

Fisherman Border Crossing Alert System using IoT

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Abstract: *The Fisher Man Border Crossing Alert System is a innovative solution designed to enhance the safety and security of fishermen operating near maritime borders. The system integrates real-time tracking technology with border surveillance data to provide timely alerts to fishermen when they approach or cross maritime borders. Fishermen are forced to accidentally cross borders where they run the risk of being murdered or captured. It is difficulty in identifying the marine borders between countries. The system is intended to prevent such accidents and to warn fisherman about border areas in advance. Maximum risks occur for fishermen in situations where they travel on a boat for fishing. In some situations, they should not move after some point and they should not enter into other countries area. It can be extensively used by people in the Sea border to find the path to reach the destination. The notification will be sent to the border security forces which act as the server to all other devices that are operated by people in ships. The fishermen crosses the sub border then the warning signal is given to both the countries and alarm is indicated to fisher men.*

Keywords: fisher men.

I. INTRODUCTION

Border crossing is a serious problem with in each country. Border crossing will not be known in coastal areas. It has become essential to be aware of one's safety in today's, unsafe environment. When fishermen travel by boat to their fishing locations, their hazards are at their highest. Even today, the fishermen from Tamil Nadu continue to use their historical rights to frequently enter an International Maritime Boundary Line (IMBL) for fishing. Wave Share Laser Sensor Module, Wireless Networks, and RF Communication Systems may be the best options for resolving a marine border crossing issue. When someone enters the detection range of the border, the Wave Share Laser Sensor Module responds and makes indication action. The tracking dependent on the devices, not the signal or network being used at the time. The notification will be forwarded to border security officials, who act as the server for all other gadgets used by passengers on ships. Location of IOT and RF communication units for all maritime zones. The LCD display used by the integrated unit to communicate with fishermen.

The Node MCU uses an RF transceiver to send the coast guards the boat's current location while stopping it from moving any further. The strategic role of the Coastguard is to protect the maritime zones from illegal activities including infiltration through maritime routes and environmental damage and provide humanitarian and scientific assistance within the maritime domain.

II. OBJECTIVE

The main objective of this project is to providing a possible solution to the various hardships faced by the fishermen. Guide the fisherman and navy guards with proper navigation. And also prevent them from climatic conditions like storm, cyclone and path misleading. Probably the communication problem and border crossing issue between India and Srilankan maritime boundary will comes to an end.

III. EXISTING SYSTEM

In this system is for automatic Border crossing detection and navigation system. It acquires the actual position of the boat and transmits the signal by means of antennae. This in turn is connected to a PIC16F877A microcontroller using RS232. The microcontroller stores the current location and is sent through the Zigbee transmitter module for further processing. The position of the boat is received by the Zigbee receiver module and is forwarded to PIC16F877A microcontroller. The microcontroller then sends the information to the GSM using MAX232 and further it is sent to the mobile through message if needed. The aware the fisherman that they are about to reach the nautical border. The area is divided into three zones fatal zone, warning zone, zone near to the fatal zone and finally the restricted zone. This system saves the life of the fishermen by making an alarm system and a motor controlled device, which is to be mounted in the boat/ship. If fishermen navigate near country’s border, an alarm is generated indicating that the boat/ship is near the border of our country. The motorturns off if the boat touches the border.

IV. PROPOSED SYSTEM

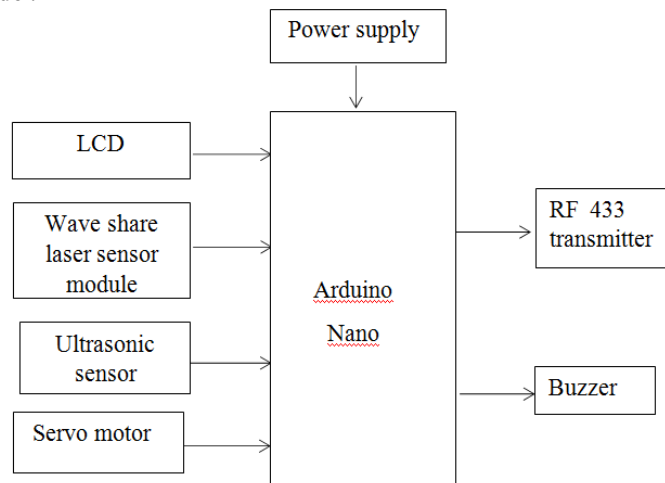
The Fisherman Border Crossing Alert System (FBCAS) utilizes a comprehensive IOT framework integrating ultrasonic sensors, Node MCU, Arduino Nano, LCD displays, and transceivers to ensure the safety and security of fishermen navigating international waters. Ultrasonic sensors detect vessel movements along maritime borders, transmitting data to Node MCU and Arduino Nano microcontrollers. These microcontrollers process the information and trigger alerts displayed on LCD screens installed on fishing vessels. Additionally, the transceiver module enables communication between fishermen and relevant authorities, facilitating immediate response to potential border violations or security threats. Through this integrated approach, FBCAS enhances situational awareness, promotes proactive management of maritime safety, and protects the lives and livelihoods of fishermen operating in challenging environments.

