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FISHERMAN TRACKING AND COMMUNICATION USING WIRELESS WATER COMMUNICATION

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Abstract

Underwater media is the most challenging medium for data communication. It is because of its qualities. Acoustic waves and optical signals are two of the different communication modes that are now in use in water media. In order to get around this, this idea uses an electromagnetic approach to transmit data over a water medium. It transmits data via sources of magnetic transmitters. This is more cost-effective and efficient than the other available options, and it will guarantee the maximum transmission rate. Automation using GPS tracking features is also included in this project. The goal of our suggested system is to provide a technologically advanced mobile computing device that is easy to understand and operate. to encourage, adequately inform, and shield IMBL from crossing the maritime border at any cost. And provide complete security and dependable protection for the lives of Indian Fishermen. Several contemporary mobile computing ideas must be applied in order to complete this assignment. WWSNs are systems that use water for communication and have submerged sensor components. The vast majority of WWSN applications include water monitoring, intelligent communication, and environmental surveillance. Emergency communications are received in this suggested system and sent by water to a centralized server or fishermen's boat in case of an emergency.

Keywords:

natural disaster, emergency, GPS, GSM, boat, fishing boat, level sensor, distress alert, and distress message.

1.INTRODUCTION

The way we interact with the physical world has been completely transformed by the Internet of Things (IoT), with IoT-based solutions being used in a wide range of industries, including logistics, transportation, healthcare, and agriculture. The fishing business is one of the most likely to profit from this. Millions of people around the world depend on the fishing sector, yet it suffers difficulties from weather fluctuations, equipment malfunctions, and maritime mishaps. Therefore, keeping track of fishermen and responding quickly to problems require a dependable communication system. This study offers a cable water communications-based Internet of Things (IoT) fisherman tracking and communication system. Underwater sensors gather information such as position, water pressure, and temperature and then use wired water technology to send the information to a central computer. The data is analyzed by the server, which provides fishermen, fishery management, and rescue teams with up-to-date information.

This method uses wireless technology to communicate the position of the boat to coastal guards via Internet of Things technology. It deals with problems like maritime border disputes,

which are especially common between India and Sri Lanka, two nearby nations. Continuous connectivity is ensured by a GPS receiver on the boat that maintains communication with satellites in the Low Earth Orbit. With the help of an LCD display and buzzer, the GPS-equipped microcontroller warns fishermen when they are about to cross international borders. Every 40 seconds, a Wi-Fi sensor also transmits messages to the monitoring server with location updates and meteorological information gleaned from temperature and humidity sensors.

The system's dual goals are to precisely pinpoint the boat's location, keep an eye on border crossings, and deliver critical weather updates for safe navigation.

1.1 INTRODUCTION TO IOT

The fishing sector, which is vital to the world's food security and means of subsistence, has several difficulties, such as safety issues and inadequate communication channels, particularly at distant or deep-sea sites. As a result, a ground-breaking solution to these problems is offered by the combination of wireless underwater communication systems and Internet of Things (IoT) technologies.The Internet of Things (IoT), which is defined by linked devices exchanging data across networks, presents hitherto untapped potential to improve fishing operations. Real-time data on position, weather, and vessel performance can be gathered and sent ashore or to other vessels by installing sensors, GPS trackers, and communication modules on fishing vessel.However, when it comes to underwater connections, conventional IoT solutions run into problems. In maritime situations, effective monitoring and communication are hampered by the difficulty of transferring data below the surface. In order to overcome this obstacle, engineers and researchers are working on wireless underwater communication systems that use creative ways to transport data through water and acoustic signals. The tracking and communication of fishermen could be revolutionized by the IoT's integration with wireless underwater communication.

Enhanced Safety: Authorities can keep an eye on movements and react quickly to situations thanks to real-time vessel tracking. Fishermen who wear biometric sensors can receive early alerts in the event of accidents or health problems.

1.2 INTRODUCTION TO WIRELESS SENSOR NETWORK

The use of wireless sensor networks (WSNs) in fisheries management has revolutionized various industries, including fisheries. By integrating WSN technology with underwater communication systems, fishermen can receive real-time data transmission and improve safety measures. This technology is crucial for sustainable fishing practices, regulatory enforcement, and resource conservation. Traditional tracking methods, such as manual reporting or satellite-based systems, have limitations such as cost, accuracy, and coverage. WSNs offer a decentralized approach to data collection, processing, and transmission, allowing nodes to collect environmental data like location, temperature, and water conditions. Underwater communication systems enable data exchange among submerged devices without the need for physical connections, enabling real-time communication between fishermen, monitoring stations, and other stakeholders. Advantages of WSNs in fisherman tracking include real-time tracking, cost-effectiveness, enhanced safety, remote data transmission, and navigation assistance.

