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A Model For Border And Air Velocity Detection Towards Fishermen Safety

Dr. J. Ramya[1], M.V. Buvanavarsini[2], Blessy Deborah Dhamodharan[3], Aparna S. Nair[4], I. Ajitha[5]

1 Associate Professor

2,3,4,5 UG Scholar

1,2,3,4,5 Department of Electronics and Communication Engineering

Hindusthan College of Engineering and Technology, Coimbatore, India.

Abstract

Fishing is one of the key sources for food and revenue in any geographical region. Because water plays such a significant part in a country's economy, it is no surprise that neighbouring nations that share the same seas regularly engage in conflicts about control of the region. This has caused serious conflicts for the fishing population in these nations' coastal areas. With the current tools available to fishermen, crossing boundaries and recognizing places in the water has become a challenge. As a consequence, they traverse international boundaries. In our daily lives, we hear of numerous Tamil fishermen being apprehended and detained by the Sri Lankan Navy. The fundamental cause for this infraction is that the maritime boundary between the nations is not immediately recognized. Furthermore, in the event of an impending natural catastrophe, failure or delay in warning leads in widespread loss of life. In this project, we suggested a mechanism that protects fishermen by tracking their admissions and departures from the port using an embedded system and informing them of the country's maritime boundary using GPS and Internet of Things technology (IOT). When they intentionally attempt to cross the border, the boat will automatically reverse course and return to the safe zone. RF signals are used to forecast the zones.

Keywords: Fishermen safety, Border detection, IOT,Air velocity, Ultrasonic sensor

I.INTRODUCTION

With the current tools available to fishermen, crossing boundaries and recognizing places in the water is becoming a challenging chore. As a consequence, they traverse international boundaries. In our daily lives,

we hear of numerous Tamil fishermen being apprehended and detained by the Sri Lankan Navy. Even now, Tamil Nadu fishermen use their historical rights and frequently fish within the International Maritime Boundary Line. Around 18,000 boats of various types operate along the India-Sri Lanka maritime border from Tamil Nadu. Those who cross the border unknowingly are either apprehended or shot by the Sri Lankan Navy based on Border Law Violation. The fundamental cause for this infraction is that the maritime boundary between the nations is not immediately recognized[2][3][4]. Furthermore, in the event of an impending natural catastrophe, failure or delay in alerting relevant employees to leave the region results in loss of life and has a huge impact on economic output. GPS is utilised to monitor the fishermen's present position.

The GPS's current latitude and longitude coordinates are transmitted to the database, where the administrator uses them for continuous surveillance and monitoring of the user; if in trouble, current position forecasts may be produced using their credentials and last known location[13]. GPS (Global Positioning System) technology has become a significant part of people's lives throughout the years. With the availability of such a feature in the hands of the people, they have been able to locate themselves on a global scale and get an understanding of their immediate surroundings thanks to the Internet of Things. If the boat enters the prohibited region, RF will take control[10].

II. LITERATURE REVIEW

Abdallah Dafallah, H. A.[1] describes a precise and dependable real-time tracking system employing GPS and GSM services developed and successfully deployed at Khartoum University labs. The system locates a tracked device and sends its location to a tracking centre. It includes a portable tracked device connected to a person, vehicle, or object and a tracking centre where the device's position is tracked. The GPS locates the tracked mobile device. If the tracking centre is a personal computer with several interface apps, it may show the position on Google maps using the free version of Google Maps APIs (application programming interfaces). The system is low cost, accurate, real-time, and adaptable for many applications.

Gupta, N et al. [5] discussed about the quadcopter with two fixed pitch propellers, one clockwise and one anticlockwise. They regulate lift and torque with RPM. Quad-copter designs are common in UAV

research. The aeroplane is stabilised using an electronic control system and sensors. Their modest size and agility allow them to be flown both inside and outdoors. In this article, ultrasonic sensors are used to identify obstacles and prevent collisions in an interior setting. The goal was to create an indoor autonomous quadcopter.This difficulty may be greatly reduced by using ultrasonic sensors. After extensive testing, a hardware architecture and an algorithm for computer aided indoor movement were suggested. The consequences were visually illustrated and extensively discussed.

Shashikant Dugad et al. [17] studied the analysis of an image using Support Vector Machine and identifies ship intrusions (SVM). Border crossing ships and safeguard industrial areas are identified with the mentioned approach. These two approaches combined can identify an encroaching ship in a continually changing maritime environment. SVM may be used to train a system by exposing it to various beach situations.The project features a cutting-edge ship intrusion detection system. Photo or video processing is an example of image processing.Video surveillance systems are used for security surveillance. An intrusion detection system for coastal regions is designed to identify ships in a dynamic environment. It is a system that eliminates previous system flaws such costly setups, imprecise detection, and algorithmic error.

