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6th International Innovation & Design in Library & Information Science Competition (InDeLib2023)

MAPPING THE **LIBRARY** OF **TOMORROW** THROUGH INNOVATION

Editors
Asmadi Mohammed Ghazali
Abd Latif Abdul Rahman
Zuraidah Arif
Zati Atiqah Mohamad Tanuri

Dewan Perdana,
UiTM Kedah

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PREFACE

The first International Innovation & Design in Library & Information Science Competition (InDeLib) was held in 2016 at the international level. InDeLiB became a brand name linked to the Faculty of Information Management, UiTM Kedah Branch, known to many local and international learning institutions. InDeLib is open to all organizations (libraries), librarians, professionals, researchers, academicians, teachers, and students from institutes of higher learning, college, secondary and primary schools. They share their ideas or methods throughout innovation and invention, particularly in library and information science. The 6th InDeLib 2023 is endorsed by the Librarians Association of Malaysia and the National Library of Malaysia.

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DATA-CENTRIC IoT SYSTEM USING ARDUINO UNO AND SMARTPHONE APP FOR WATER QUALITY PURPOSE

Muhammad Irrfan Md Fauzee[1], Wardina Balqis Zulkifli[2], Izzah Maisarah Man[3], Nor Ashikin Marzuki[4] and Dr Rossitah Selamat[5]

[1,2,3,4,5]Politeknik Tuanku Sultanah Bahiyah

irrfanfauzee@gmail.com

Abstract

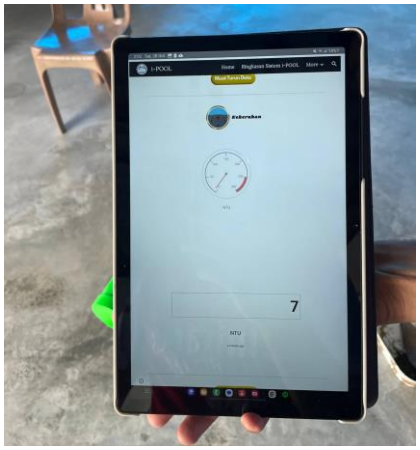
Malaysia's strategic position and rich natural resources include a rapidly growing aquaculture sector. The problem of pollution in freshwater quality is not a foreign matter nowadays because it is often associated with rapid urbanization and economic activity. Effective water quality management is crucial in preventing livestock losses. To address this, a portable IoT water quality monitoring system (i-POOL) was designed, focusing on dissolved oxygen, turbidity, temperature, and pH. Tested in various freshwater locations, including Terat Batu Lobster Pond, Land Fisherman Cooperative of Sidam Kanan District, and river, i-POOL enables real-time monitoring through a smartphone app. Feedback from the Department of Fisheries and local communities indicates positive perceptions, highlighting i-POOL's potential as a valuable tool for early water quality assessment. Thus, i-POOL clearly shows that it can have excellent prospects and be used for river and freshwater quality monitoring by providing real-time data to users.

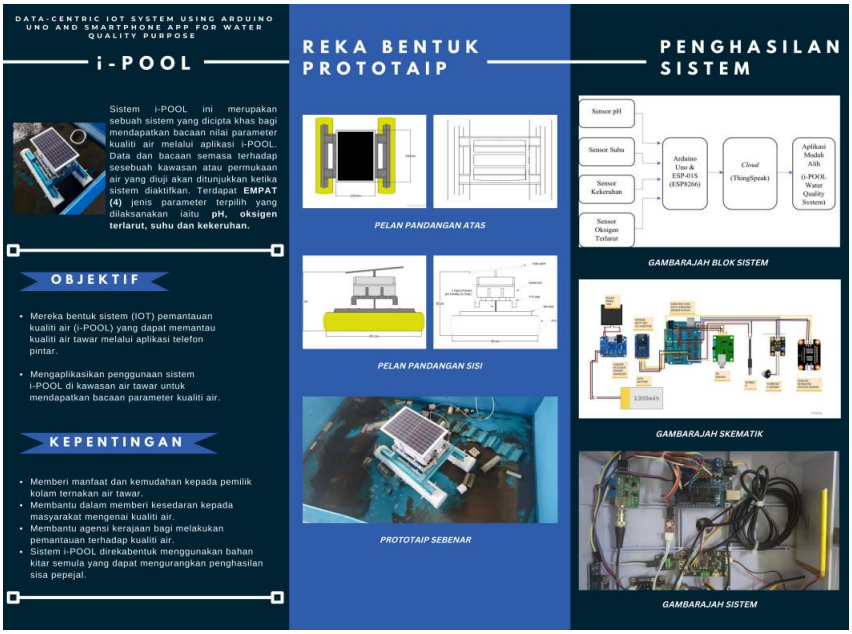
Keywords

Water Quality Monitoring, Internet of Things, Aquaculture, IR 4.0, Sustainable Development Goal, Green Technology

