar cooking helps to reduce social, economic, high iron environmental costs such as black soot, and fossil fuel emissions that affect all human beings and all current environments.

History of Solar Cooking

A strange antecedent of the current solar cooking movement is the story of what Buti and Perlin call "the MiroBurning IR "(1980, Chapter 3). The Greeks, the Romans and the Chinese all explored the use of curved mirrors, which they said could concentrate the rays of the sun so as to detonate almost all the burning objects.

It is interesting to note that the use they perceived for this aircraft was military-could they focus the mirror on fire, for example, on an enemy warship? Hot mirrors were also used for less dollar purposes, such as that the lighting of altar lights and torches for sacrificial parades, but almost no other applied use was found. The idea, which is now seen in the concentration of solar cooker, is today used in countless regions of the world.

A more direct route to solar cooking is the result of intensive efforts to harness the sun for horticulture. Although found in Roman times in wealthy households, it was only in the sixteenth century (Buti and Perlin, pp. 41) that glass became common and cheap enough to be used for horticulture. Global travel and trade have led to the transport of tropical plants and fruits to the northern countries, which has led to a desire for these products, which could not be grown in northern climates. First the Dutch and the Flemish, then the French and the English built greenhouses for this purpose, heated only by the sun. A substrate horticultural activity concentrated on tropical flora and food crops, all high under glass, in huge greenhouses. Using South exposure and insulation as needed, the greenhouse movement later inspired the use of "conserve random "or" rooms of sunshine" in the houses.

The principle of the greenhouse, the so-called "Solar Heat Trap", was used in what is considered the very first attempt to use solar energy to cook. Many Scientists of the time knew the use of glass to trap heat, but Horace de Saussure, a Franco-Swiss scientist, wondered why this phenomenon generally understood had not led to a user's Extra N. In 1767, he built a miniature greenhouse with five cans of glass * One in the other, placed on a black plateau. The fruits placed in the deepest box cook well-and a new technology is born (Buti and Perlin, p. 55). De Saussure continued his experimentation, using other materials, adding insulation, cooking at different altitudes. This European scientist, exploring solar energy almost 250 years ago, is widely regarded as the Pre Era of the movement of solar cooking. Others followed his example, including the British Sir John Herschel and the American Samuel Pierpont Langley, who later led the Smithsonian, who both conducted experiments with the hot box, Precursor of today's cooking box. .

A French mathematician named Augustin Mouchot, working almost a century later, was eager to ensure that the learning of the past was not lost. He was more interested in practical application than in the number of ground devices, interesting but not very useful areas that appeared, using the newly discovered potential of the sun (whistles, watercrafts, talking statues, etc.). He started a search to use the energy of the sun in a sufficiently efficient way. He boiled water for steam engines, a company that has not succeeded. His second project was more successful. He combined the idea of thermal trap with that of the burning mirror, creating an efficient solar cooker from a box which later modified by the addition of reflective mirrors. Eventually he created an efficient steam engine, but it was too big to be practical. He turned to the challenge of cooking and has developed a number of solar cookers, pumps and even electricity. However, his work was short-circuited by the advent of improved coal extraction methods and, therefore, by the use of Carburant Less expensive. His work has also been caught up by the replacement of cheap fuels, making the use of solar energy useless and therefore inconvenient at the moment.

At the end of the nineteenth century, Aubrey Eneas, an American formed the first solar energy company. He had built a giant parabolic reflector in the Southwest of the United States. Frank Shuman founded the Sun Power Company in Cairo to promote a water pumping system powered by solar power, then a parabolic concentrator generating electricity. Other solar innovations have followed: engines and motors, water heaters, photovoltaic lighting and even crematoriums. However, throughout history as in Greece and in Rome progress has been repeatedly interrupted by fluctuations in the availability or low cost of alternative fuels.

In recent decades wealth of billions has been created with polluted fuels and destroying our planet. The sun can provide ways to live with income of renewable energy that will give a better future for our planet and health. It continues to indicate that countless previous experiences of decrease in fuel resources was then forced to rediscover previous knowledge about solar energy. Hoping this new generation will practice clean energy usage for a better future. We should have been practicing clean renewable energy available to all human being but creating wealth seems to be our priority.

At the beginning of the years 1900, a number of Buildings designed to take advantage of solar energy were built using the principles of the thermal trap, but they were quickly forgotten and then resumed in the 1930s when several office buildings the double-glazed glass helps with the heat retention. The Second World War took place, but after the war, the need for housing exploded, resulting in new attempts, including solar collectors on the rooftops.

The Solar cooking movement began seriously in the middle of the century, with some isolated attempts to arouse an interest in technology. At the end of the years 50, Maria Telkes , MIT scientist Worked on solar cooking her interest led her to build a classic built-in oven, an insulated plywood case with an inclined top of two layers of glass and four large flared reflectors. The design is used, in infinite variation, until today. George Praise , former director of the Institute of Industrial Research at the University of Denver, Colorado was also a pioneer of the Solar technology, including solar cooking. In the years 1950, he experimented with a model of Parabolic Solar Cooker The name "Umbroiler" because of its structure in the form of an umbrella. He marketed the design, but it was a commercial failure for the time.

After this period, the years of the second half of the 20th century show a number of individuals and groups experimenting, demonstrating the potential realizing small and large projects using solar cooking appliances. From 1955, a group of individuals in Phoenix organized in Association for Applied Solar Energy and held its first Conference: the American Solar Energy Society and its international counterpart, the International Solar Energy Society. In the 70's, the growing scarcity of fuelwood and other energy shortages coupled with the expansion of the population in China and in India , encouraged government research on alternatives. The first seminar on solar Cooking was organized in 1981. The oil shortage of that time was the source for study of potential of solar energy, with considerable experience in Europe and the United States, as well as in Asia. The ULOG Group In Switzerland And EG Solar In Germany , and that Solar Cookers International In the United States, originated in the years 1980.

A woman from Arizona, Barbara Kerr , along with other colleagues, also has continued to develop models of solar cookers and test their effectiveness. She experimented with various materials and promoted the technology. In 1980, Barbara Kerr and a neighbor, Sherry Cole, designed a "kit" of cardboard cooker that could be largely built by a customer and that was very much appreciated by those who had bought one. This work of these two women has inspired the formation of Solar Cookers International . A few years later, the organization, again with the technical assistance of Barbara Kerr, was the first to introduce another type of cooking apparatus, the panel cooker, a hybrid between the box and the parabolic. This invention was a decisive step forward because it was less expensive. Now solar cookers are affordable to meet the needs of the poorest inhabitants of the world.

It could be said that the foundation of Solar Cookers International, On July 11, 1987, was the beginning of an effort to connect the promoters of solar cooking everywhere in the sense of networking, because its intention was largely educational and networking. Coincidentally, the United Nations has declared that day the world's population had reached five billion people (only 13 years after reaching 4 billion). The new organization said that at least one billion people could benefit from knowing how to cook with the sun. Obviously, the organization has been forced to steadily increase its targets, while the world's population has continued to grow at more than six billion in 2004, which means that today the target group exceeds the two Milliards.

It is interesting to note that before the creation of SCI in 1987, a major demonstration of solar-powered cooking was carried out in the highlands of Bolivia, a region where Wood was already Rare. Two organizations, at the time Pillsbury Corporation and a non-governmental organization called Meals for Millions, jointly sponsored cooking demonstrations and later taught the villagers how to build cookers with Local materials. In 1988, Pillsbury, in cooperation with Foster Parents (now Save the Children sponsored a project similar to Guatemala . These projects it appeared are one of the first nation-to-nation projects, initiating a long series of projects of this type worldwide, which continue to develop today.

Since then, Many other organizations were created to sponsor projects and promote solar cooking activity. Their work, as known by the written documentation, is detailed in the following chapters. This vignette is only a small part of the story, even unknown to supporters of solar cooking, the many men and women who have glimpsed the potential of the sun to cook food and have tried over the centuries to disseminate this knowledge oo others who can benefit from it.

Solar Cooking Basics

According to the Place where you live and how you cook, solar cooking can save you time, effort and fuel. It is also a fun way to prepare your meals. All foods can be cooked in a type of solar cooker.

Solar cooking is often associated with slow cooker or slower cooking. Cooking times are usually twice as long as conventional cooking methods, but slower cooking also has advantages. Less water is used than conventional cooking and foods retain more flavor and nutrients, instead of being steamed or boiled. These slow solar cookers do not need to stir food during cooking. By placing the solar cooker a little ahead of the current position of the sun on its passage through the sky, the cookers and cookers can be left unattended.

The parabolic solar cooker offers another approach to solar cooking by being able to achieve higher temperatures compared to the box solar cookers and panels, but they require more attention during cooking to avoid overheating of the food. They must be redirected to the sun every fifteen minutes or so. This can be done automatically if they are equipped with a Solar monitoring . They are also able to fry and grill the food, which cannot be done by the box and panel solar cookers.

For the regions of the world facing the Deforestation and limited access to Drinking water , solar cooking turns out to be an element precious or the solution. It offers an alternative without Smoke or boiling water in open fires, and safe for cooking.

Building a solar oven

If you want to try solar cooking for the first time, you may be wondering if you need to Build your own Solar cooker or Buy one from a manufacturer . Both options have advantages:

1. Building your own solar cooker can be a fun and profitable way to start.
2. Buying a solar oven is simple and YOU will often receive a higher quality solar cooker than you could build yourself.

If you want to build a cooker, go to the Construction of a solar cooker to choose a model that suits you. You will find information comparing the Pros and cons of each style of Solar Cooker.

If you want to buy a solar cooker, see the list of manufacturers and sellers on the SCI page: Buy a solar cooker . Commercial solar cookers are generally durable and efficient and offer new users an easy way to experience solar cooking. Solar Cookers are manufactured worldwide, consider potential shipping costs when choosing a model.

Solar Cookers Working

Most solar cookers operate according to the basic principle: sunlight is converted to thermal energy. Most of the Panel Solar Cookers Base and Box Solar Cookers Can reach 150 °c (300 °f). The captured solar radiation crosses a greenhouse enclosure containing a dark-colored pot. By reaching the dark surface, the solar radiation is converted into heat, which is not allowed to escape the enclosure and the Temperatures are reached. The same principle is often encountered by drivers who return in a hot car parked in the sun.

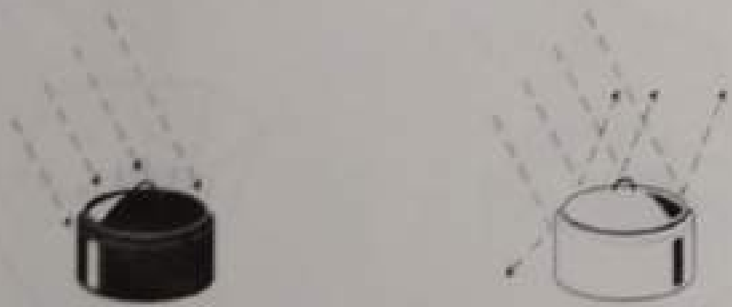
Below you will find the basic science for Panel Solar Cookers and Box Solar Cookers. Another type of solar cooker is a Parabolic Solar Cooker . They usually require more frequent reorientation to the sun, but cook more quickly at higher temperatures and can fry food. Vacuum Tube Solar Cookers use a highly insulated double-walled glass tube for the baking chamber and do not require large reflectors.