V. SYSTEM ARCHITECTURE AND OVERVIEW

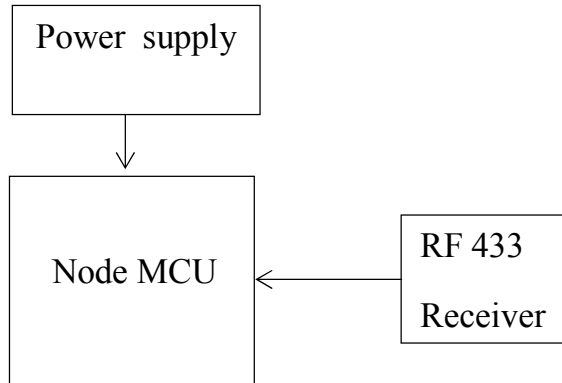
Architecture

When a fisherman checks in for a fishing trip, the Node MCU records their departure time, intended destination, and other relevant details. The Node MCU communicates with the RF transceiver to transmit this information to the monitoring station. As the fishing vessel approaches the border, the laser sensor detects its presence and sends a signal to the Node MCU. If the vessel crosses the border or enters a restricted area, the Node MCU triggers the buzzer to sound an alarm and sends an alert to the monitoring station via the RF transceiver. The monitoring station can then take appropriate action, such as dispatching patrol boats or contacting the fishermen to ensure compliance with regulations. Overall, this system provides real-time monitoring and alerts for border crossings by fishing vessels, helping to enhance maritime security and enforce fisheries regulations.

Block Diagram Server side :



Receiver side:



- **Node MCU:** The Node MCU, which is based on the ESP8266 microcontroller, could serve as the main controller for the system. It can connect to the internet via Wi-Fi and communicate with other devices.
- **Arduino Nano:** The Arduino Nano can be used to interface with sensors and actuators. It's ideal for collecting data from sensors and controlling devices like the buzzer and LCD display.
- **LCD:** An LCD display can be used to provide visual feedback to fishermen and border patrol agents. It can display information such as check-in/check-out status, alerts, and instructions.
- **RF Transceiver:** RF transceivers can enable wireless communication between the fishing vessels and the monitoring stations. They can transmit data such as GPS coordinates, vessel ID, and status updates.
- **Buzzer:** The buzzer can be used to generate audible alerts in case of emergencies or violations. For example, it could sound an alarm if a vessel strays into restricted waters or fails to check in on time.
- **Laser Sensor:** Laser sensors can be installed at key points along the border to detect the presence of fishing vessels. They can trigger alerts when a vessel crosses the border or enters a restricted area.

Overview

A Fisherman Border Crossing Alert System using IOT and Node MCU can provide real-time monitoring and alerts for unauthorized border crossings by fishermen. Node MCU boards are equipped with Wi-Fi capabilities, making them suitable for IOT applications. Each Node MCU device is installed at strategic locations along the border. Sensors like motion sensors or infrared sensors are connected to Node MCU boards to detect movement or presence along the border. Node MCU boards transmit data collected by sensors to a central server using Wi-Fi connectivity. A central server collects and processes the data received from Node MCU devices. It analyzes the data to detect any suspicious activity or unauthorized border crossings. If unauthorized activity is detected, the central server generates alerts. These alerts can be sent to relevant authorities via SMS, email, or through a dedicated application. Authorities can access a user interface (web-based or app-based) to monitor the border in real-time, view historical data, and manage alerts. The system can be integrated with existing border security infrastructure for seamless operation and enhanced efficiency.

VI. HARDWARE COMPONENTS

Arduino Nano:

Arduino Nano is an intelligent development board designed for building faster prototypes with the smallest dimension. Arduino Nano being the oldest member of the Nano family, provides enough interfaces for your breadboard-friendly applications. At the heart of the board is ATmega328 microcontroller clocked at a frequency of 16 MHz featuring more or less the same functionalities as the Arduino Duemilanove. The board offers 20 digital input/output pins, 8 analog pins, and a mini-USB port.

Power Supply:

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others. This power supply section is required to convert AC signal to DC signal and also to reduce the amplitude of the signal. The available voltage signal from the mains is 230V/50Hz which is an AC voltage, but the required is DC voltage (no frequency) with the amplitude of +5V and +12V for various applications.

LCD (Liquid Crystal Display):

The Liquid Crystal Display (LCD) is a low power device (micro watts). Now a days in most applications LCD's are using rather using of LED displays because of its specifications like low power consumption, ability to display numbers and special characters which are difficult to display with other displaying circuits and easy to program. An LCD requires an external or internal light source

Ultrasonic Sensor:

The ultrasonic sensor is a device that uses sound waves to measure distance. It sends out ultrasonic pulses and calculates the time it takes for the pulses to bounce back after hitting an object. Commonly used in robotics and automation for proximity sensing and obstacle detection.

