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Ad Hoc Network for IoT-Enabled Fisherman Tracking and Communication

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***Abstract* - Fishing supports local economies. Traditional fishing methods may lack technology for efficiency, safety, and communication. This project improves fishermen's lives with innovative wireless water communication and IoT technology. This research will create a Fisherman Tracking and Connectivity (FTC) system employing wireless water communication and the Internet of Things. This technology will connect seamen and track vessels in real time. The FTC system's wireless communication modules and Internet of Things sensors send vessel position, weather data, and emergency alarms. Underwater wireless channels deliver this data for low-latency communication. This discovery may have broad effects. Real-time data on fish migration patterns and environmental circumstances helps fishermen fish greener and safer. This study may reduce search and rescue, speed emergency response, and improve fishermen's cooperation.**

Keywords: Fishing, Fisherman, wireless water, iot communication, FTC.

I. INTRODUCTION

The fishermen endeavor to secure a satisfactory livelihood for their families by engaging in the arduous task of fishing and exploring the vast seas and oceans. This pursuit often spans several days and months. Unfortunately, the use of rudimentary tools in their fishing vessels has led to communication breakdowns and the inability of some fishermen to return to land due to ocean currents, exacerbated by their limited knowledge of navigating such circumstances. Due to abrupt weather changes, gusty winds, and the depletion of GPS gadget batteries, we developed an Internet of Things (IoT) gadget that satellites can access and install in fishing boats. This equipment includes boat position sensors, as well as temperature and humidity sensors. Furthermore, it features a device that connects to both regional and international emergency systems. The Thuraya XT-LITE and the Garmin are two basic devices found on fishing boats. However, both devices have highly restricted capabilities. We leverage the Internet of Things to integrate and enhance the two devices, incorporating sensors to improve their functionality.

In order to safeguard fishermen's well-being and prevent them from becoming lost at sea, it is imperative to embrace cutting-edge technologies and implement strategic measures. We have developed a gadget that combines modern monitoring systems, data analytics, and real-time communication to enhance multiple elements of fishing, such as boat tracking, resource control, safety measures, and fleet management. The strategic management of fishing vessels aims to improve fishermen's security. We have developed a device that accurately measures temperature and wind strength by utilizing advanced sensors. This information is critical for predicting and managing the intensity of ocean currents, which can cause a fishing boat to veer off course or drift away from desired currents. The ship employs a sensor to monitor its precise trajectory, alerting users via the gadget if it veers off course.

Background of the Project

It is critical to acknowledge that "Fisherman Tracking and Connectivity Based on the Internet of Things Using Wireless Water" has some limitations. These include the possible difficulties in setting up and maintaining the infrastructure for the wireless water network, the need for reliable power sources in remote areas, the need to ensure compatibility with existing fishing equipment, the need to address concerns about privacy and security, and the cost of establishing and maintaining Internet of Things devices. Our strategy for this project involves integrating two existing fishing tools to build a new device. However, the limited functionality of these gadgets presents an opportunity to enhance their effectiveness. By utilizing our Internet of Things-enabled equipment, we may enhance it by integrating more sensors to ensure the safety of fishermen. For example, we possess a sensor capable of monitoring the boat's trajectory and transmitting the precise coordinates of its current location. To avoid navigation into unfavorable areas, the ship has sensor gauges for wind, current intensity, and location.

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Additionally, a long-lasting or sustainable battery powers it, enabling the transmission of alerts to satellites in the event that the fishermen lose their way. We conducted a survey in which we interviewed fishermen to determine their specific needs for such gadgets, as well as the improvements and functionalities currently missing in the existing devices. Our proposed system, an Internet of Things (IoT)-based fisher tracking and communication system, utilizes wireless underwater communications. This system is designed to provide fishermen with communications connectivity in the challenging underwater environment. It also tracks their location and status using IoT technology. Additionally, it can monitor their health by measuring their temperature and blood pressure, thereby ensuring their safety and well-being. Our project is built on Innovative ideas that have the potential to revolutionize the fishing industry. By leveraging the Internet of Things (IoT) and wireless underwater communications, we aim to create a system that not only tracks fishermen's whereabouts but also ensures their safety and well-being. In order to monitor people's whereabouts while they're at sea and perhaps save their lives.