Fuel: sunlight

Sunlight is the fuel. A solar cooker needs an outdoor spot that is sunny for several hours and protected from strong wind, and where food will be safe. Solar cookers don't work at night or on cloudy days.

Convert sunlight to heat energy

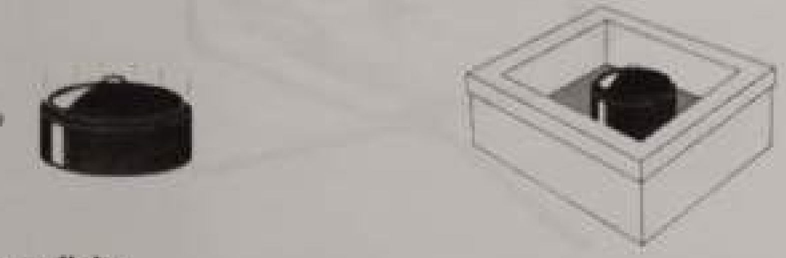
Dark surfaces get very hot in sunlight, whereas light surfaces don't. Food cooks best in dark, shallow, thin metal pots with dark, tight-fitting lids to hold in heat and moisture.



A solar cooker needs a sunny outdoor location for several hours, protection from strong winds and clean/safe cooking conditions in places where the food will be healthy. Solar Cookers do not work at night or in cloudy weather, but during the best sun conditions. Some solar cookers can cook foods under intermittent clouds.

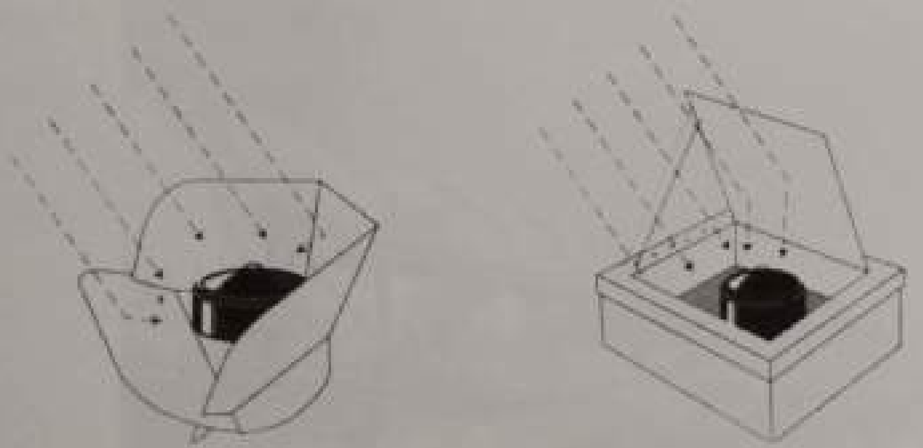
Retain heat

A transparent heat trap around the dark pot lets in sunlight, but keeps in the heat. This is a clear, heat-resistant plastic bag or large inverted glass bowl (panel cookers) or an insulated box with a glass or plastic window (box cookers).

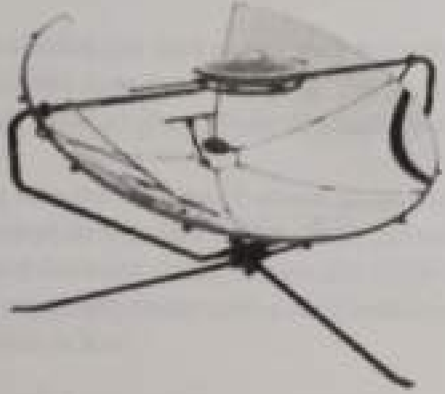


Capture extra sunlight

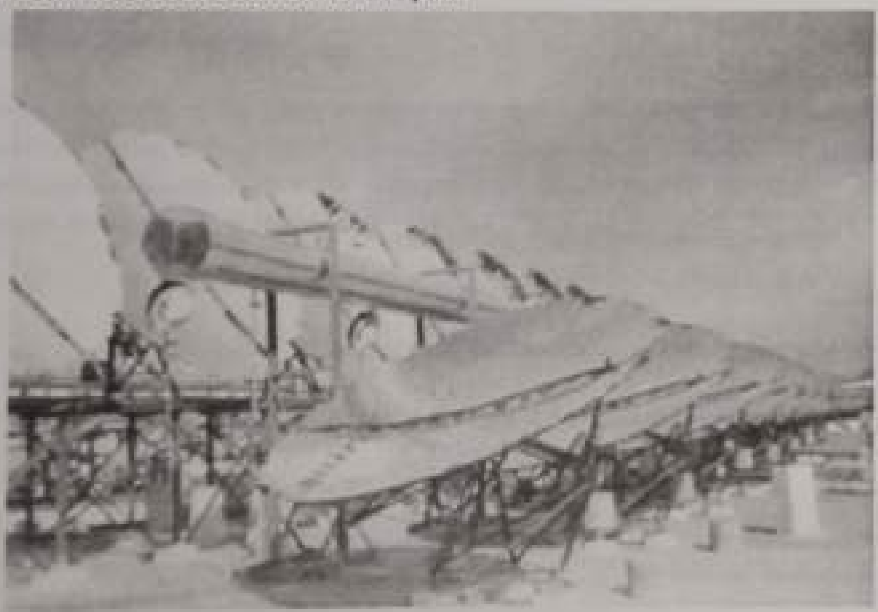
One or more shiny surfaces reflect extra sunlight onto the pot, increasing its heat potential.



- The Parabolic Solar Cookers Use a bowl-shaped reflector to concentrate the light more directly on the pot, usually from the bottom, and generally do not require a greenhouse to hold the heat. They can also fry and grill the elements.



SolSource is an example of Parabolic Solar Cooker presented with a cooking utensil. The light is concentrated at the bottom of the pan.



The institutional solar Cooking Can use many large reflectors Parabolic For general Steam and cook daily for thousands of people. Many of these systems are used in India . This example was built with the technology of Solar Bridge .

Converting solar light into thermal energy

In its simplest form, light/heat conversion occurs when photons (light particles) moving through the light waves interact with molecules that move in a substance. Rays emitted by the sun have a lot of energy in them. When they hit the material, whether solid or liquid, all this energy makes the molecules of this matter vibrate. This activity generates heat and cook.

Dark surfaces become very hot in the sun, unlike clear surfaces. Also food cooks better in Pots that are thin, shallow, dark metal with well-fitting lids. There are many other containers that can also be used in a solar oven.

Keep the Heat

A glazing (transparent heat trap) around the dark pot or over the cooker opening allows the sunlight to penetrate and prevents the heat from escaping. The glazing is resistant to heat, for example, oven bag, inverted bowl, sheet of glass, sheet of plastic, etc.

Sun rays pass through the glazing into the cooking chamber (solar cooker) via relatively short wavelengths. The sun ray is absorbed by the dark colors of the pots and converted to a heat ray which has a longer wavelength and does not easily escape out of the cooking chamber. This explains why cars left in the sun, especially those with a dark interior, will become very hot even on days when the temperature is low.

Parabolic Solar Cookers do not usually require a thermal trap, as the reflector's light is tightly concentrated on the pot. They bake at higher temperatures, but require more frequent reorientation with the Sun than box or panel solar cookers

Capturing additional solar energy

Shiny surfaces (reflectors) reflect the extra sunlight on the pot, increasing its thermal potential. Mirrors, aluminum foil, Mylar, mirror-finish metals, chrome-plated vinyl and other shiny materials have all been used with success for solar cooking, depending on the type of cooker and the environment in which it will be used.

Types of Solar Cookers

The most common types of solar cooker are:

Panel Solar Cookers, Box Solar Cookers, and Parabolic Solar Cookers. Hundreds or even thousands of variants of these basic types exist. PANEL, BOX, PARABOLIC, VACUUM TUBES.

In addition, several large-scale solar cooking systems have been developed to meet the institutional use in places around the world: INSTITUTIONAL SOLAR COOKERS.

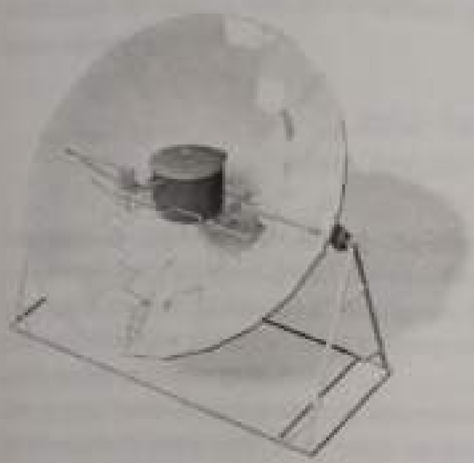
Box Solar Cookers

Box Solar Cookers cook food at moderate to high temperatures and often accept more than one pot. They usually cook food of many varieties between one and three hours of time. All over the world, they are the most common. There are several hundred thousand in India only.

Panel Solar Cookers

Panel Solar Cookers incorporate box and parabolic concentrator units. They are simple and relatively inexpensive to buy or produce. The Cookit Of Solar cookers International is the solar cooker most used.

Parabolic Stoves



COUPLE OF OTHER MODELS

The Cooker Dish AlSol 14 Shows how the pan is supported to receive the light focused from the bottom of the reflector.

The parabolic solar cooker uses a bowl-shaped reflector to concentrate light more directly on the pot, usually from the bottom, and generally does not require Greenhouse to hold the heat. The parabolic name refers to the shape of the curve of the reflector section.

They require a more frequent reorientation to the sun, possibly every 10 minutes, but they bake more rapidly food at higher temperatures than other solar cookers, often reaching more than 200 °c (400 °f). They also have the ability to fry food. In general, parabolic solar cookers will have to be stirred more than box or panel solar cookers to avoid burning food at the bottom of the pot. They are particularly useful for large-scale institutional cuisine.

Vacuum Tube Solar Cookers

SLICK SM70

Vacuum Tube Solar Cookers use a double glass tube wall for the baking chamber. The space between the glasses is created in the form of a vacuum, offering excellent heat retention. Although vacuum tubes are effective, glass technology somewhat limits the size of the glass tube opening.

Solar Cooking Tips and Tricks . . .
Main Article: Cooking instructions and tips

The golden rule for solar cooking is to prepare your food early and not worry about overcooking for box and panel solar cookers. Most people who start solar cooking will use a panel solar panel cooker or a box solar cooker. These solar cookers are sun-oriented and generally do not need to be turned to follow the sun during a period of solar cooking for 3 to 4 hours. Less water is added to the recipes than baking with more conventional ovens.
Once you have chosen a cooker, you will need to find suitable cookware. The enameled metal pans (thin-walled) work well. They warm up quickly. Cast iron pans also work and are usually preheated in the solar oven before cooking. The advantage of heavier pots is that they will help maintain a regular cooking temperature if the sun is sometimes blocked by clouds. Many solar cooks use the enamel pots. Because dark pots work best in the solar cooker, it is important to remember to use a non-toxic paint for the outer surface of the pot if you choose to paint your own pots.