Servo Motor:

A Servo Motor is a type of motor that can rotate with great precision. Normally this type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows the servo motors to rotate with great precision. If you want to rotate an object at some specific angles or distance, then you use a servo motor. It is just made up of a simple motor which runs through a servo mechanism.

Wave Share Laser Sensor Module:

A Wave share Laser Sensor contains a transmitter and a receiver. In the transmitter, there is an oscillating tube can generate a shockwave in a frequency of 180KHz. After amplified by a transistor, the shockwave is applied to the laser tube for exciting. In the receiver, there is a receiving tube, matching to the oscillating tube, can receive the reflected light. Since the laser sensor adopts modulation processing technology, the receiving tube can only receive the reflected light in a same frequency, efficiently preventing from the visible light.

RF Trans Receiver:

It is a blend of a transmitter and receiver, hence the name. It allows for sending and receiving information. Signals through it can travel large distances. This also applies even when there is an obstruction between the transmitter & receiver. RF transceivers operate radiofrequencies ranging from 30 kHz to 300 GHz. They are very small in size and have a wide operating voltage range, i.e. 3V to 12V. They can be applied to various types, sizes, and shapes of electronic circuit boards.

Node MCU:

The ESP8266 Node MCU CP2102 board has ESP8266 which is a highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

Buzzer:

A buzzer is an electronic signaling device that produces a buzzing or beeping sound. It is commonly used to alert or notify users about specific events, conditions, or alarms. Buzzers can be found in a wide range of applications, from household appliances to industrial equipment. Here are some key features and applications of buzzer

VII. SOFTWARE COMPONENTS

Arduino IDE:

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programmed (referred to as a micro controller) and a ready-made software called Arduino IDE (Integrated Development Environment), which is used to write and upload the computer code to the physical board.

ThingSpeak Account:

ThingSpeak is a platform for IoT (Internet of Things) applications that allows users to collect, store, analyze, and visualize data from sensors or devices. In the context of a Fisherman border crossing alert system, ThingSpeak could be utilized to gather data from various sensors placed along the border, such as motion sensors or cameras, to monitor for any illegal crossing attempts by fishermen.

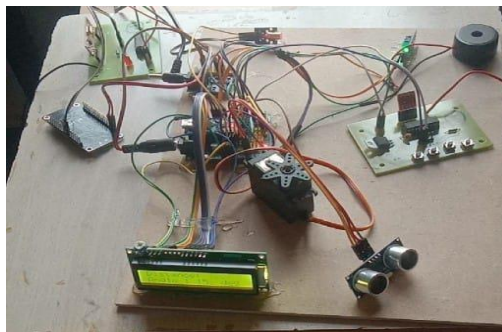
Here's how it might work:

- Sensors placed along the border detect movement or other relevant data.
- The sensors send this data to a microcontroller or IoT device equipped with communication capabilities.
- The microcontroller or IoT device then uploads this data to ThingSpeak.
- ThingSpeak stores the data and allows users to set up triggers or alerts based on specific conditions, such as detecting unauthorized border crossings.
- When a trigger condition is met, ThingSpeak can send alerts to relevant authorities or personnel, allowing them to take appropriate action

VIII. RESULT AND ANALYSIS

The Fisherman Border Crossing Alert System aims to provide real-time monitoring and notification of fishermen crossing borders, ensuring compliance with regulations and enhancing border security. The system utilizes ultrasonic sensors installed at border crossings to detect the presence of boats or fishermen. This allows for accurate and timely detection of border crossings. detecting a border crossing, the system generates alerts in real-time. These alerts can be transmitted via RF transceivers to relevant authorities or monitoring stations. In addition to generating alerts, the system can trigger automated responses, such as controlling servo motors to open or close gates/barriers. This helps in regulating entry and exit at border crossings.

The system can log data related to border crossings, including timestamps, location information, and crossing frequency. This data can be stored in a cloud platform like ThingSpeak for further analysis and reporting. The system may include an LCD display to provide real-time status updates, such as the number of crossings, gate/barrier status, and any alerts generated. This enhances situational awareness for authorities and operators. The system can be easily scaled to cover large border areas and customized to meet specific requirements. Additional sensors, nodes, or communication channels can be integrated as needed. By providing real-time monitoring and automated response capabilities, the system contributes to enhancing border security and preventing illegal activities such as smuggling or unauthorized border crossings. The Fisherman Border Crossing Alert System offers a robust solution for monitoring, managing, and securing border areas frequented by fishermen.



IX. CONCLUSION

In conclusion, the FisherMan Border Crossing Alert System represents a significant advancement in border security technology. By integrating real-time monitoring and alert systems, we can effectively enhance the safety and security of our borders, particularly in areas prone to illegal fishing activities. The system's ability to detect and respond to suspicious activities swiftly will not only protect marine resources but also safeguard the livelihoods of coastal communities. Moving forward, continued research and development in this field will be crucial to further refine and optimize the effectiveness of border surveillance systems worldwide.

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