II. RELATED LITERATURE

A. Palanisamy, R., & Mathivanan, V. (2019) Sensor networks struggle most with safe data exchange. Sensor network Base Station (BS), Cluster Head (CH), and Sensor Nodes store cluster, master, public, and private keys. Using wireless spectrum opportunistically, cognitive radio (CR) technology improves wireless network range and efficiency. CR networks offer the most advanced spectrum-aware wireless communication paradigm using cognitive radio. CR networks have unique spectrum variations and QoS constraints. Cognitive radio ad hoc networks have dynamic topology, distributed multihop design, and variable spectrum.

B. Al-Ramadhan, B. Al-Sahen, M. Ayesh, and S. E. Esmaeili designed a boat safety and accident prevention system in Kuwait that includes a radar that serves as an obstacle detector placed in front of the boat, which will help sailors avoid an underwater obstacle, reducing collision and preventing boat accidents. Their technology has the ability to both prevent an unwanted obstruction and initiate an SOS. Send a message to the coast guard with your GPS location in case of an emergency.

C. "Putting vessel motion research into the hands of operators," by Leigh McCue. 2011 saw the release of the Small Craft Motion Program (SCraMP) for the iPhone OS.(iOS). This software is made to give low-budget users, especially fishermen, access to crucial data regarding the state of their fishing boats. The iPhone's CPU, gyroscope, accelerometer, and location services are all used. You can use this application to measure a ship's motion.

D. The Internet of Things regime encompasses the rapidly increasing universe of sensors, computers, actuators, and smart gadgets. Buildings, cellphones, automobiles, household appliances, and natural things might all connect over the Internet, creating a smart world.

E. Wireless networking is currently popular. Area of communication. There are multiple options available. Reduced network configuration Cognitive radio mobile ad hoc networks (CRAHNs) are comprised of fields. This The PhD research presents a cluster-based routing system that is cognizant of the spectrum. The SACBRP node joining technique enables the integration of non-clustered nodes into existing clusters. After the election of a cluster head, routing takes place. Simulations utilize the NS2 network simulator. The proposed SACBRP enhanced both end-to-end latency and primary user activity.(Palanisamy et al., 2016).

F. Many IoT devices demand considerable energy to communicate, connect, and exchange information with a central node or other devices. Developing efficient power saving measures is essential for increasing battery life. Load balancing may improve network lifespan by reducing energy consumption of smart devices. Many studies have reviewed acceptable techniques and technologies to raise the intelligence level of the globe by using UAVs for various purposes Smartness is measured by several elements, including the economy, living, mobility, environment, people, government, and tourism. In, the authors discuss technological challenges and possible applications for smart UAVs in smart cities. The authors explored ways for integrating smart UAVs in smart cities. However, they did not include green IoT technologies such as UAVs in smart city applications. In the authors discussed green IoT ideas and solutions to enhance city smartness. However, none of the technologies discussed how UAV technology may enhance green IoT applications.

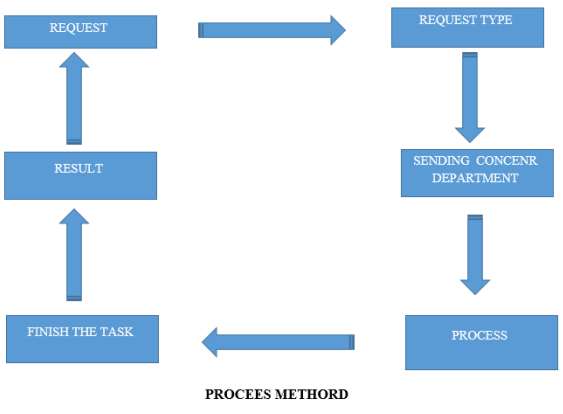

Figure 1: Process method

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Algorithm

The proposed approach utilizes a global positioning system (GPS) receiver to determine the current location of the boat by analyzing signals received from the satellite. The GPS receiver is responsible for receiving and translating the signal into the desired data message. If the vessel is detected crossing the boundary, radio frequency receivers will trigger an alert and transmit a notification to the relevant authorities.

III. ANALYSIS AND PROJECT DESIGN

Built around the Internet of Things framework, the Fisherman Tracking and Connectivity system utilizes wireless water communication. Its purpose is to enhance the security, efficiency, and communication capabilities of fishermen operating at sea. The system monitors fishermen's location in real time, monitors their health indicators, and facilitates communication between fishermen and onshore staff through IoT devices, specialized wireless water communication technologies, and a central monitoring system.

