PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE
(Approved by AICTE & Affiliated to Anna University, Chennai)
Madurai – Sivagangai Highway, Arasanoor, Thirumansolai Post, Sivagangai Dt. – 630 561, Tamilnadu
Mobile : 9842102628, 7373002628 Email: info@psyec.edu.in Website : www.psyec.edu.in
City Office : 10, Pandian Saraswathi St, Sivagami Nagar, Narayanapuram, Madurai - 625 014. Telefax- 0452 2682338, Mobile : 98423-02628

Number of M.E Energy Engineering Student Undertaking Main Projects during the Academic Year 2022-23

Programme Name &Code: Energy Engineering & 407

Sl. No	Register Number	Name of the Students	Project Title
1	912021407003	Karanthamalai Murugan I	Fabrication of Solar panel with sun position tracking system
2	912021407004	Komala Devi K	Production of Bio diesel from waste cooking oil by intensification Techniques
3	912021407005	Lingaraj M	Solar Power Multi-Purpose Agri bot using Android Phone
4	912021407006	Nagaraj R	Structural behaviour of various Nano Composite Material for Pantograph
5	912021407007	Priyadarshini P	Production of Bio ethanol from Agricultural waste
6	912021407008	Rasathi S	Hybrid artificial tree for Solar /Wind power generation
7	912021407009	Vigneshwaran S	Fabrication of solar, wind and rain water power generation in a single machine

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FABRICATION OF SOLAR PANEL WITH SUN POSITION TRACKING SYSTEM

A PROJECT REPORT

Submitted by

KARANTHAMALAI MURUGAN I

Register Number: 912021407003

A PROJECT REPORT (PHASE II)

Submitted to the

FACULTY OF MACHANICAL ENGINEERING

In partial fulfilment of the requirement for the award

Of the degree

MASTER OF ENGINEERING

IN

ENERGY ENGINEERING

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

SIVAGANGAI

ANNA UNIVERSITY: CHENNAI 600 025

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:14:57 +05'30'

BONAFIDE CERTIFICATE

Certified that this project report title "FABRICATION OF SOLAR PANEL WITH SUN POSITION TRACKING SYSTEM" is the bonafide work of "KARANTHAMALI MURUGAN. I" (Reg.No. 912021407003) who carried out the project work under my supervision during April 2023 to MAY 2023.

SIGNATURE

Mr.M. RADHAKRISHNAN M.E,
HEAD OF THE DEPARTMENT
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

SIGNATURE

Mr. S.POUNRAJ M.E Asst. professor
SUPERVISOR
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

Submitted for the project Viva-Voce examination held on 9.10.23

9/10/23.

INTERNAL EXAMINER

EXTERNAL EXAMINER

R RAJA

Digitally signed by R RAJA
Date: 2024.06.20 14:15:24 +05'30'

ABSTRACT

This project proposes an algorithm for detection of the position of the sun and implementation of this control algorithm on a single axis solar tracking system. The tracker consists of a photovoltaic panel and moves its surface approximately to the right angle to the sun to obtain maximum possible photon energy and convert it to electrical energy. Solar power is one of the most modern sources of renewable energy. Energy from sun is unlimited. But the main challenge remains in maximizing the amount of energy in an efficient manner in order to capture the rays from the sun for converting energy directly to electricity. One way to increase efficiency is by implementing a solar tracking system for solar panels. This is done so that the rays from the sun fall perpendicularly on the solar panel and thus ensures the capture of maximum available solar energy. The tracker periodically follows the path of the sun throughout the daytime in such a way that the panel surface is always faced to the sun. All the works of solar tracking system performed up to these days are based on almost the same theory of position sensing. Traditionally, tracking is performed by use of various types of sensors that detects position of sun. This project paper proposes a unique solar tracking algorithm instead of traditional algorithm. Unlike the use of photo-conductors, light detecting resistors, photo-transistors or photodiode, those cannot operate independently and requires voltage biasing this new type of sensing algorithm is based on generated voltage in solar panel. The solar panel generates voltage as rays of light fall on it. The generated voltage varies with the change in incident angle of light. Thus the path of sun is detected by detecting the relative change in solar

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incidence angle. Also, the thesis suggests use of low power microprocessor (such as, ATmega32) to maintain the overall operation. Hence the proposed design simplifies the operation of solar tracking and reduce operation and maintenance cost.