Pots for Solar Cooking

The best pots for solar cooking are those made of thin and dark metal with a lid. Most times when people have trouble cooking in a solar oven, we often find that they use pans in finishes that reflected the sunlight away from the pot instead of absorbing it. Unless you are cooking with a parabolic solar oven where the light is focused on the bottom of the pot, it is very important to use dark colored pots that absorb the sunlight and turn it into heat.

Light colored pots can also work but generally do not work as well as dark colored. The pot lids can be dark or clear. Dark lids are better if your food to be cooked is light colored.

It is important to always cook with the lid in place so that the moisture of the food does not escape and condense on the plastic bag or other Glazing.

The material from which the pot is manufactured will also affect the speed with which it will warm up and its ability to retain the heat. Here are a few things to keep in mind:

- Pots made of thin materials heat faster than thicker pots
- Metal pots heat faster than ceramics or earthenware
- Ceramics and earthenware are slow to heat initially, but will hold the heat better than the thinner metals. The cast iron should only be used in good solar cooking conditions as it requires strong sunshine to obtain the best results.

It is generally not recommended to use a sheet to wrap food in solar cooking; however, temporary pots or lids can be formed from a painted (non-toxic paint) layer in the absence of other equipment. Foods packaged in a conventional way under unpainted aluminum foil **bake very slowly**, **if not at all**, because the glossy film, especially in several layers, insulates the food from sunlight and warmth. The food won't cook.

Glass Jars

Solar cooking food in jars to put in solar ovens

Solar Cooking with glass jars

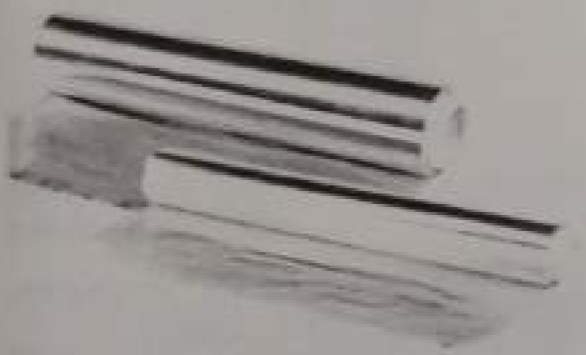
Glass jars make good pots although they cook better if they are darkened rather than left clear. In addition, the darkening of the outside of the food containers will protect some of the B vitamins. When you Paint Jars , you can apply a strip of tape from top to bottom before painting. When the paint is dry remove the tape to leave a transparent strip of glass clean for visual inspection to the inside of the jar.

When you use jars for baking, **make a hole in the lid** of any canned jar, such as mayonnaise jars, peanut butter jars, etc., to prevent steam buildup. Be careful! Non vented jars can explode!

Earthenware Pots

Some clay pots with slow cooking does not cook well at first, although dark-colored earthenware pots that are wood fired and/or have glazing, work very well. Perhaps the poor performance of some earthenware is due to the fact that liquids are soaked into the earthenware and can evaporate outside. Perhaps it is due to the thickness and porous nature of the poorly cooked terracotta walls. Unglazed earthenware pots can be saturated with food oil, grease or natural resin that closes the pores and changes the surface. The oil will heat well and this could be part of what improves cooking in low-cooking terracotta pots. The Light-colored terracotta must be darkened outside only, perhaps by rubbing a black food, a non-toxic black powder or soot from clean wood in the oil layer. Despite this, some forms of low-fire terracotta can be difficult to use for some solar box cookers.

Reflector Material



Aluminum foil

Standard kitchen aluminum foil can work well as **Reflective material** for solar cooking. It can be stuck with white paste or Wheat dough. Some folds may result from the bonding process. In addition, although the surface of the aluminum foil is not hot to touch in the sun, there will be differences in the rate of expansion between the sheet and the material unto which it is glued. This can cause wrinkles. As a general rule, a slight folding of the sheet does not create a problem for cooking.

Solar cooker design continues to evolve and offers better cooking efficiency. There is an increased interest in finding more low cost reflective materials in order to better reorient the sunlight. Polished Metal surfaces have been tried and, although effective, tend to be costly solutions. Metallized polyester Film properly glued to plastic Coroplast sheets are an even more economical approach for users who want to create their own reflectors. Michelle Dean , professor and researcher in solar energy at Brazil , explains one of these approaches in the Realization of the petals of the solar cooker with Mylar and D.

Components of Solar Cookers

Glazing

Two transparent Pyrex bowls can be assembled to enclose the pot, creating an effective greenhouse enclosure.

Two Pyrex bowls, or one with a Pyrex tray, are an excellent greenhouse enclosure for Panel Solar Cookers . This example worked well, even without a cover on the Porcelain cooking bowl.

Glazing is the term used in this article and in the solar industry to describe the glass or plastic coatings used in a cooker or solar collector. (In other industries, glazing may concern only glass products.)

The glazing creates a Greenhouse effect "trapping" solar energy and increases the efficiency of cooking.

Glazing partially blocks the sunlight, but the overall efficiency of solar cooking increases with use of glazing, especially in windy weather. Thicker glazing blocks usually more sunlight than the thin. In theory and in most situations, two layers of glazing work better than one in most solar cooking applications. A single layer of glazing will perform and is much simpler to construct.

Pyrex bowls (of assorted sizes) are transparent and work well as a glazing. There is little refraction of the light, because the rays can penetrate directly unto the black pots. In 2018, Alan Bigelow , Scientific Director of SCI , led the protocol test PEP on the solar panel cooker CooKit , comparing two types of greenhouse enclosures. Alan found that the use of the double-hulled Pyrex enclosure was 25% more effective in generating heat than the use of a Plastic Roasting Bag . More information...

John Roche, retired 3M research and design engineer and solar expert, states that the effectiveness of the sun is reduced approximately 15% for every layer of glazing.

Sport solar oven

Acrylic has good uv stability for use in the sunshine. It also has lower softening and melting temperatures. The Sport solar oven adds a sheet of UV stabilized polyester to the molded acrylic lid to provide for excellent insulation for the oven.

Plastic oven roasting bags have been widely used to create a greenhouse enclosure for the Panel Solar Cookers. However, they are much less effective than the Pyrex bowl approach. Their advantages include, inexpensive to buy and easy to use. They are also difficult to clean if they are contaminated with spilled food, especially in areas where the water supply is limited. There is a problem of removing plastic bags, which do not decompose when discarded.
The cumulative cost of continuously replacing plastic oven roasting bags is more costly than a Pyrex bowl and/or some commercial solar cooker models that can last for 10+ years. The average life of oven roasting bags of fifteen uses was previously documented by SCI.

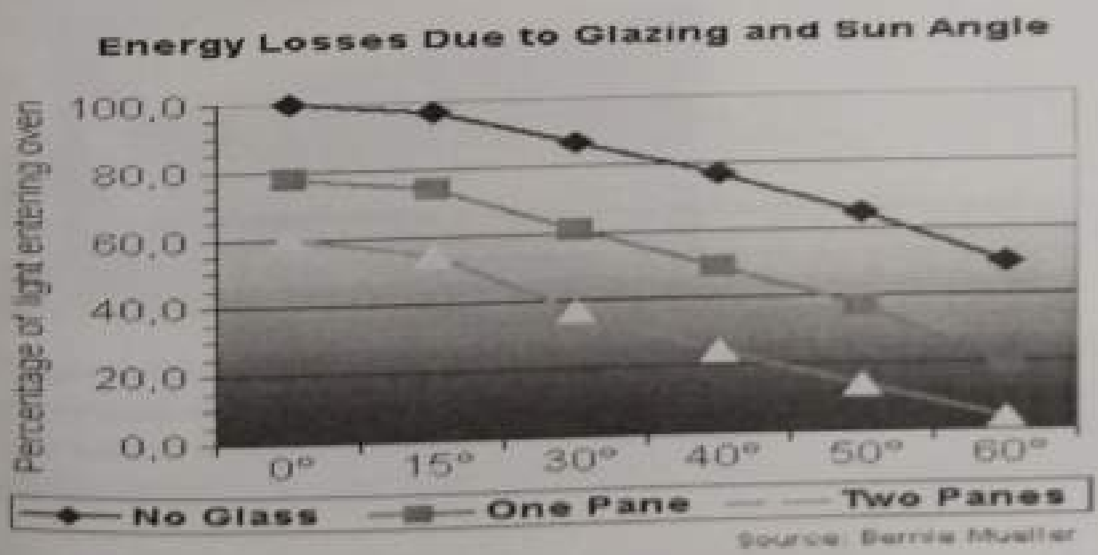
Are plastic bags always harmful to the environment when they are not burned?

Considerations

Different aspects of a ' greenhouse ' must be taken into account. Take these points into account.

1. **Proposed design:** Cooker, hotplate or dish? A box cooker is normally closed with a glass lid. The parabolic solar cookers sometimes operate without glazings, but the glazing improves the performance considerably. The panel solar cookers are well served by domes.
2. **Material:** Glass can withstand high temperatures, not all plastics can.
3. **Size:** Does the intended pan fit in the glazing without touching the sides? How easy can the glazing be stored? A plastic bag can be bent, the glass cannot.
4. **Availability:** If you want to build more stoves or replace a damaged solar cooker, can the glazing be easily obtained?
5. **Cost:** Always a challenge. Solar cooking and a small budget go together for wide spread acceptance.
6. **Robustness:** Glass can break when used, transported or stored. Plastic is more flexible than glass. High temperature oven roasting bags are a practical product. In Refugee situations, it can be difficult to get water to wash the bags if food has spread over them. Long term use of oven roasting bags can be very expensive.
7. **Life Cycle:** Discarded plastic bags can be distasteful in the environment and they can be

Glass Plates



For the box cookers, the transparent glass, simple standard thickness (2.5 mm), proved to be very satisfactory. Thinner glass is less prone to cracking heat than thicker panes, probably because it heats more rapidly and evenly, reducing thermal stresses. The flat glass is very heavy and was only satisfactory when it was soaked. Some Solar Cooker designers choose simple glazing for portable models with a second Temporary option in bad weather. Permanent double glazing is often chosen for all-season solar cooking, which is probably ideal when materials are available.

Glass, although fragile, is generally available in major metropolitan areas around the world, while tempered glass and synthetic glazing are specialty materials requiring unique supply lines. The glass does not degrade in the sun. If it is protected from thermal stresses and shocks, it is more durable long-term than most plastic glazing, even those that are treated against degradation by ultraviolet rays. Glass is excellent as long as it does not break.

Glass with small iron content allows more radiation to penetrate the box and makes a hotter oven but is not essential. One-way glazing was found to reduce the function of a baking oven. Recycled automotive glass, especially flat parts of the side windows of the vans, has been used successfully, but even parts that seem clear can be tinted to some extent to reduce heat in the vehicle or to add safety glass. Both tented glass and all the added materials block the solar radiation.

Glass can be tempered if desired, although the cost of hardening is so high that occasional replacement of the glass may be less costly in the long term for the artisanal Solar Cooker. Glass with simple thermal cracks can be held in place by a silicone sealant or a non-toxic glue or a narrow band of tape.

