IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 8.102 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 12, Issue 6, June 2023

DOI: 10.17148/IJARCCE.2023.12696

A REVIEW ON SOLAR BOAT FOR WATER QUALITY

Shamnaz[1], R Suraj[2], Ganesh Chandrashekar Bailur[3], Mohan Raghavendra Inamadar[4], Dr. Ganesh V N[5]

Department of Electronics & Communication Engineering, Mangalore Institute of Technology & Engineering, Karnataka, India[1,2,3,4]

Associate Professor, Mangalore Institute of Technology & Engineering, Karnataka, India[5]

Abstract: The presence or absence of different pollutants in seawater, such as oil, sedimentation, sewage, nutrients, heavy metals, and thermal pollution, is referred to as water quality. The process of measuring the saltwater's temperature, salinity, density, light transmission, and amount of dissolved oxygen is known as water quality monitoring. This article presents this work, which focuses on an autonomous system that uses a solar-powered water boat to evaluate the quality of saltwater. The boat has sensors that can measure temperature, conductivity, pH, and water turbidity, this cutting-edge boat provides quick and accurate testing of saltwater quality. The evaluation emphasizes the importance of designing a system that is not only reasonable but also secure and dependable, harnessing the benefits of solar energy for long-term operation.

Key Words: Solar boat, Water quality, Sensors

I. INTRODUCTION

The quality of seawater is a crucial issue for both human well-being and the economic activities that rely on it. The increasing anthropogenic stress on marine ecosystems, such as resource exploitation and pollutant discharge, is driving the need to develop systems capable of real-time observations and the administration of enormous amounts of data for further study. The vast majority of cars and electricity-generating facilities rely on fossil fuels, which are non-renewable energy sources. This issue emphasises the necessity of moving from conventional to renewable energy sources and creating new technologies. [1] The use of renewable energy sources as alternatives to fossil fuel-based technology across a variety of industries due to the expected future depletion of petroleum resources. One of the most promising renewable energy sources is solar energy. Solar energy has various benefits, including being abundant, affordable, environmentally friendly, and producing no noise or pollution. The objective of this endeavour is to implement a solar-powered water boat for monitoring seawater quality. The advantages of this approach include increased precision, reduced cost, a robust and portable design, and safety when scanning the water. Additionally, the boat features a backup battery to ensure continued functioning in circumstances where it might encounter darkness or need to navigate during the night.

II. LITERATURE REVIEW

I. The study introduces an approach for creating a solar-powered boat as a way to determine the appropriate size of the photovoltaic (PV) system while controlling costs.[2]

II. The study claims that more recent research studies have been done that concentrate on the utilization of renewable energy. Researchers are investigating and advancing the use of renewable energy sources as alternatives for fossil fuel-based technology in a number of industries due to the possibility of future petroleum depletion. According to the study, solar energy is the most suitable type of renewable energy source to replace current ship fuels.[1]

III. The study demonstrates the benefits of renewable energy, energy efficiency, minimizing climate change, and generating economic rewards. This paper describes an autonomous system that measures the quantity and quality of water using a solar-powered water boat.[3]

IV. In this paper, research directed towards solar energy as a potential renewable energy source. By replacing traditional fuels, solar energy cuts fuel prices while simultaneously lowering water pollution.This alternative energy source provides a workable way to lessen reliance on non-renewable resources and the ensuing environmental issues.[4]

IJARCCE ISSN (O) 2278-1021, ISSN (P) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

ISO 3297:2007 Certified ⁜ Impact Factor 8.102 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 12, Issue 6, June 2023

DOI: 10.17148/IJARCCE.2023.12696

V. The use of a remote-controlled boat equipped with an automatic calibrator to measure several water quality indicators is discussed in this work. The factors considered in this study include temperature, conductance, pH, oxygen (O2), nitrate (NO3-), and ammonium (NH4+) content. The experiment's catamaran was designed expressly for this purpose. The measurements are wirelessly and automatically taken from a control station that is powered by a personal computer (PC) while the boat is moving. The data is subsequently stored in a unique database for future study.[5]

VI. The maritime transportation industry recently indicated interest in employing solar energy and power reserve technology to decrease carbon and nitrous oxide emissions and enhance energy efficiency. But the frequent tilting at sea that ships experience on account of weather and navigational factors—increases uncertainty and hastens the degeneration of solar power system batteries. [6]