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CHAPTER-11

CONCLUSION

A solar tracking system, comprising: a first set of solar heat gain transducers that produce respective first electrical output signals to drive a reversible first motor for changing a vertical angle of a solar collector; a second set of solar heat gain transducers that produce respective second electrical output signals to drive a reversible second motor for changing a horizontal angle of the solar collector; each of the transducers having a thermistors in thermal contact with a thermal mass, wherein the thermal mass comprises a mass of conducting material to elevate in temperature while illuminated by the sun, and wherein the thermistors senses the temperature of the thermal mass and produces a corresponding one of the electrical output signals proportional to the temperature; and each of the transducers having the thermistors and the thermal mass contained in a solar energy collecting and heat insulating enclosure that is solar energy transparent.

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Date: 2024.06.20 14:16:20 +05'30'

PRODUCTION OF BIODIESEL FROM WASTE COOKING OIL BY INTENSIFICATION TECHNIQUES

PHASE II REPORT

Submitted by

K. KOMALA DEVI (912021407004)

in partial fulfillment for the award of the degree of

MASTER OF ENGINEERING IN ENERGY ENGINEERING

PANDIAN SARAWATHI YADAV ENGINEERING COLLEGE
DEPARTMENT OF MECHANICAL ENGINEERING
ANNA UNIVERSITY, CHENNAI

MAY 2023

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:16:35 +05'30'

ANNA UNIVERSITY, CHENNAI

BONAFIDE CERTIFICATE

Certified that this Report titled **"PRODUCTION OF BIODIESEL FROM WASTE COOKING OIL BY INTENSIFICATION TECHNIQUE"** is the bonafide work of **K.KOMALADEVI (91202107004)** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported here in does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Signature of the HOD with date	Signature of the Supervisor with date
Mr. M. RADHA KRISHNAN Professor and Head Department of Mechanical Engineering Pandian Saraswathi Yadav Engineering College, Sivagangai – 630 561	Mr. R. Pandithurai M.E., Assistant Professor Department of Mechanical Engineering Pandian Saraswathi Yadav Engineering College, Sivagangai – 630 561

Submitted for the Project viva voice held on 9/10/23

INTERNAL EXAMINER **EXTERNAL EXAMINER**

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:16:50 +05'30'

ABSTRACT

Energy security and air pollution is the challenging issues now days. Current, globally depleting fossilized fuel reserves, increasing environmental pollution and problems are the key motivating factors to pursue research on an alternative fuel derived from biomass, which can fulfil the ever-increasing energy demand for sustainable development. Biodiesel as a sustainable alternative helps in the protection of the environment due to its non-toxic, renewable, and biodegradable nature and produces less sulphur emissions and greenhouse gases. It is easy to use as well as clean and safe to handle as compared to gasoline diesel.

The present work is mainly motivated on design and development of an environment-friendly, energy-effective and industrially viable process intensification (PI)-based techniques {Ultrasound, Microwave, and Conjoint (microwave + ultrasound technique} using both homogeneous (potassium hydroxide, KOH) and heterogeneous (calcium oxide, CaO) catalyst to synthesize biodiesel from waste cooking oil (WCO) and blended oils. The outcomes of independently studied ultrasound process observed to have enhanced the biodiesel yield (98 % for KOH and 96.45 % for CaO catalyzed conditions). Biodiesel is an effective alternative fuel. In present study, biodiesel is prepared using waste cooking oil, using intensification techniques such as Mechanical stirring and Microwave Irradiation method is used to draw biodiesel.

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CHAPTER VIII
CONCLUSION

Higher costs of producing biodiesels relative to fossil-based diesel fuels drive the studies on optimizing biodiesel production conditions. Among different methods for biodiesel production, microwave-assisted biodiesel production is considered very promising, and in light of that, various parameters affecting the efficiency of the process were reviewed and discussed herein. Superiority of the microwave-assisted biodiesel production over that with conventional heating system relies on the capability of the microwave system to directly transfer heat to the reactants. Moreover, reverse thermal gradient would contribute to fast and uniform heat transfer to the reactants. Various parameters of microwave method can affect biodiesel production, as investigated in this review article. Biodiesel production can be enhanced by increasing microwave power. Further increase in the power may cause alcohol evaporation which has an adverse impact on the transesterification reaction. Indeed, too much increase in the microwave power can damage the molecular structure of available materials in the reaction medium. Based on available reports, optimal biodiesel production yield can be obtained when microwave power is between 300 and 700 W. Temperature is another parameter affecting the transesterification reaction directly, i.e., an increase in temperature increases biodiesel production. However, too much increase in temperature may induce a reverse impact, i.e., decrease the production yield. Optimal reaction temperature for biodiesel production was found to range from 55 to 65^0C. The highest efficiency of microwave technology in biodiesel production has been achieved at T=60^0C. An increase in radiation time can also increase the biodiesel production yield up to an optimal point, beyond which biodiesel production declines due to high increase in temperature and the possibility of