Plastic Plates

Transparent plastic double wall polycarbonate glazing, Seattle 2009 Mikeand Martha Port used similar material as pictured above in Nicaragua. The underside of the material (warmth of the oven) expanded the lower level more quickly while the topside of the material expanded at a slower rate. This resulted in significant open gaps at the corners defeating the performance of the oven. (The wood pictured above may be present captured inside of a metal ring attached to the side wall of the solar cooker might overcome the warping. Double wall glazing is much more effective!

Polyester film

Prasanta the Solar Cooker Workgroup Sliedrecht NL , reported in 2014 having successfully tested a polyester glazing material for use as an alternative to glazing. He has featured in various weather conditions. The contact cement was used to attach the material to the wooden frames. Because the glue was not UV-resistant, the exposed glue areas were painted white with the edge of the frame. The polyester film is as follows: It is almost weightless, it is cheaper and less fragile than glass, and the mounting of the material and its transport are simple. Two rolls of 10 kg each will be 150 transparent windows of 65 X 65 cm and 4 mm thick, sufficient to make 75 double-glazed solar cookers..

Cookers to Panels

A Panel Solar Cooker Typical differs from a Box Solar Cooker in two aspects:

1. The enclosed space is much smaller (usually it is a bag around the pot or a sheet of plastic wrapped in a circle on which the pot rests -
2. It allows the light to enter not only from the top, but from all sides (this is well suited for the use of panel reflectors).

Sharon Cousins , who cooks in northern Idaho at 47 degrees north, on a ridge exposed to the southwest swept by prevailing winds, has developed several rigid covers that are not likely to be damaged with use as a solar cooker. One of her favorites is a one-gallon transparent Pyrex bowl/casserole for the bottom and a large transparent acrylic bowl for the opening. These are large enough to hold her black one gallon painted enamel jar, a round granite roaster, and various other pots. This works much better under cold or windy conditions than an oven bag. It also gives easy access to food, which is particularly useful if foods are improved by stirring them from time to time (for example, rice to milk) or if food will be added later during cooking. The most difficult ones began to soften.

glass baking box.

Daniel Joseph, a soldier stationed in Kuwait, experimented with a CooKit and a larger glass enclosure. The glass box offers a good view of the pot, well supported on a grate. Can an explanation of how he made the glass box be added? I suspect this used extruded right angle metal which he cut to size with beads of silicone caulking insulating the metal from the glass and the interior of the cooker.

Cooking directly in glass containers

Sometimes a glass container is used without a pot. The food inside is heated directly by the sun.

Juan Urrutia Sanz has several recommendations when using glass bottles or containers:

1. You can Cook Foods of all colors except the green pepper, which becomes colorless and hard.
2. The black-skinned fish is simply cooked by exposing the skin to the sun. For frozen fillets – place the fish in a net suspended in a jar or other small container secured by the lid. It

is not necessary to cut the net. After three quarters of an hour in the sun around noon, the fish is cooked.

3. With light colored food, add such things as: paprika, food coloring, laurel leaves, red peppers . . .
4. You should always cook with a little liquid, at least one layer of water at the bottom of the jar. Glass containers can be of all sizes, from smallest for single portions to large, and you can cook several in containers at once. The lids must be black or painted black. I do ~~it does~~ not recommend corks, rubber or other materials that degrade in the sun or heat.
5. In general, follow the same guidelines as other pots for solar cooking, such as the size of parts, etc.

Pot Cooking Chamber

Glass jar inside another glass pot baking chamber

If you place a Pyrex bowl, which is larger than the pot underneath, there will be a good chance that the condensed moisture can run downwards. This could damage the base of a cardboard solar oven. Consider placing a flat glass dish under the pot (not pictured).

Dr. Steven Jones Used a black jar in a Pyrex dish instead of a bag Plastic.

Two bowls can be assembled to enclose the jar.

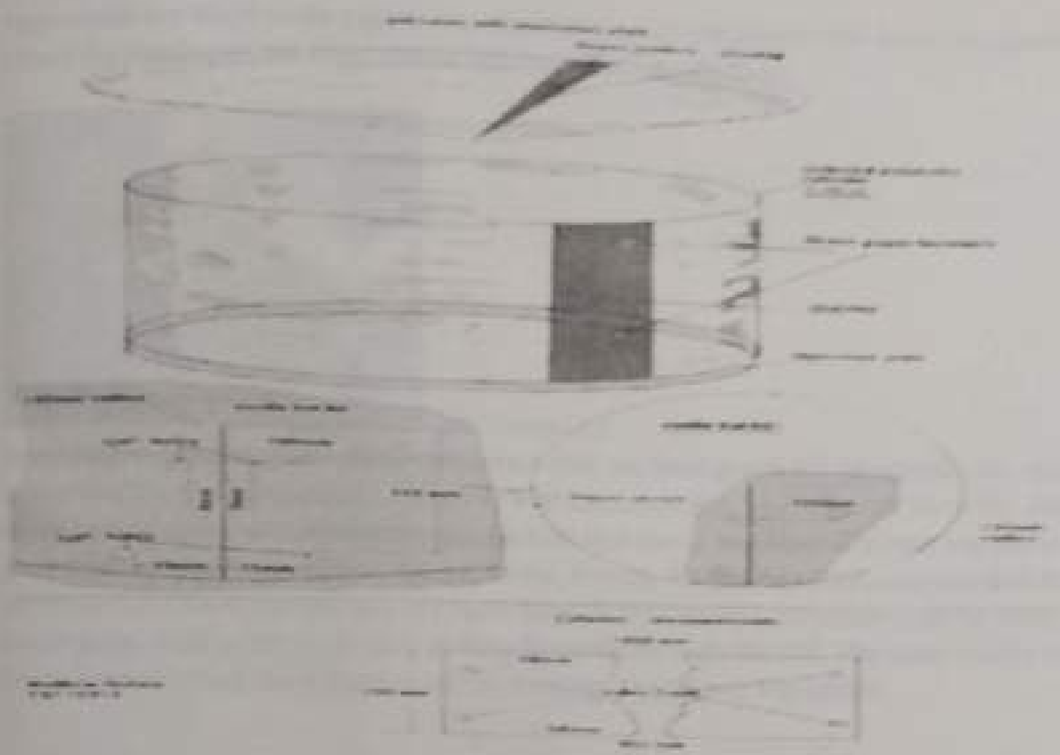
Two Pyrex bowls containing a porcelain cooking bowl without lid

Roger Haines Tested a flexible sheet of polycarbonate wrapped in a cylinder shape for a baking enclosure. It requires a round baking pot with a substantial lip that sits at the top of the enclosure. It reports good results.


Polycarbonate cooking box for the Panel Solar Cookers .


Haines Polycarbonate Wrap with a clear Cover allows sun under the pot.


Polycarbonate Bakery Cover



Reynolds Oven Bags are available in supermarkets in developed countries. They work pretty well, but new stove designs incorporate more durable housing approaches for better efficiency and durability.

Polypropylene (PP) bags distributed with CooKits in the United States are usually reusable a few dozen times before becoming brittle. More durable alternatives have been tested over the years, including polyester sheets with ultraviolet (UV) inhibitors, formed in bags using adhesive tape.

Some solar cookers use plastic bags for wrapping pots or pans. Normally heat-resistant bags, such as baking bags, are used. These resist very well the heat of the solar cooker. If other bags of plastics are used, the bag should not touch the pot, as it could melt or weaken the bag. This would cause holes through which the heat escapes. Different cable frames have been designed for this purpose.

Polypropylene and High Density polyethylene (HDPE)

Both polypropylene and high density polyethylene (HDPE) are used in autoclaves that sterilize med instruments at much higher temperatures than solar cookers. So these plastics are usually available in most countries. HDPE is also widely used for grocery bags worldwide. They are not that superior and transparent, and are "noisy" and milky in color. These HDPE bags are generally inexpensive. If they are almost transparent, they work almost as well as oven roasting bags which are much more expensive. The thickness of the plastic film does not significantly affect the heating of the solar cooker but can affect its life span.


Sun Scoop Lite

Transparent polypropylene food containers that are food grade # 5 recyclable can usually withstand the temperatures of a pot like any autoclave bag, and offer UV benefits. (More and more countries are prohibiting the production and use of any kind of plastic bag because they are an environmental problem. Kenya, China, France, Rwanda and Italy are some of the first countries who have banned use of plastic bags. Polypropylene containers can be round, square, rectangular, high or short, as long as they fit perfectly with the Pot. The more clarity of the container will affect the efficiency of the cooking, the clearer the better.

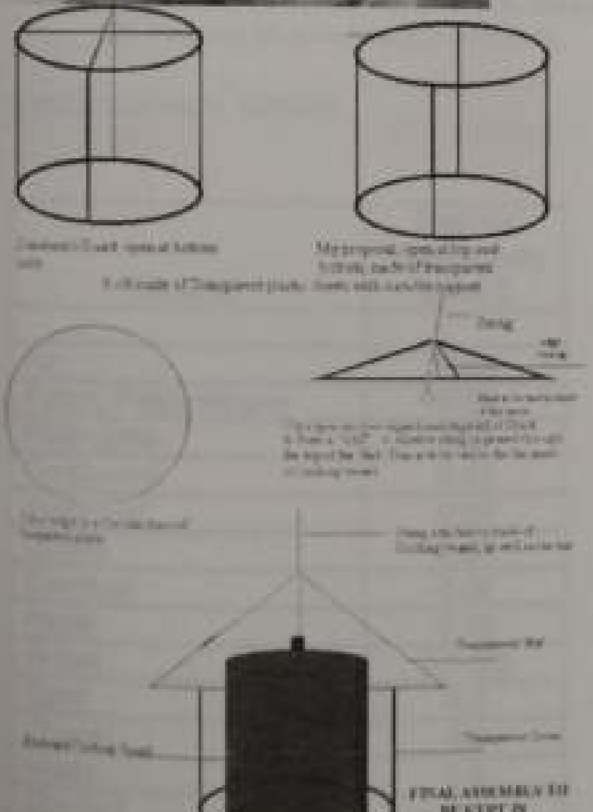
Are plastic bags dangerous For the environment?

The production of plastic bags consumes almost no energy, because the chemical changes of the oil to these plastics are minor molecular changes. The amount of fossil fuel (oil) required for producing a plastic bag is a tiny fraction of that consumed when someone prepares a meal with paraffin (kerosene). All plastics do not emit harmful fumes when heated or burned, only those that contain chlorides, fluorides or iodide-based additives, such as PVC pipes and styrenes (styrofoam) when oxygen is insufficient. Others, including all plastic bags used in solar cooking (polyethylene, Polypropylenes and Polyesters), are all simple hydrocarbons which, heated or burned, emit only minute amounts of carbon dioxide and water (vapour). Once the bags are worn, they can be safely burned, like the Paraffine or wood. They can also be reused. For example, in the context of solar cooking projects sponsored by Solar Cookers International in the refugee camps of East Africa, refugees used traditional weaving techniques to make baskets, hangers, braids, ropes and other useful objects.

Plastic Bags Accessories

Good plastic bags can be difficult to replace. Small frames can be made that hold the plastic bag around the pot/jar to insulate it, but prevent the bag from touching the hot pot, so that the bag does not heat up as much and lasts longer. A Cadre designed by M. Gnibouwa Diassana, From Mali, by twisting a rigid electrical wire, keeps the plastic bag away from the pot when baking in a solar oven CooKit .