It provides comprehensive solutions to the specific challenges faced by maritime fishermen. The goal is to enhance emergency response, streamline resource management, promote a more interconnected and secure environment, and enhance the overall well-being of fishermen by leveraging IoT and wireless communication technology.

The Fisher Tracking and Connectivity System's objective is to improve fishermen's tracking and communication capabilities in aquatic environments. The Internet of Things technology forms the foundation of this system, which employs wireless water communication. This technology allows fishermen to observe and communicate in real-time using wireless water communication and Internet of Things (IoT) devices. The concept entails equipping fishermen with Internet of Things (IoT) devices, like GPS trackers and sensors, either integrated into their fishing equipment or attached to their boats. These devices collect and transmit data to a central monitoring system, including information on location, water quality, and other relevant characteristics. The system facilitates smooth data transmission between Internet of Things devices and the central monitoring system by employing wireless water communication technologies, such as underwater sensor networks or acoustic communication methods. This enables fishermen to maintain uninterrupted connectivity, even in remote locations or underwater. The Fisher Tracking and Connectivity System offers numerous benefits. First, it improves fishermen's safety by providing live tracking of their locations and actions. Emergency response teams possess the capability to promptly detect and provide assistance to fishermen who are in a state of difficulty. Furthermore, the technology enhances operating efficiency by providing valuable data on fish migration patterns and water quality. Fishermen can optimize their catch and reduce the time and financial resources wasted on unproductive fishing trips by making informed decisions based on their expertise.

Moreover, the system promotes fishing techniques that are environmentally sustainable. By monitoring fish movements and population dynamics, it facilitates aquatic habitat conservation and helps to avoid overfishing. Ultimately, the Fisher Tracking and Connectivity System, which relies on the Internet of Things and utilizes wireless water communication, emerges as a very advantageous technology that greatly improves the fishing business. It improves fishing operations' sustainability, efficiency, and safety by providing real-time tracking, continuous connectivity, and informative data. As technology advances, we should expect further enhancements and increased adoption of these systems in the future.

The Fisherman Tracking and Connectivity system, built upon the Internet of Things framework, utilizes wireless water communication. Its primary objective is to enhance the security, efficiency, and communication capabilities of fishermen operating at sea. The system monitors fishermen's location in real time, monitors their health indicators, and facilitates communication between fishermen and onshore personnel using IoT devices, specialized wireless water communication technologies, and a central monitoring system.

It provides comprehensive solutions to the unique challenges encountered by maritime fishermen. The goal is to improve emergency response, optimize resource management, promote a more interconnected and secure environment, and enhance fishermen's overall well-being through the use of IoT and wireless communication technology.

IV. METHODS USED IN DEVELOPING THE PROJECT

The project was developed using IoT technology. The system collects data from fishermen by utilizing IoT devices and sensors, which include information such as location, health indicators, and other relevant data. It enhances tracking and connectivity functionalities by leveraging IoT concepts, including data collection, connectivity, and data analysis.

Wireless water communication involves the transmission of data between the equipment used by fishermen and the central monitoring system. This is achieved through the use of specialized technology such as underwater modems or acoustic communication. Although underwater conditions are often unfavorable for conventional wireless systems, these technologies still provide a dependable connection. Data analytics refers to the application of techniques and processes

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to process and analyze collected data. In order to identify patterns, anomalies, and trends in the data, it is necessary to utilize models and algorithms. Data analytics facilitates the development of emergency alerts, monitoring of health conditions, and optimization of resource management.

A centralized monitoring system is established onshore to receive, process, and store the data transmitted by the fishermen's devices. The system incorporates real-time data processing algorithms for immediate analysis and decision-making, along with a database for storing and retrieving data.

V. CONCLUSION

In conclusion, the Fisher Tracking and Connectivity System, anchored in the Internet of Things framework and employing wireless water communication, stands as a beacon of innovation in the maritime industry. By seamlessly integrating IoT devices and specialized communication technologies, this system not only enhances the safety and efficiency of fishermen but also fosters sustainable fishing practices and environmental stewardship. Its ability to provide real-time tracking, continuous connectivity, and valuable data insights heralds a promising future for the fishing industry. As we look ahead, we anticipate further advancements and wider adoption of such transformative technologies, ushering in an era of enhanced productivity, safety, and sustainability for fishermen worldwide.

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