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damages to triglyceride structure. According to the reviewed literature, optimal reaction time was found to range between 1 and 7 min when a homogeneous basic catalyst is used. Alkali catalysts KOH and NaOH are very suitable for microwave-assisted biodiesel production. According to the results obtained from existing studies, it can be concluded that optimal catalyst concentration for biodiesel production is between 1 and1.3 wt%. Ethanol and methanol are the two most used alcohols in transesterification reaction. Methanol has excellent performance in biodiesel production due to its high dielectric constant and low molecular weight. Also, as methanol can absorb huge amounts of microwave radiation within a short time, it reaches the desired temperature so rapidly, enhancing the biodiesel production rate and efficiency. Considering the solubility of ethanol in methanol, adding a small amount of ethanol to methanol and using the mixture in biodiesel production increases the reaction efficiency. As transesterification reaction is an equilibrium reaction, alcohol concentration can be increased to increase the production yield. However, this molar increase has restrictions. The highest production rate has been achieved at a molar ratio of 6:1. Contents of FFAs and water are two limiting factors for biodiesel production, i.e., the lower the FFA and/or water content(s), the higher will be the biodiesel production yield. In order to achieve higher biodiesel production yield, the reactants should be mixed thoroughly.

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SOLAR POWERED MULTIPURPOSE AGRIBOT USING ANDROID PHONE

By

M. LINGARAJ

Register number: 912021407005

A PROJECT REPORT (PHASE II)

Submitted To The

FACULTY OF MECHANICAL ENGINEERING

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MASTER OF ENGINEERING

IN

ENERGY ENGINEERING

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

SIVAGANGAI

ANNA UNIVERSITY, CHENNAI 600 025

R RAJA

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Date: 2024.06.20 14:18:33 +05'30'

BONAFIDE CERTIFICATE

Certified that this project report title **"SOLAR POWERED MULTIPURPOSE AGRIBOT USING ANDROID PHONE"** is the bonafide work of **"M.LINGARAJ"** **(Reg.No. 912021407005)** who carried out the project work under my supervision during April 2023 to May 2023.

SIGNATURE

Mr.M. RADHA KRISHNAN M.E.,
HEAD OF THE DEPARTMENT
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

SIGNATURE

Mr.M. RADHA KRISHNAN M.E.,
SUPERVISOR
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

Submitted for the project Viva-Voce examination held on 09-10-2023

INTERNAL EXAMINER

EXTERNAL EXAMINER

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:18:51 +05'30'

Abstract

In India nearly about 70 percentage of people are depending on agriculture. Numerous operations are performed in the agricultural field like seed sowing, grass cutting, ploughing etc. The present methods of seed sowing, pesticide spraying and grass cutting are difficult. The equipment's used for above actions are expensive and inconvenient to handle. So the agricultural system in India should be encouraged by developing a system which will reduce the man power and time. This work aims to design, develop and design of the robot which can sow the seeds, cut the grass and spray the pesticides, this whole system is powered by solar energy. The designed robot gets energy from solar panel and is operated using Bluetooth /Android App which sends the signals to the robot for required mechanisms and movement of the robot.

This increases the efficiency of seed sowing, pesticide spraying and grass cutting and also reduces the problem encountered in manual planting

Keywords: Agriculture, autonomous, grass cutting, pesticide spraying, robot, seed sowing, solar powered

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CHAPTER IX

CONCLUSION

9.1 CONCLUSION

To carry out difficult farming activities including seed sowing, grass cutting, and pesticide spraying, an autonomous multipurpose agricultural robot is created. Two different sized seeds are to be sown using this work. Reduced human interaction and effective resource use are two advantages of robots. Since the robot is solar-powered, renewable energy is being used. Android apps are used to carry out the tasks. Innovative equipment for grass cutting, spraying pesticides, and spreading seeds has a big impact on agriculture. Farmers can save a lot of money on labour and more time by adopting this advanced job.