Dr. Dale Andreatta , mechanical, and Stephen Yen, an electrical engineering student, indicate that Perfluoroalcoxy fluorocarbon (PFA) could also be a good alternative. Although expensive, PFA can withstand temperatures above 250 °c and is UV stabilized.



Another option, proposed By Steve Harrigan is to use a container made of the same polypropylene as the baking bags.

Use of a solar cooker with a "bare" pot is like using an oven with the door open. The food will warm up, but the fact that the pot is surrounded by a warm air cover is much more efficient. A saucepan can exchange heat in three ways: by radiation, by convection and by conduction. Inside a greenhouse or oven, the air helps to transfer heat into the pan. The three effects work in parallel to transfer heat into the pan. In operation without enclosure, the pan must be heated only by radiation, while convection and conduction eliminate heat.

How much does double glazing improve cooking

It depends on the transparency of the glazing and the insulation properties. In general, double glazing is better than single glazing, but it is also more complex and more expensive than single glazing. Although double glazing is better, **the real question is whether the improvement justifies additional costs and complexity.**

Inexpensive alternatives to double glazing can be:

- Use a larger reflector to increase the amount of sunlight;
- Decrease the size of the enclosure. This decreases the outer surface (which is exposed to cold air) and therefore the amount of heat loss. For example: If you replace a glass dome of 36 cm in diameter by a 30 cm, the outer surface decreases of 30%. The outer surface of a 50x50x30cm cooker decreases by almost 10% if you are 25 cm in height instead of 30.

Greenhouse effect In: Materials

Material	Thermal Conductivity W/m C
Air	0.03
Foam, Polyurethane	0.03
Fiberglass	0.04
Corkboard	0.04
Wool Felt	0.05
Cotton	0.06
Sawdust	0.06
Paper	0.18
Wood	0.1-0.2
Sand	0.3
Plaster	0.5
Glass	0.8
Dry Soil	1
concrete	1.04

Thermal inductivity of various materials

Box Solar Cookers **often use insulation in their wall cavities. However, studies have shown that this insulation may not be as important as you might think, because more heat is lost through the** Glazing **. If the glazing is well insulated (double layer) then insulation in the walls is all the more beneficial.**

Insulation in solar cookers with the construction of an inner box inside of an outer box is usually achieved by lining the walls of the boxes with aluminum foil. If you have limited quantities of aluminum foil, the priorities are as follows: 1) cover the interior space of the oven, inside walls and the inner top of the lid around the glazing and the reflector (or reflectors), 2) cover the inside of the outer box.

For additional insulation, pack with a light weight, clean, non-toxic substance. Such bulk insulation is packaged without tightening as it insulates better if it is fairly airy. Yet it is tight enough not to settle down with time, leaving an empty space at the top. Also, with loose packaging, the sides of the oven are not forced to bulge and misshape the solar cooker. A deflector between boxes foiled or not, helps to insulate, partly by preventing sedimentation and partly by blocking the convective flow of air. Sheets of cardboard or other materials used to separate the insulation space inside each wall, are set roughly in the middle of the space Coatings on both sides of the deflectors is best but not necessary. According to the work of Dr Ed Pejack, an inclined deflector adds to the structural resistance, but is not significantly better for insulation than perpendicular insulation.

Solar Cooker Designs

Designers and Manufacturers Have adopted various approaches to create solar cookers. The most commonly used were the Box Solar Cookers And The Panel Solar Cookers . They work well for slow cooking, are generally less expensive than other styles and are fairly easy to build for most people. Variants of these designs have generally been used to introduce solar cooking in deforested developing countries since 1950. Models made of high quality are available for purchase from suppliers in many Countries

The parabolic solar cooker are also used for a long time, mainly in Europe and Asia. They bake at higher temperatures and usually require ~~a~~ more complicated manufacturing. A number of models are available from the Manufacturers . They can be used in series to create steam for Institutional kitchens feeding thousands of people a day.

Vacuum Tube Solar Cookers Are compact, cook efficiently, and cook smaller amounts of food. Several models are commercially available. Other variations of solar cookers are also included in the subcategories listed below.

Designs

The CooKit is - a Solar Panel Cooker - is very simple.

Benefits

- Inexpensive to build or buy, and can generally be collapsed for storage or transportation
- Slow cooking keeps the flavors and nutrients and requires little or no reorientation to the sun

Disadvantages

- Generally reaches Temperatures ranging from 110 to 140 °c (230 to 284 °f) and cannot fry food
- Craft units are difficult to protect

Article principal: Solar Panel Cooker Designs

Solar Box Cooker

The "Minimum" Box Solar Cooker is a popular Design which can be easily built using cardboard boxes.

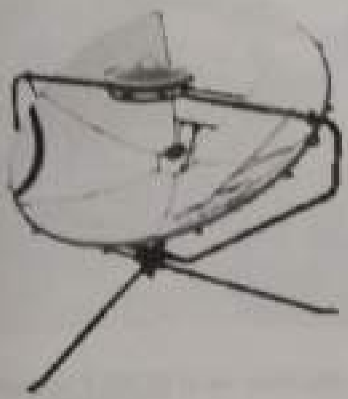
Benefits

- Some big enough to cook with several Pots , also perfect for cooking and slow cooking
- Can be built with simple materials
- Several high quality commercial designs also available

Disadvantages

- The front wall of the "box" casts shadow (decreases sunshine) entering the cooking chamber unless the unit is tilted
- Cannot fry food. The cooking temperature is between 135 and 200 °c (275-392 °f)

Design of Parabolic Solar Cooker



The SolSource is an effective Parabolic Solar Cooker

Benefits

- Cooking times are similar to those of a traditional cooker
- High temperatures allow frying and broiling food, usually between 120 and 230 °c (248 to 446 °f)

Disadvantages

- Requires periodic reorientation, often every fifteen minutes, which can be carried out with a device of mechanical Solar monitoring
- Generally more expensive than panel or box solar cookers and requires more storage space.

Design of Vacuum Tube Solar Cooker

The SLICK SM70 is an example of a Vacuum Tube Solar Cooker.

Benefits
- Usually compact and can cook quite efficiently with relatively small reflectors
- Contemporary designs have an aesthetic appeal

Disadvantages
- The baking chamber requires careful handling to avoid thermal shocks and breakage of the glass tube
- Glass technology limits the size of the opening of the baking chamber somewhat

Benefits
- The curved trough reflector is effective for gathering and concentrating sunlight along a straight focal line
- Works well with the baking chambers to Vacuum tubes To create a compact packaging that is easy to store

Disadvantages
- The design of the chute does not focus the sunlight on a standard pot
- Not particularly well suited for building home enthusiasts

Article principal: Solar Trough Cooker Designs

Other Solar Cooker Designs

Benefits

- Mirror reflectors are flat panels, not requiring the complex curved shape of parabolic solar cookers, they can nevertheless reach typical temperatures of parabolic solar cookers
- Metal frames to hold the mirrors can be assembled by workers with basic welding skills

Disadvantages

- Due to the relatively large size and geometry of some models, they usually need to be redirected by hand or by a mixing system and of Followed Mechanical.
- May require more floor space than other solar cookers

Fresnel Solar Cooker Design

The Solar Cooker Heliac Uses a Fresnel lens with a wide focus, ensuring efficiency and safety.

Benefits

- High temperatures can be Boiling and frying when cooking
- Easy to build on site with flat lenses, avoiding complicated convex structures
- The structures of the structures containing the lenses can be produced with resources5 local

Disadvantages

- Highly concentrated solar radiation with a spot focus can produce burns
- They may require more storage space than other solar solar cookers

Solar Rice Cooker

There is a wide variety of models of solar cookers, many of which are very simple to build from inexpensive and easy to obtain materials. Some can be built in less than an hour for less than 5 USD. Start with choosing a type of cooker design according to your needs. The table below lists the strengths and weaknesses of the most common types and shows some popular cooks of each type. Under each table are several types of this cooker. You can also Buy a solar oven ~~to~~ from various companies.

Data collection

Data collection is an integral part of the Promotion of solar cooking . In 2017, Solar Cookers International provided the following checklist to help plan new projects.

Data collection Part I: A necessity, not an option

1. Include data sharing as part of the project partner selection process. Communicate clearly that data collection and sharing is expected, not optional.
2. Include a detailed plan for the analysis of the data. Who will collect the data? Where? When? How often?
3. Were the costs of data collection and project evaluation included in the project budget and grant applications?
4. Data quality control: Who will follow up if some of the respondents ' responses do not appear to be clear?
5. Solar Cookers International recommends using the SCI Adoption & Impact Survey Developed by the global network. It is consistent with the surveys used by homes and international organizations.
6. SCI recommends conducting the baseline survey before commencing the intervention. We recommend conducting the post-intervention survey one year after the start of solar cooking by the group.
7. Add data to There .

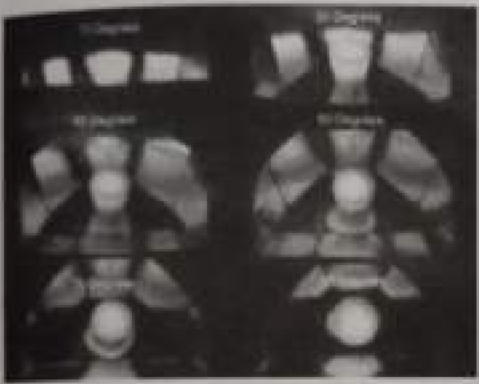
- **April 2017:** Share your best practices with info@solarcookers.org .

Data Collection Part II: Successful solar cooking projects

1. With the survey on the adoption and impact of solar cooking, we recommend conducting the basic survey (before People start cooking with solar energy) and post-distribution issues one year after the start of solar cooking.
2. Make sure that the data is added to the SCI-card of the solar cooker's distribution.
3. Include evaluation costs in the initial project budget and grant applications.
4. Include an agreement on data sharing as part of the initial selection of participation in the project. (participants must understand that this is an expectation for participation in the project)

5. Include regular meeting times in project design so that project participants solve problems, develop community and share data.
6. Make sure the surveyor understands the questions and the expected answers.
7. Gather individual success stories and facts and figures. Include requests for photographs and/or videos and/or quotes within the framework of the grant agreement (and the budget) with the organization implementation with a specific number and due date.
8. Make sure there is a data analysis plan (who does? Where? When? is included in the budget) and data quality control (a way to track whether Some responses do not appear to be clear or may have been communicated incorrectly).
9. Make sure there is a way to understand the local fuel measurement units (such as harvest waste bags) in universal terms (Like kg).
10. Consider the format in which the responses to the survey are recorded. Excel spreadsheets would be much easier for data analysis, but so far I have only been able to receive answers in Microsoft Word format. Take into account the time it takes to transfer data from Word to Excel if this is the case. If possible, use the Google Form version of the survey (but this requires an Internet connection at a given time).

