IoT Based Safety And Security System For Fishermen

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Abstract- *Regardless of geological location, fishing is one of the primary sources of food and revenue for practically all coastal regions. 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 challenges for the fishing population in these nations' coastal areas. With the current tools available to fishermen, crossing boundaries and recognising 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. The fundamental cause for this infraction is that the maritime boundary between the nations is not immediately recognised. Furthermore, in the event of an impending natural catastrophe, failure or delay in warning relevant employees to leave 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. When they intentionally attempt to cross the border, the boat will automatically reverse course and return to the safe zone. RF signals may be used to forecast the zones.*

Keywords- RF, IoT, Fishermen, GPS, NodeMCU

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. 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. We utilize GPS 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. 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.

II. LITERATURE REVIEW

Abdallah Dafallah, H. A.[1]This study 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. [2]. A quadcopter has 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.

Dr. Shashikant Dugad et al. [3]This study uses image analysis and a Support Vector Machine to identify ship intrusions (SVM). The major goal is to identify border crossing ships and safeguard industrial areas. 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. [4] 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) PROBLEMSTATEMENT

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. 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 PROJECTSCOPE

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 PROJECTOBJECTIVE

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.

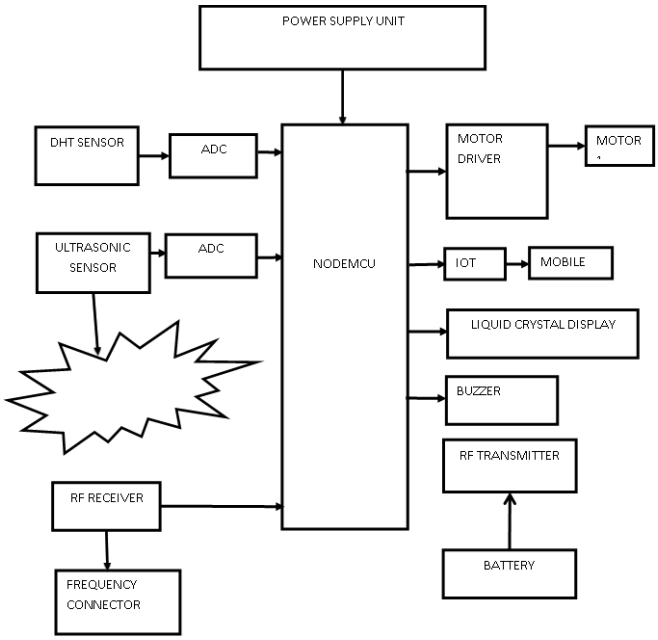

Figure 1: Architecture Diagram

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. This microprocessor supports RTOS and works at a configurable clock frequency of 80MHz to 160MHz. 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. A Micro USB connector and VIN pin may be used to power the Node MCU (External Supply Pin). It has interfaces for UART, SPI, and I2C.

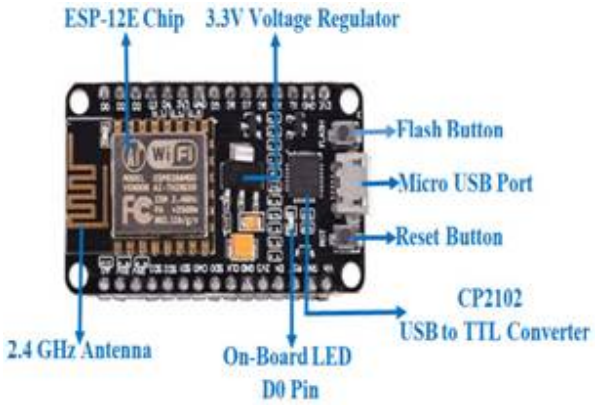

Figure 2 Node MCU Board

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 3 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. Each sensor is calibrated twice in two separate precise humidity chambers, and two distinct sensor-related coefficients are recorded in the module's EEPROM.

The presence of water in the air is referred to as humidity. The quantity of water vapour in the air may have an impact on human comfort as well as numerous industrial production processes. The existence of water vapour has an impact on a variety of physical and chemical processes.

Figure 4 Sensor

Humidity measurement is crucial in agriculture for plantation protection (dew avoidance), soil moisture monitoring, and so on. Humidity sensors are used in all of these applications, as well as many more, to indicate the moisture levels in the environment.

4.4 ADC

The design of the ADC0808 and ADC0809 has been optimized by incorporating the most desirable aspects of several A/D conversion techniques. The ADC0808, ADC0809, offers high speed, high accuracy, minimal temperature dependence, excellent long-term accuracy and repeatability, and consumes minimal power. These features make this device ideal for applications from the process and machine control to consumer and automotive applications. For a 16-channel multiplexer with common output (sample/hold port), see ADC0816 data sheet. (See AN-247 for more information.)