Jiajun Niu, & Simpson, J. J. [9] For marine controlled-source electromagnetic (CSEM) detection of oil resources buried under the bottom, this paper presents thorough data and discussion. To avoid the free-space area in the simulation where displacement currents are necessary, approximate continuation boundary conditions are often employed at the ocean–air interface. This letter solves this problem by modelling CSEM hydrocarbon detection using the usual three-dimensional full-vector Maxwell's equations FDTD approach. We show that the continuation boundary condition fails at large (km) source-to-receiver distances in deep-water detection issues and at all distances in shallow-water detection problems.

A) PROBLEM STATEMENT

Due to the intricacy of the matter and the people's ignorance, maritime boundary infringement and incursion by fishing boats has been a big worry for wayward fishermen and their families, as well as a tremendous burden on governments and the public alike. The primary answer is to protect these fishermen from the dangers they face on a daily basis in order to earn a living[11][12]. Keeping the aforementioned issues in mind,

III. SYSTEM MODEL

The project's goal is to assist fishermen in identifying boundaries in the marine region while fishing and to give extra advantages to fishermen. This approach identifies the boundaries using the RF transmitter and receiver and transmits the information to the microcontroller. The microcontroller then executes the duty of shutting off the motor, and the GPS position is also sent. Ultrasonic sensors are used to identify obstructions in the boat's path. It saves fishermen's lives. We've set three ranges to alert the fisherman. This method will send an alert when they arrive in each location. Even if the fisherman do not return to the safe zone after entering the restricted zone, this technology will automatically relocate the boat from the restricted zone back to the safe zone. This project is also used to determine the velocity of the air, which is useful to

fishermen. This approach is linked to the internet of things, and information will be given to the appropriate person through a mobile app called Blynk.

3.1 PROJECT SCOPE

Our fishermen, whether willingly or unwittingly, cross the border and end up in the maritime waters of neighbouring nations. They put their lives in danger for a daily paycheck. It may sometimes be lethal. In addition, there is no one to assist them in an emergency. Our radio frequency (RF) communication-based system (RFCs) will assist them in not crossing the border. The gadget (Enslaved person) aboard fishermen's boats will transmit GPS signals embedded in data packets on a regular basis. Patrol boats or a receiver (Master) along the coast will receive this. As a result, the master has real-time information regarding the whereabouts of each boat. If the enslaved person is about to cross the border, the master will notify the boat, and the boat's orientation will be controlled as well. As a result, an enslaved individual should stay safe inside water bounds. Tracking a specific enslaved individual is also possible, and when a distress call is relayed from slave boats, instant assistance from the shore may be supplied.

3.2 PROJECT OBJECTIVE

The primary goal of this initiative is to save the lives of fishermen who inadvertently or accidentally enter our country's border.

In our project, we created a system that indicates the border to the fishermen in the boat and alerts them when they are going to breach their border limit.