In conclusion, WSNs and underwater wireless communication hold immense potential for improving fishermen's tracking and communication capabilities, leading to more sustainable fishing practices and better resource conservation. Further exploration into WSN-based solutions for fisherman tracking and communication in underwater environments is recommended.

2.MOTIVATION

The main motivation behind wireless underwater communication for fisherman tracking and communication represents a significant breakthrough in improving the safety, effectiveness, and sustainability of the fishing sector. We manage the inherent dangers connected with maritime activities by integrating state-of-the-

art technology, giving fishermen access to real-time monitoring and help while navigating uncertain waters. By facilitating quick reactions to emergencies and reducing the risk of unfavorable weather and equipment malfunctions, this cutting-edge system protects the lives and livelihoods of fishermen all over the world. Moreover, we overcome the drawbacks of traditional techniques by integrating wireless underwater communication, guaranteeing uninterrupted connectivity even in demanding marine conditions. In addition to improving safety, this approach encourages resource conservation, operational effectiveness, and adherence to marine laws, all of which support a more robust and sustainable fishing sector. To put it simply, our project represents a revolutionary step toward the promotion of safer, more effective, and ecologically friendly techniques in the field of maritime activities.

3.EXISTING SYSTEM

Position identification is accomplished by GPS, GSM, and Zigbee systems; however, insufficient signal strength might impede mobile communication. Satellites in geostationary orbit can cover large areas, but communications can be interfered with by icebergs. The shortcomings of the current systems include a lack of citizen awareness and border awareness, which can result in accidents.

4.PROPOSED SYSTEM AND WORKING

The proposed method provides boat position information to fishermen globally by employing GPS receivers to detect a country's border using longitude and latitude. High transmission rates and cost-effectiveness are ensured by the system's usage of electromagnetic (EM) data transmission in water media. To provide the highest transmission rate, data is transmitted via magnetic transmitter sources. In order to help fishermen optimize their operations and lessen overfishing, the system also gives information regarding fish populations.By providing fishermen with real-time monitoring and communication capabilities, the suggested system for tracking and communicating with fishermen utilizing wireless underwater technology seeks to improve sustainability, efficiency, and safety in marine environments. Development of communication technologies, design of tracking devices, mesh networking, data transmission protocols, user interfaces, power management, testing, deployment, and continuous maintenance are important elements.The fishing boat's or other vessel's current location is determined by the system using a GPS receiver and comparing it with predetermined values. It provides information to fishermen about approaching the four zones that make up the nautical border: normal, warning, zone adjacent to restricted, and restricted. The LCD shows a normal zone when the boat is in one. Environmental issues, legal compliance, security, scalability, affordability, and community involvement are additional factors to be taken into account.