Testing



Absolute Tests

- The performance of the stoves varies considerably and the performance of a specific stove is often different in the laboratory and in the field. The tests enable those responsible for the implementation to assess the performances and fuel emissions. Decisions to implement and improve the design and performance of stoves.
- **Boil water Test (WBT)**
- The SOR test Water Utilization is a laboratory test that evaluates the performance of the stove while performing a standard task (boiling and simmering) in a controlled environment to study the heat transfer and combustion efficiency of the stove. ILS are the easiest, fastest and cheapest to drive, but reveal the technical performance of a stove, not necessarily what it can achieve in real households. **Controlled Cooking Test (CCT)**
- The controlled cooking test is a field test that measures the performance of the solar cooker compared to traditional cooking methods when a cook prepares a local meal. The CTC is designed to assess the performance of the stove in a controlled environment using local fuels, pots and practice. It reveals what is possible in households in ideal conditions, but not necessarily what is actually achieved in households during their daily use. CCT Test Protocol

Cooking Performance Test (KPT)

- The cooking performance test is a field test used to evaluate the performance of the stove under real conditions. It is designed to assess the real impacts on household fuel consumption and ease of use. LEs KPT are usually carried out as part of a real diffusion effort with real populations cooking normally, and give the best indication of the actual changes. The KPT is a reference test, with parameters that judgment must be considered as part of the process of designing the solar cooker.

Follow the Sun

It is not normally necessary to turn the Box Solar Cookers and the Panel Solar Cookers to follow the sun, unless you cook beans or a large amount of food, or if you are cooking a day when sunlight is not optimal. It may be beneficial to reorient them to the sun every three or four hours. However, the Parabolic Solar Cookers require a much more frequent reorientation with

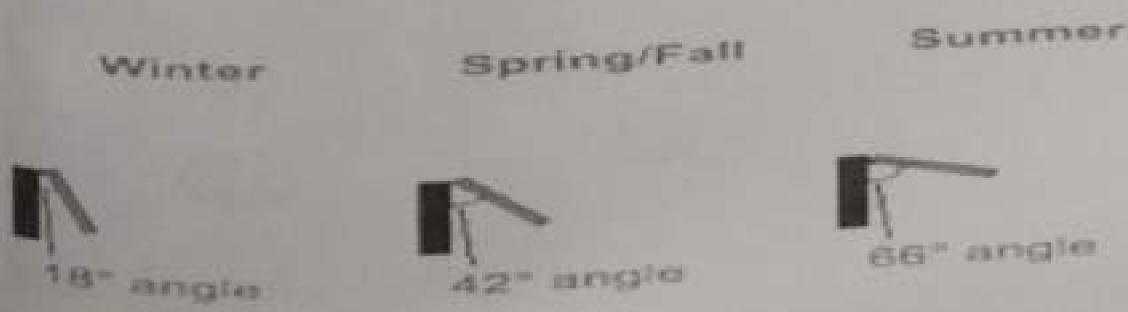
the sun, e.g. once every 15 – 20 minutes as well as stirring food frequently. If sun monitoring is necessary, some of the ideas below will be used for this purpose.

When **considering** tracking systems, it may be useful to determine the annual movement of the sun at various locations. In addition to the annual scope, this useful tool also provides real-time sun information for a specific location. Suncalc.org

The following table presents a good concept regarding sun angles and where one lives. The latitude of the following example is unknown.

Figures shown in degrees from vertical

Jan	Feb	Mar	Apr	May	Jun
26°	34°	42°	50°	58°	66°
Jul	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
58°	50°	42°	34°	26°	18°



Benefits of Solar Cooking for households

Health and nutrition

- Moderate cooking temperatures in simple solar cookers help preserve nutrients.
- Those who would otherwise do not have the means to buy fuel can cook nutritious foods, such as legumes and many whole grains, which require hours of cooking.
- Sometimes many families have to exchange rare foods for cooking fuels. Solar cooking can help them keep more food **and** improve their nutrition.
- Smoke from fires and smoldering coals irritate the lungs and eyes and can cause disease. The solar cooker is smoke-free.
- Smoke from the fires for cooking is a major cause of global warming.
- Cooking fires are dangerous, especially for children, and can easily spread if they are not contained, causing damage to buildings, gardens, etc. Solar Cookers are without fire.
- Millions of people regularly walk for miles to pick up Wood for cooking fires. Tedious fuel travel can cause injury and expose people to the dangers of animals and criminals. Solar cooking reduces these loads, risks and frees up time for other activities. In the Iridimi refugee camp in Chad The Need to leave the camp to pick up firewood was reduced by 86% thanks to the introduction of tens of thousands of solar cookers (model CooKit).
- With good sunshine, the solar cooker can be used to cook food or Pasteurizing Water In case of emergency when other fuels and energy sources are not be available.

Economy

Each group of food products costs the same price as the pile of charcoal indicated in the middle. By using a solar oven, a family can use the money saved on the fuel to buy more food

- In the world, of countless poverty-stricken families spend at least 25% of their income on cooking fuels. Sunlight -"fuel" for solar cookers - is free and abundant. The money saved can be used for food, education, health care, etc.
- Solar Cooker companies can provide additional income. Opportunities include manufacturing, sale and repair of solar cookers as well as solar cooker companies, such as restaurants and bakeries.
- Even residents of developed countries can save a lot of money on the costs of cooking and air conditioning. See Cost savings of solar cooking .

Convenience

- solar cooking, the food does not need to be stirred and can simply be placed in a solar oven and left to cook unattended for several hours (without burning) while other activities are being pursued. In the right circumstances, it is possible to place a brick or a soapstone in the solar cooker in the morning and go home late in the afternoon or early evening for a hot meal ready to eat. Well insulated solar cookers will keep food hot into the late afternoon and/or early evening without use of bricks or soapstone.
- The pots used for solar cooking are easy to clean.
- Time is saved - a valuable fact for persons who have to travel many kilometers to fetch firewood.
- Many solar cookers are portable, allowing solar cooking on sites or during outdoor activities such as picnics, trekking or camping.
- Solar cookers can be used to pasteurize water making it safe to drink. (included in health benefits below)

Health Benefits

- The pollution of the Air from household cooking fires often leads to respiratory diseases resulting in more than seven million deaths a year. The solar cooker is smoke-free.
- Waterborne preventable diseases account for 80% of diseases and deaths in developing countries. Solar cookers can be used at household level to Pasteurize Water and milk , making them safe to drink. Pasteurization uses about half of the fuel that would have been used for sterilization.
- Many solar cookers can be used to Disinfect Dry Medical Supplies such as medical devices, bandages and other fabric materials, as well as to heat compresses.

Environmental benefits

- Two billion people depend on wood and charcoal for cooking fuels. Solar Cooking lessens these basic needs and helps preserve the declining forests.
- Cooking fires fueled by biomass and oil pollute the air and contribute to global warming. Solar cookers are pollution-free and, when used in large numbers, can help to curb Global warming and gradation. See The overall gradation .
- The kitchens stay fresh while the solar food cooks outdoors. This reduces the load on air conditioning and refrigerators during the summer months, saving fossil fuels (and reducing public utility bills).

Business Benefits

Solar Cooker Business Opportunities

- Manufacture and sale of solar cooker
- Solar Cooker Repair
- Solar products companies such as the Restaurants, Bakeries or Catering

Other commercial uses

- Cleaning dishes and utensils
- Boil the straw Ritz for making paper
- Honey Wax Extract
- Dying fabrics
- Pasteurizing The Potting soil
- Remove the husks from the rice grain

Benefits for Governments

- Reduce imports and subsidies for biomass and fossil fuels.
- When forests disappear and many people suffer from fuel shortages, solar cookers reduce the need for firewood by 30% to 50% for families.
- Electricity companies that are struggling to meet demand in heavy usage hours due to the intensive use of stoves and air conditioners can reduce this demand by promoting the use of solar cookers.
-

Method of cooking with solar cooker

Dried and cooked cereals (barley, maize, millet, oats, quinoa, Rice , wheat) 2 hours. Start with the usual amount of water. Next time, adjust to your taste. If the conditions in your sky are less than ideal, you may have better luck if you preheat the water and grain separately, as suggested for pasta. This is especially useful if the grain is very slow to soften.

Vegetables -Do not add water. Artichokes: 2 1/2 hours; Asparagus: ½ to 1h; Other fresh green vegetables: 1-1 1/2 hour. If they are cooked for longer, they will taste good but lose their beautiful green color and can become mushy. Beans-dried: 3-5 hours. Usual amount of water may be soaked in advance; beets, carrots, potatoes and other root vegetables: 3 hours. Cabbage, Eggplant: 1 1/2 hour if cut. Eggplant becomes brownish, like an apple cut, but the flavor is good; Corn: 1 to 1 1/2 hour. Corn grains fade slightly if exposed to the sun longer. The **pot** holds the moisture and protects the grains naturally. A clean black sock can be placed on a corn cob for a faster cooking time. Squash, zucchini: 1 hour will turn into mush if it stays longer.

Martha Port's experience indicates there is enough water in all fresh (not dried) vegetables, fruits and meats for them to cook in their own natural juices. No water is necessary for them to cook. Adding water simply requires more energy to heat the water before cooking of the food can start. Adding no water is one reason solar cooking is so-o-o flavorful. Only add water to things that require rehydration (rice, pasta, grains, dried food, etc.)

Eggs - Do not add water. Two hours for hard yellows, the whites can become brownish, but the flavor is the same.

Meat - Do not add water. If they are cooked for longer, they become softer. Fish: 1-2 hours; Chicken: 2 hours cut, 3 hours whole; Beef, pork, etc.: 2 hours cut, 3 to 5 hours for large pieces; Turkey, best to cook up into quarters or smaller pieces.

Pasta -Heat the water in a one saucepan. Put the dry pasta with a small amount of cooking oil in another saucepan and heat both pots until the water is almost boiling. Add hot pasta to hot water, stir and cook about 10 more minutes.