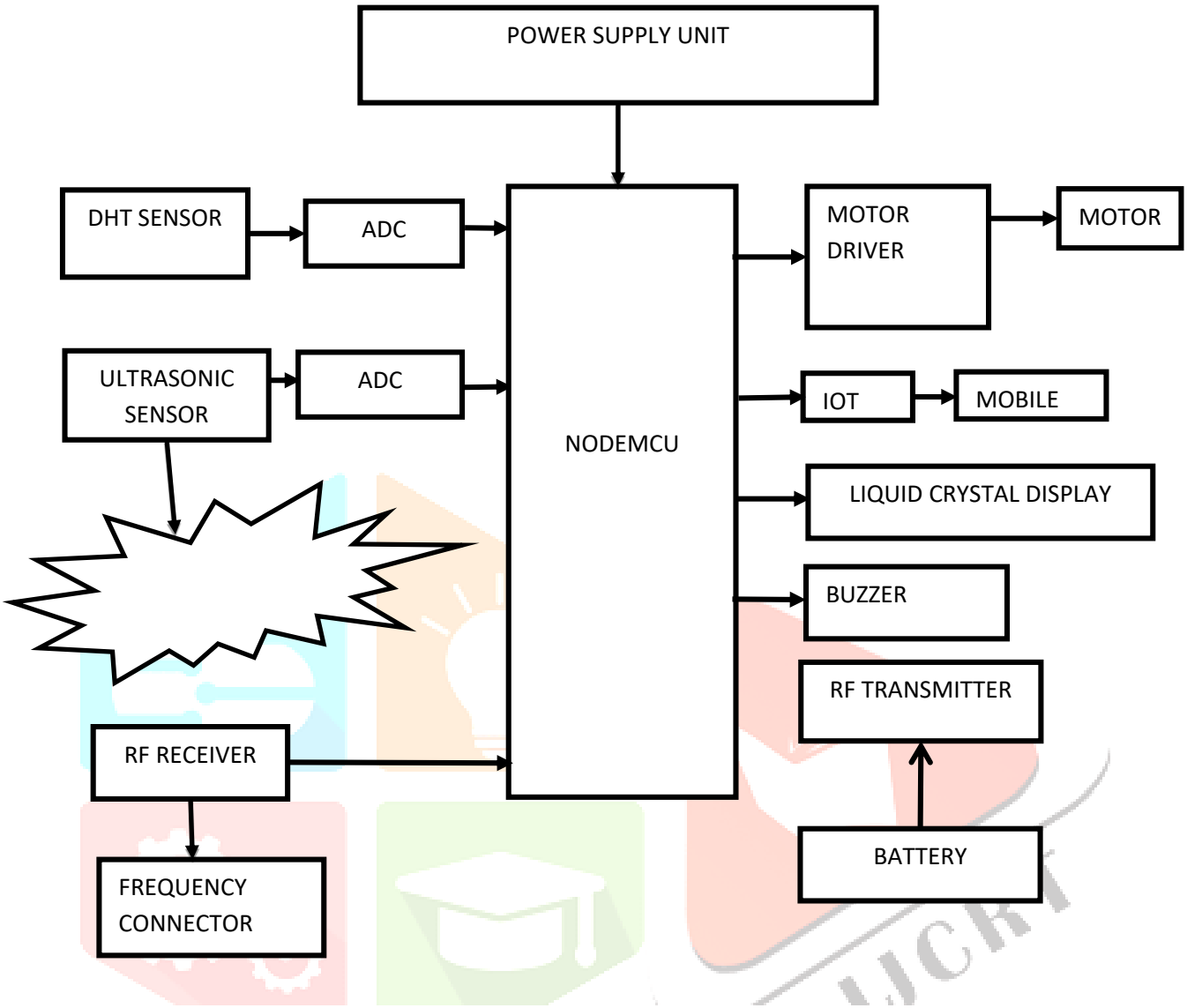

Figure 1: Architecture Diagram

IV. IMPLEMENTATION

4.1 NodeMCU ESP8266

The ESP-12E module on the NodeMCU ESP8266 development board has an ESP8266 chip with a Tensilica Xtensa 32-bit LX106 RISC CPU. To store data and applications, NodeMCU contains 128 KB of RAM and 4MB of Flash memory. Its high processing power, along with built-in Wi-Fi/Bluetooth and Deep Sleep Operating capabilities, makes it suitable for IoT applications.

4.2 ULTRASONIC SENSOR

An ultrasonic sensor is a kind of electronic device that detects the distance between two objects by producing ultrasonic sound waves and receiving the reflected sound as an electrical signal. Ultrasonic waves move quicker than audible sound (i.e., the sound that humans can hear).

Figure 2: ultrasonic sensor

4.3 HUMIDITY SENSOR

The DHT 11 relative humidity sensor module is made up of a capacitive humidity sensor, a CMOS capacitor to frequency converter, and an EEPROM that stores the calibration variables. Because of the properties of the capacitor type humidity sensor, the system may react to changes in humidity extremely fast. The presence of water in the air is referred to as humidity.

Figure 3: Sensor

Humidity sensors are used in all of these applications, as well as many more, to indicate the moisture levels in the environment.4.4 IOT(INTERNET OF THINGS)

Users of IoT systems may gain more automation, analysis, and integration within a system. They increase the reach and precision of these regions. The Internet of Things (IoT) makes use of both current and developing technologies for sensing, networking, and robotics. IoT capitalizes on recent software breakthroughs, lowering hardware costs, and current attitudes about technology[8].

V. WORKING

The aim of the project is to help the fisherman for identifying border in the sea area while fishing and also provides additional benefits to the fisherman.This method uses the RF transmitter and RF receiver to identify the borders and sends the information to micro controller[6][7]. Then micro controller performs function as turn off the motor and also GPS location also send.Ultrasonic sensors are used to detect the obstacles on the way of the boat it saves lives of fishermen.We have fixed 3 ranges to intimate the fishermen.When they reach each region this system will give an alert[14][15]. Even though

after reaching the restricted zone the fishermen not returned to safe zone then this system will automatically make the boat to move back from the restricted zone.This project also used to find the velocity of the air this is also additional helpful to the fisherman. This method is totally connected to the internet of things and information will be send to the required person with help of a mobile. Micro controller acts hearts of our whole system which controls every device which interfaced in the module. Embedded C program language is used for programming and respective connected pins are used to input output devices. This system has SPI unit which is used to connect IOT applications. Sensor values are read from the analogue to digital converter pins and processed according to program logics.