9.2 Scope for Future Work

The designed robot will perform the seed sowing, pesticide spraying and grass cutting operations simultaneously. When the solar panel gets heated it converts sunlight into electricity. This electrical energy is fed into the charging circuit. The charging circuit will work according to maximum power point tracking (MPPT) protocol to generate pulsed voltage and also avoids reverse current. The pulsed voltage is given to battery in order to charge it. The charging of battery is controlled with the help of voltage sensors. Since battery is bidirectional it will charge and supply voltage to ardunio at a time. The voltage supply with sustained oscillation is fed into ardunio with the aid of high pass filter. The channel relay provides voltage supply to all different mechanisms. The motor driver is used to drive the DC motors which run the robot. The model consists of android app and bluetooth HC-05 to transmit and receive the signals respectively. The robot waits until it gets signals from app. When the signal is received, the respective operations will be activated and robot will work accordingly.

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TRUCTURAL BEHAVIOUR OF VARIOUS NANO COMPOSITE MATERIAL FOR PANTOGRAPH

A PROJECT REPORT-(PHASE-II)

Submitted by

NAGARAJ.R (REGISTER NUMBER: 912021407006)

FACULTY OF MACHANICAL ENGINEERING

In partial fulfilment of the requirement for the award

Of the degree

MASTER OF ENGINEERING IN

ENERGY ENGINEERING

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE

SIVAGANGAI

ANNA UNIVERSITY: CHENNAI 600 025

R RAJA

Digitally signed by R RAJA
Date: 2024.06.20 14:20:11 +05'30'

BONAFIDE CERTIFICATE

Certified that this project report title **"STRUCTURAL BEHAVIOUR OF VARIOUS NANO COMPOSITE MATERIAL FOR PANTOGRAPH"** is the bonafide work of "NAGARAJ.R" (Reg.No. 912021407006) who carried out the project work under my supervision during April 2022 to July 2022.

SIGNATURE

Mr.M. RADHAKRISHNAN M.E,
HEAD OF THE DEPARTMENT

Mechanical Department,

Pandian Saraswathi Yadav

Engineering College,

Arasanoor,

Sivagangai District.

SIGNATURE

Mrs. S.YOGESWARI Asst. professor
SUPERVISOR

Mechanical Department,

Pandian Saraswathi Yadav

Engineering College,

Arasanoor,

Sivagangai District.

Submitted for the project Viva-Voce examination held on 09/10/23

INTERNAL EXAMINER

EXTERNAL EXAMINER

R RAJA

Digitally signed by R RAJA
Date: 2024.06.20 14:20:30 +05'30'

ABSTRACT

This study explores the replacement of traditional pantography materials with a novel composite material, consisting of reinforced nano boron carbide (n-B4C) and multi-walled carbon nanotubes (MWCNTs), through a comprehensive structural analysis. The integration of n-B4C and MWCNTs in the pantograph material offers the potential to enhance its mechanical strength, wear resistance, electrical conductivity, and thermal performance. To assess the feasibility and benefits of this substitution, a systematic structural analysis was conducted, including stress, strain, and deformation calculations. The results reveal promising improvements in the mechanical properties of the composite, including increased tensile strength and stiffness. Additionally, the enhanced wear resistance and electrical conductivity of the material were observed, which can significantly contribute to prolonged service life and improved operational efficiency of pantograph systems. This study provides valuable insights into the potential advantages of adopting n-B4C and MWCNT-reinforced composites in pantography applications, highlighting their positive implications for both performance and sustainability within the transportation sector. Further research and practical validation are recommended to fully exploit the advantages of this innovative composite material in real-world pantograph systems.

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CHAPTER-8

CONCLUSION

The use of a reinforced composite material consisting of MWCNTs and n-B4C offers a promising avenue for advancing pantograph technology. The combination of enhanced mechanical properties, reduced weight, improved electrical and thermal conductivity, and increased wear resistance makes it a compelling choice for the development of more efficient, durable, and environmentally friendly pantograph systems. Further research, development, and testing are needed to fully realize the potential of this innovative material in pantography applications.