Product Description

Introducing a data-centric IoT system that revolutionizes water quality monitoring. Powered by an Arduino Uno as a microcontroller and an ESP-01 for Wi-Fi connectivity, this innovative solution integrates a suite of turbidity, pH, dissolved oxygen, and temperature sensors. With a rechargeable battery and solar capability, it ensures continuous operation and is environmentally friendly. Including IR 4.0 increases efficiency, making it a green technology that aligns with sustainable development goals. This intelligent system communicates seamlessly with a dedicated smartphone app, provides real-time water quality insights and can create data storage for future reference. Embracing a holistic approach advances technology and contributes to environmental sustainability. Experience advanced water quality monitoring with Arduino Uno, fostering a new era of data-driven solutions for a greener and more sustainable future.





Novelty & Uniqueness

This advanced IoT water quality monitoring system highlights its revolutionary approach to water quality monitoring., combining real-time data collection and transmission with remote access. Unlike traditional methods, it immediately addresses water quality issues, increasing its practical value for resource protection and public health. The use of advanced sensor technology throughout the system aligns with Industry 4.0, placing it at the forefront of technological evolution, thus making the system a pioneer in the industry and strengthening its potential to revolutionize water quality monitoring practices. The user-friendly interface and the interpretation of accessible data further differentiate, ensuring usability for experts and the general public. The new system represents a significant advance in water quality monitoring, promising to protect resources and contribute to real-world environmental solutions.

Benefit to Mankind

The i-POOL water quality monitoring system, developed in response to the crucial need for adequate water quality management in Malaysia's rapidly growing aquaculture sector, offers substantial benefits to humanity. Its strategic application spans various sectors, from individual households concerned about water quality to fisheries authorities safeguarding public water sources. The system ensures early contamination detection by focusing on critical parameters such as dissolved oxygen, turbidity, temperature, and pH, preventing livestock losses and financial setbacks in aquaculture projects. The portable nature of i-POOL allows for versatile use in freshwater areas, aligning with the urgent demand for solutions in regions affected by pollution from rapid urbanization and economic activities. As evidenced by positive feedback from the Department of Fisheries and local communities, i-POOL emerges as a valuable tool, enhancing public health and environmental awareness and contributing to society's overall well-being by providing real-time water quality data.

Potential Commercialization

With its focus on ease of use, affordability, and durability, this aquaculture water quality monitoring device holds solid commercial potential. It targets aquaculture farmers seeking efficient detection of important water quality indicators and is designed for a wide range of applications in freshwater livestock ponds, rivers, and lakes. Its commercial appeal extends to government agencies, businesses, and the public involved in water quality studies. By ensuring the health and quality of livestock, the device becomes an invaluable tool, offering promising opportunities for widespread use and commercial success in the aquaculture and environmental monitoring sectors.

Acknowledgement
We thank the Department of Fisheries Kulim District in Kedah for their invaluable assistance and cooperation throughout the research process. Thanks to the Sidam Kanan District Land Fisherman Cooperative and Terat Batu Crayfish Pond for facilitating business visits to their freshwater fish ponds, which, to some extent, contribute to verifying the effectiveness of our water quality monitoring system. The Intellectual Property Corporation of Malaysia (MyIPO) support in obtaining the patent certificate underscores the uniqueness and originality of our product designs. In addition, verification from the National Metrology Institute of Malaysia (NMIM) confirmed the accuracy by performing calibration tests for each sensor. We appreciate their contributions, which have played a key role in making our products different in terms of quality and utility.

Researchers Biographical Data

i. Muhammad Irrfan Md Fauzee, Wardina Balqis Zulkifli, and Izzah Maisarah Man are students in the Department of Civil Engineering at Politeknik Tuanku Sultanah Bahiyah. Their dedication to advancing engineering solutions is evident through their collaborative efforts in water quality monitoring systems.

ii. Mrs. Nor Ashikin Marzuki and Dr. Rossitah Selamat, both respected lecturers in the Department of Civil Engineering at Politeknik Tuanku Sultanah Bahiyah, bring their wealth of expertise to guide and mentor the research team. Their academic background and experience contribute significantly to the development and success of innovative projects.