When boat reaches the first zone the RF transmitter and receiver detects the border using frequency gives the first zone alert. If the boat crosses the first zone and reaches the second border/ zone of the sea RF transmitter/receiver module again detects the border and gives the second alert to the fishermen.And for the final safety if fishermen unknowingly crosses the second border and reaches the restricted zone then the system/boat will automatically reverse from the restricted zone to the safe zone thereby saving lives of fishermen[16].

This project also used to find the velocity of the air this is also additional helpful to the fisherman.This method is totally connected to the internet of things and information will be sent to the required person with help of a mobile application called Blynk.

VI. RESULTS AND DISCUSSION

6.1 OBSTACLE DETECTION

This sensor is used to avoid obstacles like rocks, other boats and ships from sea accidents. Echo and trigger pins are connected to micro controller when echo pins generate the echo signal, trigger pin will be activated and receives the signal from echo pin to find out nearby obstacle.

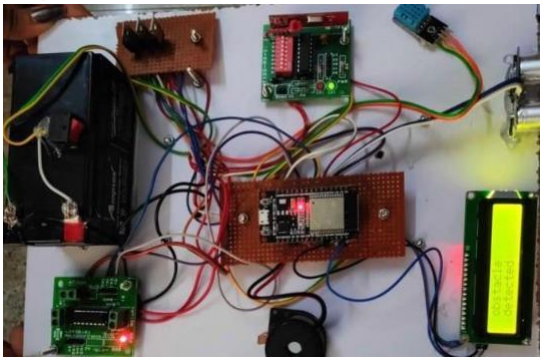

Figure 4: Obstacle Detection

6.2 AIR VELOCITY DETECTION

DHT11 sensor is used to find out the velocity of air in the sea. This sensor is connected with the analog pin in micro controller. It generates the signal by voltage 0-5 and calibrated in program to get the digital values.

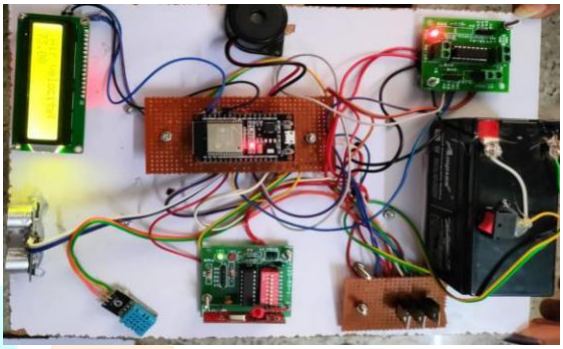

Figure 5: Air Velocity Detection

6.3 BORDER DETECTION

This system has SPI unit which is used to connect IOT applications. Sensor values are read from the analogue to digital converter pins and processed according to program logics.The below prototype clearly explains about the “Trizonal Alert”.When boat reaches the first zone the RF transmitter and receiver detects the border using frequency signals and gives the first zone alert. If the boat crosses the first zone and reaches the second border/ zone of the sea RF transmitter/receiver module again detects the border and gives the second alert to the fishermen.And for the final safety if fishermen unknowingly crosses the second border and reaches the restricted zone then the system/boat will automatically reverse from the restricted zone to the safe zone thereby saving lives of fishermen.

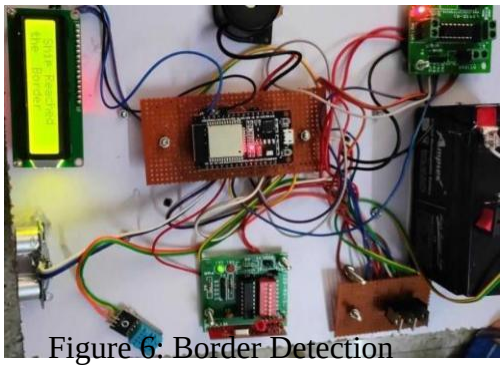

Figure 6: Border Detection

VII. CONCLUSION AND FUTURE SCOPE

Every year, hundreds of people are killed by natural disasters. Fishermen are particularly susceptible during natural catastrophes such as cyclones since they have practically no communication technology on board to aid them in an emergency. Using GPS and IoT technologies, the suggested system intends to keep fisherman safe. Our technology recognises location with 99 percent accuracy, according to our evaluation. It transmits data in a matter of seconds, allowing fisherman to swiftly send distress alarms with their position to the rescue team in an emergency. The suggested system attempts to protect fishermen's safety by implementing a tri-zonal system, barring them from violating the International Maritime border at sea.

The device also aids in the identification of safe vessels in the maritime zone. The suggested technology also aids in the detection of obstructions in the boat's route. Using proper Machine Learning algorithms to train a system the daily fishing patterns of all domestic boats in order to find abnormalities by categorizing native and non-native vessel operations. Make it easy for fishers to engage with the proper government authorities. Specifically, Customer Support Enhancements. Native language support is provided for both application texts and voice warning alarms. To improve security, use facial recognition, the user's private pin, and QR code scanning.

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