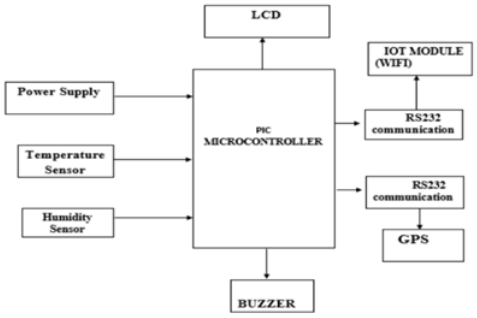

Fig.1.block diagram of transmitter side

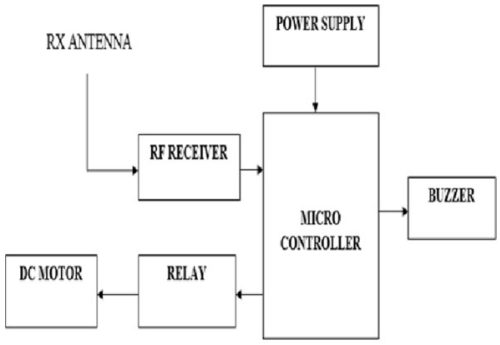

Fig.2.block diagram of receiver side

5. SYSTEM REQUIRMENTS

5.1. HARDWARE DESCRIPTION

5.1.1. ARDUINO UNO

Fig.3. Arduino UNO

Based on the Microchip ATmega328P microprocessor, the Arduino UNO is an open-source microcontroller board.It features 14 digital and 6 analog pins, allowing for easy programming with a type B USB connector and Arduino IDE. The board can be powered by an external 9-volt battery or a USB cable and resembles the Leonardo and Arduino Nano. The Arduino website provides a hardware reference design, accessible under a Creative Commons Attribution Share-Alike 2.5 license. The Uno board, named after the release of Arduino Software (IDE) 1.0, serves as the standard model and the first in a line of USB Arduino boards. The board's ATmega328 has a preprogrammed bootloader, allowing for fresh code uploads without the need for an additional hardware programmer. It uses the original STK500 protocol for communication and employs the FTDI USB-to-serial driver chip, which is configured as a serial-to-USB converter.

5.1.2 NODE MCU

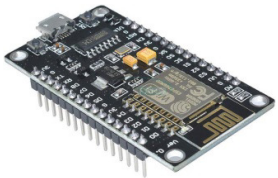

Fig.4. Node MCU

An inexpensive, open-source platform is Node MCU. At first, it came with hardware based on the ESP-12 module and firmware that uses Espresso Systems' ESP8266 Wi-Fi Sock. [6] [7] Eventually, support for the 32-bit ESP32 MCU was included.

5.1.3 LCD DISPLAY

Fig.5. LCD Display

Characters, numbers, and designs are displayed on the LCD. The presenter and the microcontroller's (P0.0–P0.7) I/O port are communicating. Because the presentation is multiplexed, only one show, for example, airs continuously at a time. In one-tenth of a second, the next presentation will begin. A succession of programs will produce a constant display of count due to the consistency of vision.

5.1.4 BUZZER

Fig.6. Buzzer

A device that signals sound, such as a buzzer or beeper, can be piezoelectric, mechanical, or electromechanical. Common uses for beepers and ringers include clocks, warning devices, and customer information verification.

5.1.5 POWER SUPPLY

Fig.7. Power supply

The 12V advance down transformer receives power from the AC source. With the use of a diode span, the 12V AC transformer yield is corrected. Capacitors are used to divide the 12V DC Diode Bridge result.

5.1.6GSM SIM900 MODEM WITH RS232

Fig.8. GSM SIM900 MODEM WITH RS232

The GSM/GPRS Modem-RS232 operates on frequencies between 900 and 1800 MHz and has an RS232 interface for connecting microcontrollers, chips, and PCs. It supports GPRS internet connection, M2M interface applications, voice, and SMS, and allows AT commands for audio calls, SMS, and internet access.

5.1.7 HUMIDITY SENSOR

Fig.9. Humidity sensor

A humidity sensor detects and records air temperature as well as moisture content. The sensor consists of a nonconductive polymer layer sandwiched between two metal plates. Moisture from the air is captured by this film, changing the voltage between the two plates. The amount of moisture in the air is displayed digitally by the conversion of these voltage variations.

5.1.8 DATA TRANSMITTER / RECIEVER

Fig.10. Data transmitter/Receiver

The encoded message or image is transmitted from an electrode submerged in water, which sends the image as vibrations, which are detected by the receiving electrodes in the communication module at the receiving end.

6.RESULT AND DISCUSSION

The study shows that a wireless underwater communication system for fishermen works well. Their positions may be tracked in real time by the system, which updates a central monitoring station in real time. Fishermen may connect and get information using this system's improved flexibility and coverage, no matter where they are. In dynamic underwater conditions, communication dependability is essential, and reduced latency enables prompt decision-making. By removing the requirement for tangible infrastructure in the water, the technology improves environmental impact, operating efficiency, and safety. Future studies can concentrate on enhancing data encryption, security procedures, energy efficiency, and the integration of cutting-edge sensors for environmental monitoring and fish behavior analysis.

7.CONCLUSION

The research uses magnetic transmitter sources and electromagnetic techniques to propose a novel underwater data transmission technology. It keeps fishermen from crossing maritime limits and incorporates GPS tracking for their protection. Additionally, the system makes it possible to send emergency signals across the water, enhancing the effectiveness and dependability of underwater communication. Should a fisherman disregard the warning and proceed, the alarm will sound, reducing the boat engine's speed by fifty percent. The boat will enter the restricted area, keep beeping, and turn off the engine by regulating the fuel supply if the fisherman does not respond.

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