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Date: 2024.06.20 14:21:06 +05'30'

ANNAUNIVERSITY:CHENNAI 600025

BONAFIDE CERTIFICATE

Certified that this project report title "**PRODUCTION OF BIOETHANOL FROM GRICULTURAL WASTE**" is the bonafide work of "**PRIYADARSHINI.P**" eg.No.**912021407007**) who carried out the project work under my supervision ring April2023toMay2023.

IGNATURE

Ir.M.RADHAKRISHNAN M.E.,
EAD OF THE DEPARTMENT
Aechanical Department,
andian Saraswathi Yadav
ngineering College,
rasanoor,
ivagangai District.

SIGNATURE

Mr.S. POUNRAJ M.E.,
ASSISTANT PROFESSOR
SUPERVISOR
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

ubmitted for the project Viva-Voce examination held on 09.10.23

9/10/23.

INTERNAL EXAMINER

EXTERNAL EXAMINER

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:21:25 +05'30'

ABSTRACT

Due to rapid growth in population and industrialization,worldwide ethanol demand increasing continuously. Agriculture Waste such as sweet sorghum and cassava peels waste are used as a raw material, because they are renewable resources and attractive feed stock for bio ethanol production. Here, Dust (or) mpurities are removed from the raw materials and then drying process is carried out. For the require of minimum particle size milling process in takes place. After the milling process, lingocellulose is obtained by fermentation process(Timeperiod:48-72hrs)by using enzyme (Alphaamylase).Finally lignocelluloses undergoes distillation process (Temperature:70^{0}C) bioethanol will be produce. Then analyzethe sample by using High Performance Liquid Chromatography and analyze the presence and absence of bioethanol in given sample.

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CHAPTER-7
CONCLUSION

Ethanol production has already been very well established to solve our problems like eavy important fuel prices and harmful emissions of the conventional fuels. India has to vercome its technological lagging and join other countries and optimizing this technology. lany research works has been reviewed in this project along with the solution to the hurdles every step of the process.

In our experiment, we took a raw materials such as corn waste (corn stover, husk) potato peel waste sweet sorghum & cassava peel . We have done certain unit operations and nally got ethanol from both the raw materials. At the end of the experiment, we conclude at sweet sorghum & cassava peel provide more efficiency than the corn waste & potato peel. ecause of the presence of starch content is more compared to corn waste & potato peel

The choice of substrate, enzymes, microorganisms and the condition under which they perates where found to be crucial for the yield of ethanol. Under the optimized conditions of H, particle size and substrate concentration of ethanol yield was 20g/l. We took qualitative nalysis method to find the concentration of ethanol in the sample by comparing sample tration as well as blank titration.

The instrumental method used for analysis of element present in our sample. We prefer igh performance liquid chromatography used to found presence of alcohol content present in ur corn and potato peel, sweet sorghum & cassava distillate sample. In our project finally, we etect the presence of ethanol in distillate.Our future plan is to increase the concentration of thanol by modify the project in different view.

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HYBRID ARTIFICIAL TREE FOR SOLAR/WIND POWER GENERATION

A PROJECT REPORT (PHASE-II)

Submitted by

S.RASATHI (Register Number:912021407008)

in partial fulfillment for the award of the degree of

MASTER OF ENGINEERING IN ENERGY ENGINEERING

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE,
ARASANOOR, SIVAGANGAI -630561

ANNA UNIVERSITY: CHENNAI 600 025

OCTOBER 2023

ANNA UNIVERSITY, CHENNAI

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:22:29 +05'30'

BONAFIDE CERTIFICATE

Certified that this Thesis titled "**HYBRID ARTIFICIAL TREE FOR SOLAR/WIND POWER GENERATION**" is the bonafide work of **S.RASATHI (912021407008)** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

SIGNATURE

Mr.M. RADHAKRISHNAN M.E,
HEAD OF THE DEPARTMENT
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

SIGNATURE

Mr. S.POUNRAJ M.E.,
SUPERVISOR
Mechanical Department,
Pandian Saraswathi Yadav
Engineering College,
Arasanoor,
Sivagangai District.

Submitted for the project Viva-Voce examination held on..09..10..2023

9/10/23.
INTERNAL EXAMINER

EXTERNAL EXAMINER

R RAJA Digitally signed by R RAJA Date: 2024.06.20 14:22:47 +05'30'

ABSTRACT

Renewable energy sources – which are available in abundance all around us, provided by the sun, wind, water, waste, and heat from the Earth – are replenished by nature and emit little to no greenhouse gases or pollutants into the air. About 80 percent of the global population lives in countries that are net-importers of fossil fuels that's about 6 billion people who are dependent on fossil fuels from other countries, which makes them vulnerable to geopolitical shocks and crises. Renewable energy actually is the cheapest power option in most parts of the world today. Prices for renewable energy technologies are dropping rapidly.