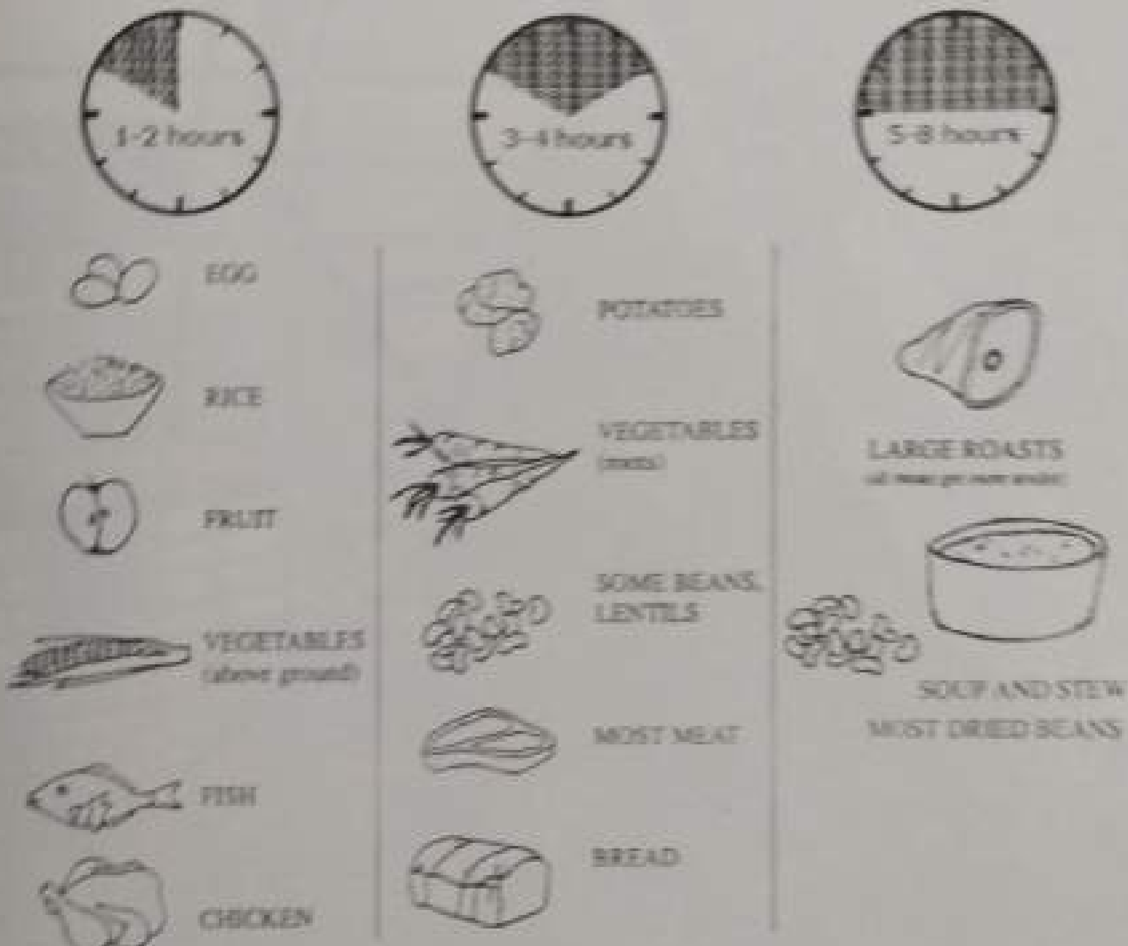
Baking – Best time is in the middle of the day (9h or 10h - 14h or 15h) breads: whole loaves 3 hours; Cakes: 1 hour and a half; Cookies: 1 to 1 1/2 hour and should not be covered. The sun makes wonderful fresh garlic bread.

Sauces and gravies with flour -Heat the juice and flour separately, with or without a little oil in the flour. Then combine and Stir. It will be ready soon.

Roasting nuts -Cook uncovered. Almonds: 1 hour, peanuts: 2 hours.

CARAMELIZATION of sugar -Sugar can be caramelized in a saucepan in the solar cookers. It's done at lower temperatures than on a conventional cooker. Basically, browning (in a cooker) starts at 140 °c (284 °f). Once the temperature begins to exceed 149 °c (300 °f), the sugar begins to burn

Here are some typical cooking times for 4 pounds (2 kilograms) of food on a sunny day.




Solar Cooker
Demonstrator

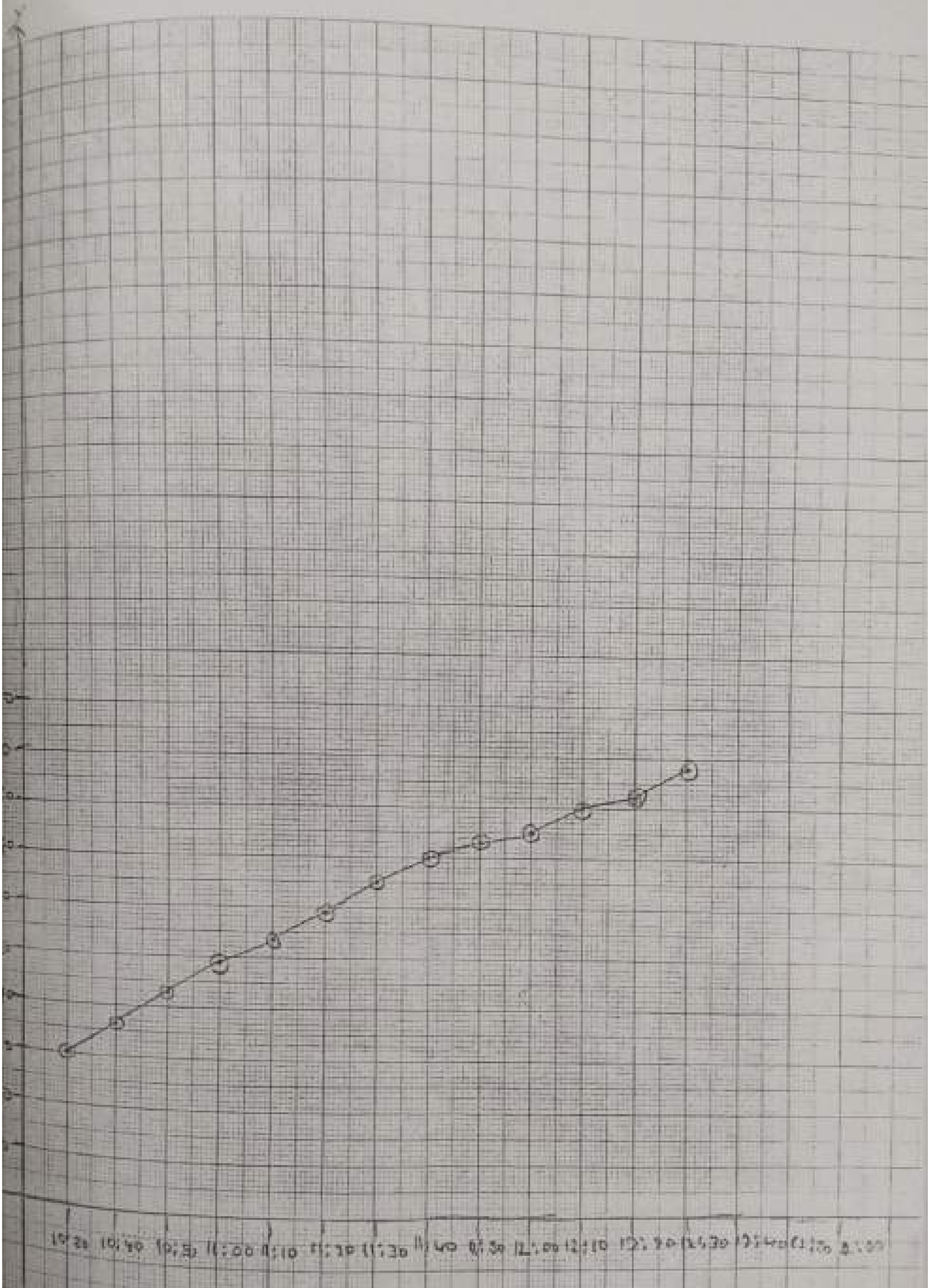
TESTING OF BOX TYPE SOLAR COOKER

Testing of Box Type Solar Cooker

Box type solar cookers are simple and suitable for limited cooking due to their relatively low heat collection capacity. For a large scale dissemination of any technology, it is essential to maintain an effective quality control on the products being offered by the industry to the end user. For this there is a need to establish test procedures and methodological for producing performance parameters, which could provide an equitable basis for comparison of performance of products.

In India, a complete test standard ISI 3429 (BIS, 2000) is available for the thermal performance evaluation and testing of box type solar cooker, which provides performance characteristics of solar cookers, more or less independent of climatic variables. There are two thermal performance parameters called figures of merit (F_1 and F_2) associated with testing of box type solar cookers as per ISI 3429: 2000.

The first figure of merit F_1, is determined from a [illegible] test

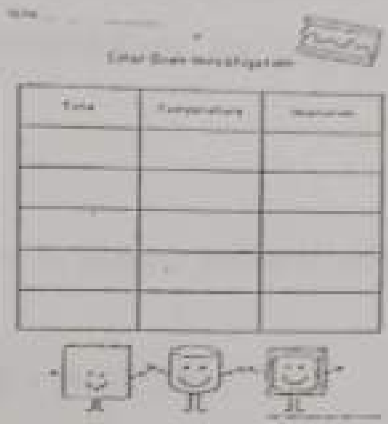


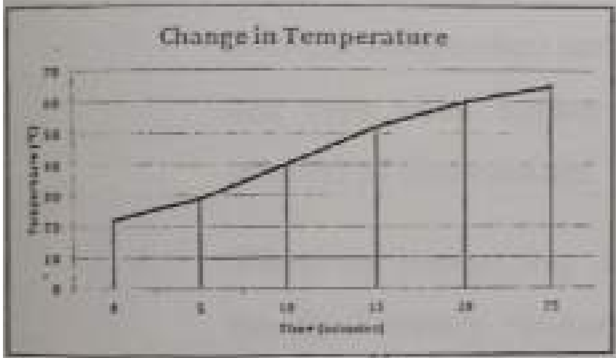
NO Load Test

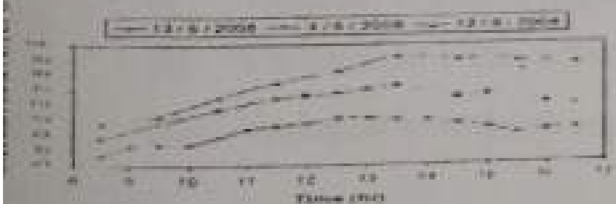
Time	Temperature	Observation
10:30	30°	14-3-2022
10:40	35°	14-3-2022
10:50	42°	14-3-2022
11:00	46°	14-3-2022
11:10	54°	14-3-2022
11:20	58°	14-3-2022
11:30	60°	14-3-2022
11:40	62°	14-3-2022
11:50	68°	14-3-2022
12:00	71°	14-3-2022
12:10	74°	14-3-2022
12:20	80°	14-3-2022
12:30	83°	14-3-2022

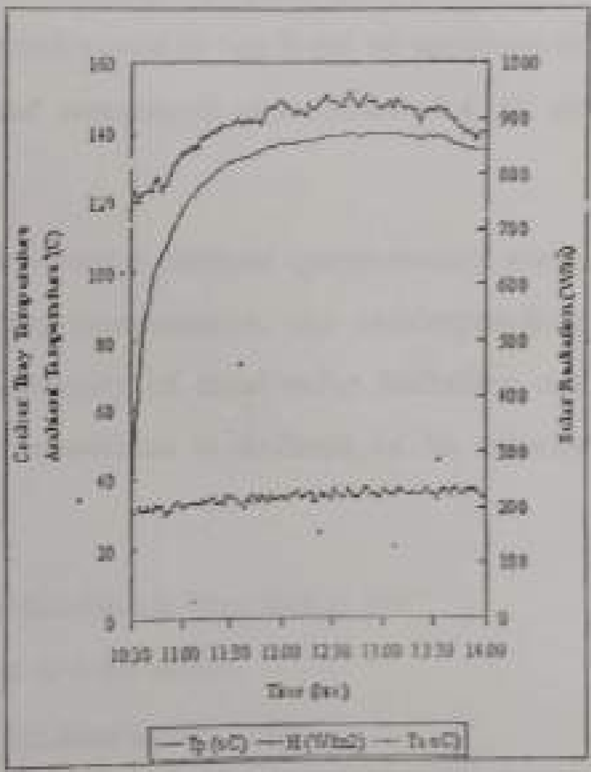
under no load condition while the second figure of merit, F_2 is evaluated from tests under full load conditions taking water as the load;