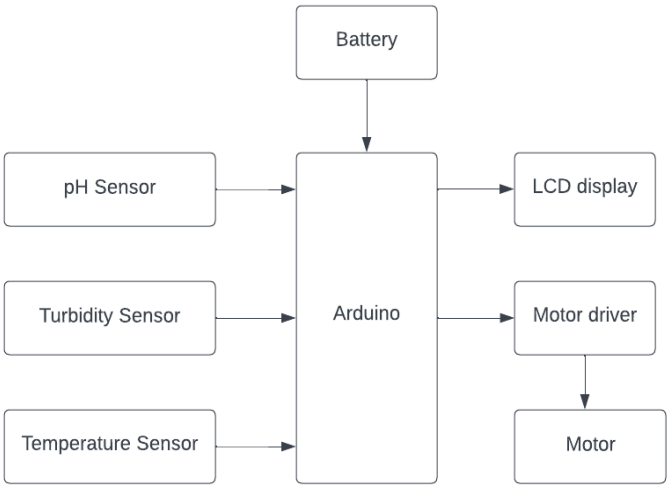
VII. This paper offers a thorough analysis of recent advancements in intelligent water pollution monitoring systems. An IoT-based smart water quality monitoring system is suggested as a treatment because it is efficient and affordable. To support continuing water quality monitoring, it continuously measures a range of quality indices. Three separate water samples are used to evaluate the established model, and the results are uploaded to a cloud server for further evaluation and action. In order to enable real-time monitoring, data collecting, and analysis and allow stakeholders to act promptly on the information obtained, the system leverages IoT technology. This proactive strategy aids in preserving the water quality and effectively addressing pollution problems.[7]

VIII. This review paper focuses on how Internet of Things (IoT) technologies are being used to develop smart water quality monitoring systems (IoT-WQMS) that are mainly designed for residential use. It examines the limitations on access to clean drinking water associated with traditional water quality measurement criteria. Additionally, it covers the usage of intelligent sensors in IoT-WQMS and offers a critical assessment and validation of current systems.[8]

IX. With the aid of a wireless, multi-sensor network and a cost-effective, real-time monitoring system is designed. This gadget gives speedy findings by measuring a number of physiochemical properties of water, in contrast to conventional approaches, which rely on sample and laboratory analysis. The contributing factors are temperature, pH, turbidity, electrical conductivity, and total dissolved solids (TDS). The procedure is especially made for assessing rivers, lakes, and reservoirs when the water quality varies from one site to another. The answer to this issue is to create a remote-controlled boat that can float and steer across water.[9]

X. This study provides a comprehensive examination of recent research in the discipline of intelligent water quality monitoring. Additionally, it offers an Internet of Things (IoT)-based method for water quality monitoring within pipe that is straightforward and power-efficient.[10]

III. REFERENCE BLOCK DIAGRAM



The block diagram consists of Arduino UNO, battery, LCD display, motor driver, motor, pH, temperature, and turbidity sensors.

International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified ⁜ Impact Factor 8.102 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 12, Issue 6, June 2023
DOI: 10.17148/IJARCCE.2023.12696

IV. SUMMARY

The project report emphasises the importance of monitoring seawater quality for the sake of the ecosystem, human health, economic viability, adherence to regulations, and understanding the effects of climate change. The literature review section investigates several approaches to monitoring water quality and the utilisation of renewable energy sources.. The linked studies provide important details on using a solar boat to monitor water quality. The report proposes development of a specially designed solar-powered boat that can monitor the water quality using various sensors.

V. CONCLUSIONS

In conclusion, the problem of poor water quality brought on by different pollutants in saltwater has become a serious concern with effects on the environment and aquatic life. Researchers have been exploring different ways to monitor the water quality to address this problem. The project focuses on creating a solar-powered boat that uses different sensors.

REFERENCES

[1] Adi Kurniawan: A Review of Solar-Powered Boat Development: April 2016
[2] Ahmad Nasirudin, Ru-Min Chaoa, I Ketut Aria PriaUtamab: Solar Powered Boat Design Optimization: 2017
[3] Prof. Paval K. L, Pandurang Sonne, Namdev Shinde, Sandip Sonawane: Design of Solar Powered Water Boat for Water Quality and Quantity Measurement: A Review: 2019
[4] Shinde Dnyaneshwar Tukaram, Shende Rahul Uttam, Raut Sujit Shivaji, Narkhedkar Rohit Ankush, Prof. Kare K.M: Design and fabrication of a solar boat.
[5] A. Kozyra, K. Skrzypczyk, K. Stebel, A. Rolnik, P. Rolnik, M. Kucma: Remote controlled water craft for water measurement.
[6] Hongda Liu, Qing Zhang, Xiaoxia Qi, Yang Han: Estimation of PV output power in moving and rocking hybrid energy marine ships.
[7] Varsha Lakshmikantha, Anjitha Hiriyannagowda, Akshay Manjunath, Aruna Patted, Jagadeesh Basavaiah, Audre Arlene Anthony: IoT based smart water quality monitoring system
[8] Farmanullah Jan, Nasro Min-Allah, Dilek Düştegör : IoT Based Smart Water Quality Monitoring: Recent Techniques, Trends and Challenges for Domestic Applications
[9] Moez ul Hassan, Sanjay Kumar, Hitesh Kumar, Kabir Kumar, Sarmad Hameed, Kiran Fatima: Real time water quality monitoring boat: 2018.
[10] S. Geetha, S. Gouthami: Internet of Things enabled real time water quality monitoring system, July 2017.