In today's life, there is an additional requirements and resources are need for the global population. This project introduces the Artificial tree which gives electrical energy and the oxygen. This tree provide an oxygen to be emitted in the air for breathing .For the electrical energy, the renewable sources of Solar and wind is used. The leaves means solar panels and fans that are used for collecting sunlight and wind which is converted into light energy with the help of PV cell.

The collect energy is then stored in battery there it can be used for street lighting . In this project, the artificial tree is designed and with the hybrid sources of Solar PV and wind power generation respectively. Here, the Solar power keeps the surroundings disinfectant and healthier. Photovoltaic cells that strap the solar power are an charming option for grab light and generate electric power. In this system, to identify the sunlight the Light Dependent Resistor (LDR) is used in the tree which directs the sun light and generates the power continuously.

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FABRICATION OF SOLAR, WIND AND RAINWATER POWER GENERATION IN A SINGLE MACHINE

PROJECT REPORT (PHASE II)

Submitted By

VIGNESHWARAN S

Register number: 912021407009

In partial fulfillment of the requirements

For the award of the degree

Submitted To The

MASTER OF ENGINEERING IN

ENERGY ENGINEERING

PANDIAN SARASWATHI YADAV ENGINEERING COLLEGE SIVAGANGAI

ANNA UNIVERSITY: CHENNAI 600 025

R RAJA

Digitally signed by R RAJA
Date: 2024.06.20 14:23:22 +05'30'

BONAFIDE CERTIFICATE

Certified that this project report title "**FABRICATION OF SOLAR ,WIND AND RAINWATER POWER GENERATION MACHINE IN A SINGLE MACHINE**" is the bonafide work of **VIGNESHWARAN .S" (Reg .No. 912021407009)** who carried out theproject work under my supervision during April 2023 to may 2023

SIGNATURE

Mr.M. RADHAKRISHNAN M.E,

HEAD OF THE DEPARTMENT

Mechanical Department,

Pandian Saraswathi Yadav Engineering College, ,Arasanoor,

SIGNATURE

Mr. S.POUNRAJ M.E.,

SUPERVISOR

Mechanical Department

Pandian Saraswathi Yadav Engineering College Arasanoor Sivagangai District. Sivagangai District.

For the project Viva-Voce examination held on.....09.10.2023

9/10/23

INTERNAL EXAMINER

EXTERNAL EXAMINER

R RAJA

Digitally signed by R RAJA
Date: 2024.06.20 14:23:40 +05'30'

ABSTRACT

Renewable Energy is the energy that comes from natural resources such as sunlight, wind, rain, tides, waves and geothermal heat which are continually replenished. Hybrid power generation model mainly focuses on the renewable energy resources. These sources of energy can meet the world's demand without dismantling the stability of Earth. Hybrid power system model is mainly to meet the increasing energy demand through nonconventional energy sources. In our project a hybrid model Solar, Wind and Rain water has been planned to use to generate electricity. This configuration allows the three sources to supply the load separately or simultaneously depending on the availability of energy resources. The objectives of the present study are to convert the solar, wind and rain water into electricity and to optimize the energy requirement using these nonconventional energy resources. It reduces the environmental pollution using clean or environmental friendly technology and creates awareness among people regarding renewable energy resources.

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CHAPTER-9

CONCLUSION

This Integrating Solar-Rains-Wind-Lightning Energy Power Generation System will be highly effective in all places, especially in rural areas where the commercial electricity has not reached or undelivered. It causes no effect on nature i.e. pollution free, at the same time not proneness any kind of accident due to lightning and highly suitable for domestic purposes. It is also useful to urban and city areas, simultaneously with the commercial power supply to minimize power supply load i.e. cut short power charge. By using this system, people can save electricity charge and very less maintenance charge to this equipment is required. The designing of this equipment is done in such a way that it is very compact and acts as user friendly. When it is manufactured in a large scale, cost of this integrated natural resources power generation system is affordable. Moreover there is no power failure or load shedding situation at any times. Therefore, it is the most reliable renewable power or electricity resources with the least expenditure in the globe.

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