Stagnation (No Load) Test









It is obtained by keeping the solar cooker without pots in the sun-shine in the morning and allowing plate temperature to rise gradually. Soon after solar noon the plate temperature reaches at the quasi-steady state and the stagnation temperature has been achieved. The hot junction of the thermocouple with radiation shield should be fixed at midpoint of cooker tray with proper thermal contact and without protruding out. The no load test should be carried out at a clear day in following steps before 10.30 hour of local solar time, so that the stagnation temperature is achieved near or just after the solar noon. A step wise methodology for stagnation test is outlined below;

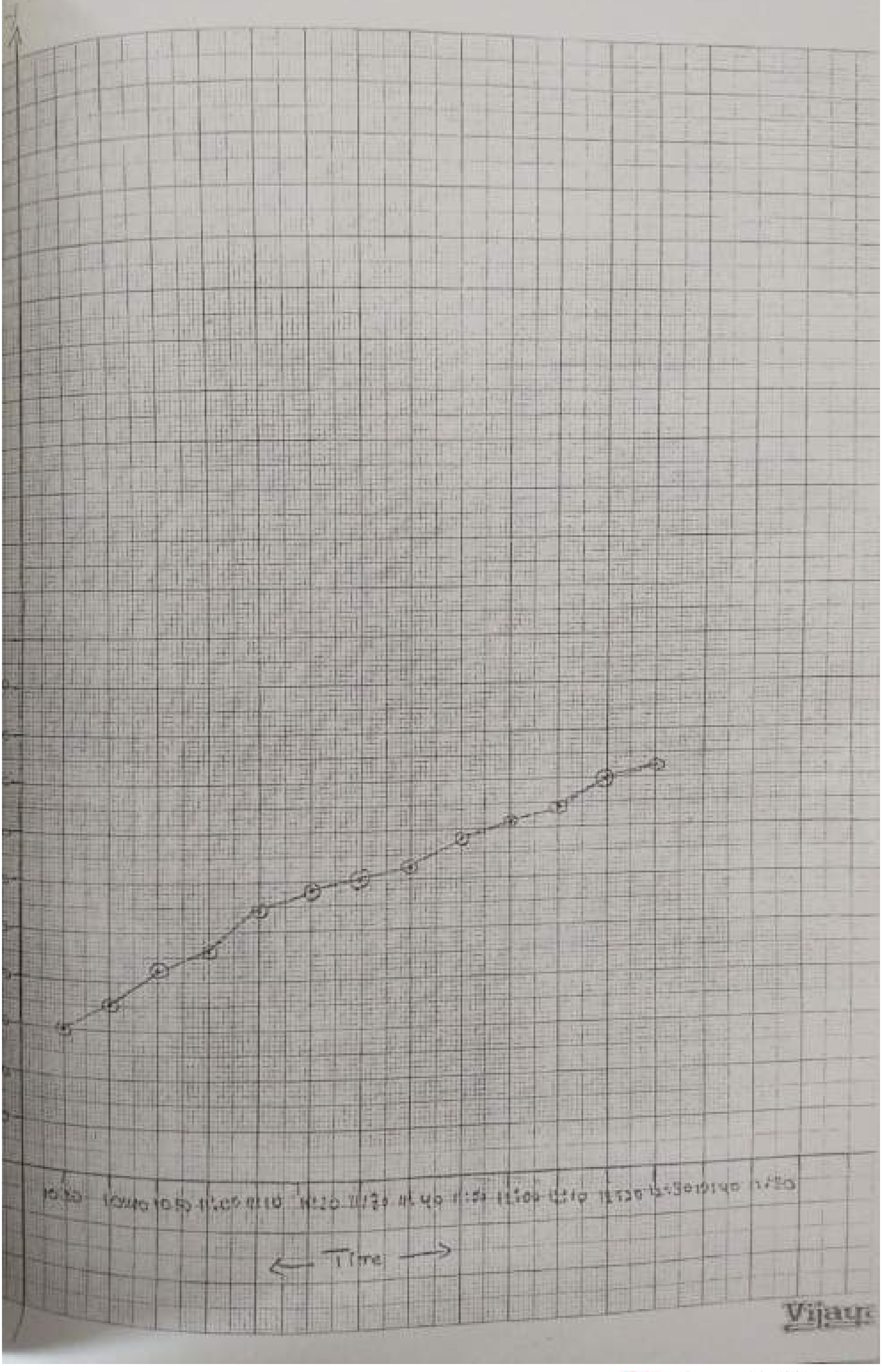
1. The box type solar cooker is placed without pots in open sun condition.
2. The reflector is covered with a black cloth.
3. Cooker tray temperature, intensity of total solar radiation, ambient temperature and wind speed at the level of aperture of box type solar cooker are monitored and measured at an interval of five minutes.
4. When the cooker tray temperature reaches quasi-steady state, the final steady cooker tray temperature, the corresponding outside temperature and intensity of total solar radiation are recorded. The steady state condition is defined as 10 minute period when:

(i) Variation in cooker tray temperature is less then ± 1 °C.

(ii) Variation in solar radiation is ± 20 W/m^2.

(iii) Variation in ambient temperature is ± 0.2 °C.

The permissible solar radiation condition for carrying out the tests is that it should always greater than 600 W/m^2. If the value of F_1 is greater then 0.12, the cooker is marked as A - Grade and if F_1 is less than 0.12 the cooker is marked as a B - Grade solar cooker.


Time

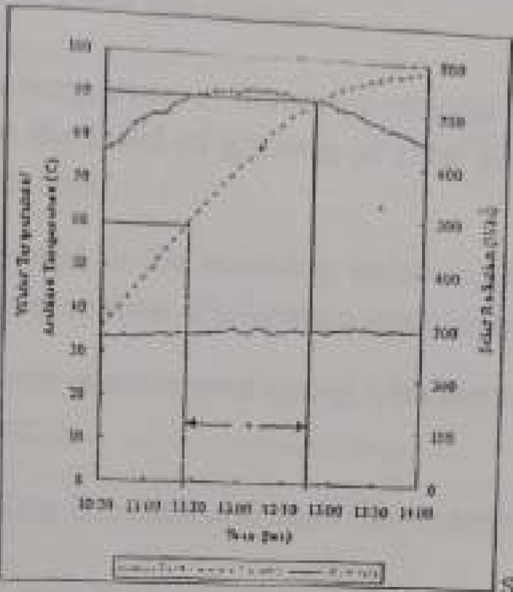
S.No	Time	Reflector temperature (T_1)	Inlet temperature (T_2)	Inner glass temperature (T_3)	Surface temperature (T_4)
1	10:30	37°	40°	45°	50°
2	10:53	40°	43°	45°	50°
3	11:30	37°	38°	40°	42°
4	12:00	42°	45°	47°	52°
5	12:30	45°	48°	50°	55°

S.No	Time	Temperature of the water
1	10:30	60°
2	10:53	65°
3	11:30	55°
4	12:00	58°
5	12:30	60°

Full Load Test

Time	Temperature	Observation
10:30	30°	13-3-2022
10:40	36°	13-3-2022
10:50	42°	13-3-2022
11:00	49°	13-3-2022
11:10	53°	13-3-2022
11:20	59°	13-3-2022
11:30	65°	13-3-2022
11:40	70°	13-3-2022
11:50	72°	13-3-2022
12:00	75°	13-3-2022
12:10	80°	13-3-2022
12:20	81°	13-3-2022
12:30	82°	13-3-2022

Full Load Test



Testing for the second figure of merit of the box type solar cooker consists of operating the solar cooker with full load test with cooking utensils, and the amount of water i.e. 8 liter/m^2 in each pot has been decided by the bottom area of the pots. The cooker is kept outside in morning (before 10.30 hours of local solar time) and the water temperature is allowed to rise gradually until it reaches up to the boiling point.

Followings instructions are associated with the full load test of box type solar cooker.

1. The empty cooking pots are weighted and then filled with water as load @ 8 litres per square meter of aperture area. Water at ambient temperature is equally distributed in all the cooking pots if they are of the same size. If sizes are different then water quantity in each cooking pot shall be in proportion of their bottom area. By reweighing the exact mass of water is calculated. The pots are placed in the cooker after removing or shading the reflector with a black cloth.

2. Temperature probe of thermocouple is placed in the largest at the, cooking pots with the measuring tip submerged in the

water. The temperature lead should be sealed where it leaves the cooking pots and the cooker.

3. The ambient temperature, intensity of total solar radiation and wind speed at the level of glazing of solar cooker are measured throughout the test.

4. The test is started in the morning between 10.00 hour to 10.30 hour of local solar time. Following measurements are done;

(i) Water temperature is measured along with the exact time of the measurement.

(ii) The data recording is continued until the water temperature exceeds 95°C.

(iii) Initial and final water temperatures data pairs are located and time duration is noticed between them. Initial and final temperature is chosen 60°C and 90°C.

(iv) The average ambient temperature and average solar radiation intensity between times t_1 and t_2 are calculated.

(v) The experiment is conducted in clear weather, and it is ensured that the solar radiation during the test exceeds 600 W/m^2.

The Indian test standard has a provision of a number of qualification tests for ensuring durability of the products. These include, rain penetration test, transmittance test, mirror reflectivity test, slam test, load test for cover plate, leakage test for rubber gaskets, impact test, etc. Specifications for the different components of solar cooker are also given in the test standard.

RESULT :-

The Performance Efficiency of a Solar Cooker is Evaluated.

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ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

A

PROJECT REPORT

ON

PERFORMANCE EFFICIENCY OF

SOLAR COOKER

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT

FOR THE AWARD OF DEGREE OF

BACHELOR OF SCIENCE IN PHYSICS

Submitted to the

ADIKAVI NANNAYYA UNIVERSITY, RAJAMAHENDRAVARAM

By

B. BhanuSri, B. pavitra, K. Srikirthi

REGD NO-1932038, 1932040,

1932047

Under The Guidance of

Sri K.VENKATESWARA RAO M.sc, B.Ed

&

Smt K.KRANTHI M.SC, M.Phil

DEPARTMENT OF PHYSICS

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DEPARTMENT OF PHYSICS

CERTIFICATE

This is to Certified that the Project Work Entitled "PERFORMANCE EFFICIENCY OF SOLAR COOKER" is a Bonafidework Carried out by G. Bhanu Sri, B. Pavitra, K. Sukeerthi Regd No 1932036, 1932049, 1932047 Year 2022,

in partial fulfilment for the Award of Undergraduation in PHYSICS, of **Adikavi Nannayya university, Rajamahendravaram** during the Year 2021-22.

It is certified that all Corrections/ Suggestions indicated for Internal Assesment have been incorporated in the report .This project report have been approved as it satisfies the academic requirements in respect of project work prescribed for the Bachelor Degree in PHYSICS.

K. Hemanth
Signature of the Guide

27/6/22
Signature of the HOD

V. M.
Signature of the Principal

Signature of the Examiners
30 June 2022

ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

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ASD GOVERNMENT DEGREE COLLEGE FOR WOMEN (A), KAKINADA

DEPARTMENT OF PHYSICS

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DEPARTMENT OF PHYSICS

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FOR THE AWARD OF DEGREE OF

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30 June 2022