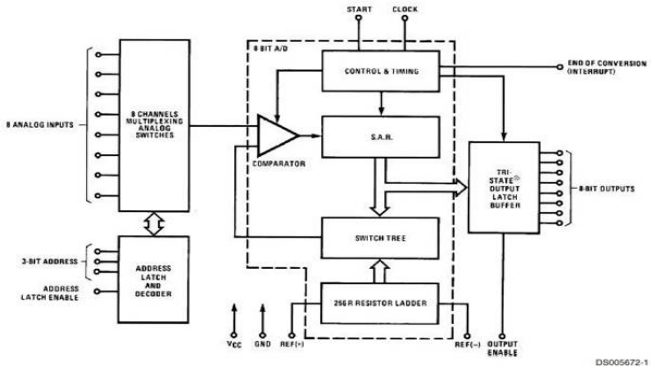

Figure 5: ADCChannel Diagram

4.5 LAYERING

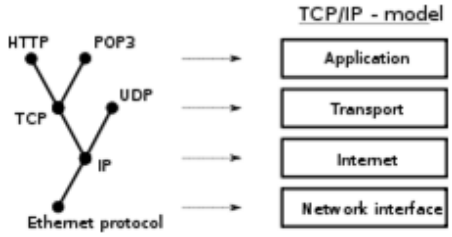

Figure 6: Layering Structure

The TCP/IP concept, often known as the Internet layering method, is related to various popular protocols. The internet's communication protocols are intended to perform in a wide range of varied and complicated environments. To facilitate design, communications protocols are built on a layering architecture.

4.6 PROTOCOLLAYERING

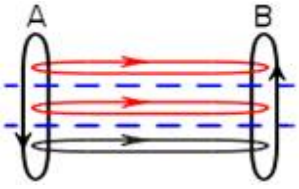

Figure 7: ProtocolLayering

Messages are routed via a protocol suite. The actual message loops are shown in black, while the effective communications between levels are shown in red.

Protocol layering is currently the foundation of protocol design.Each protocol layer addresses a separate set of communication issues.

4.7 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 capitalises on recent software breakthroughs, lowering hardware costs, and current attitudes about technology.

4.8 LINEAR POWER SUPPLY

An AC-powered linear power supply usually uses a transformer to convert the voltage from the wall outlet (mains) to a different, usually a lower voltage.If it is used to produce DC, a rectifier is used. A capacitor is used to smooth the pulsating current from the rectifier.The accurate pulsation frequency is related to the AC power frequency(50 or 60 Hz).

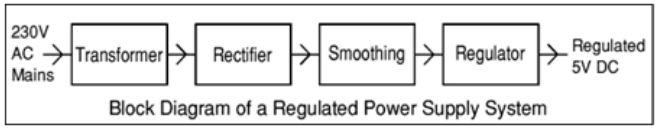

Figure 8: Block Diagram of a regulated Power Supply System

4.9 TRANSFORMER

Transformers transfer alternating current (AC) energy from one voltage to another with little power loss. Transformers only function with alternating current (AC), which is one of the reasons why mains power is alternating current.

4.10 RECTIFIER:

There are numerous methods to link diodes in order to create a rectifier that converts AC to DC. The most essential rectifier is the bridge rectifier, which generates full-wave changing DC. A single diode may be used as a rectifier, however it only utilises the positive(+) sections of the alternating current wave to generate half-wave changing DC.

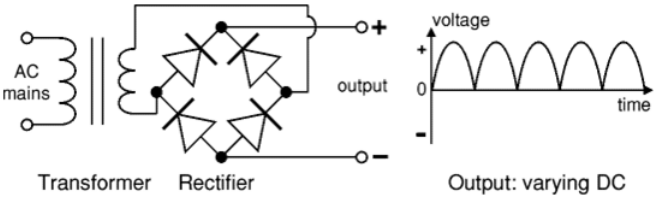

Figure 9: RectifierCircuit

4.11 REGULATOR:

Voltage regulator integrated circuits may have fixed (usually 5, 12, and 15V) or variable output voltages. They are also graded according to the highest current they can carry. There are negative voltage regulators available, mostly for use with dual supply. The majority of regulators feature some kind of automated protection against high current ('overload protection') and overheating ('thermal protection').

The LM78XX family of three-terminal regulators are available with a variety of preset output voltages, making them suitable for a wide range of applications. Local on-card regulation is one of them, which eliminates the distribution issues associated with single-point regulation.

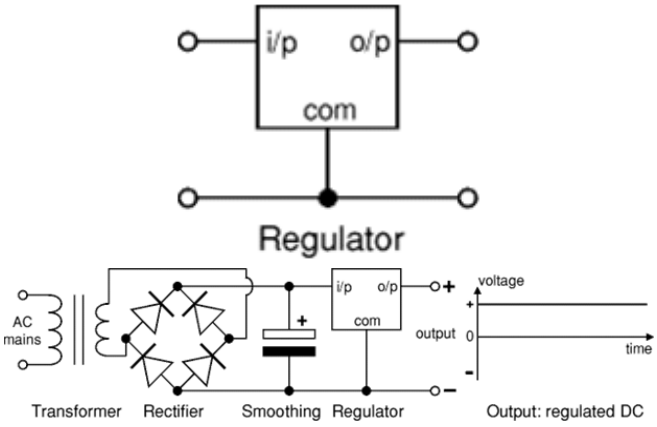

Figure 10: RegulatorCircuit

The regulated DC output is very smooth with no ripple. It is suitable for all electronic circuits.

4.12 TRANSMITTER

The TWS-434 is extremely small and is excellent for applications requiring short-range RF remote controls. TWS-434: The transmitter output is up to 8mW at 433.92MHz with a range of approximately 400 feet (open area) outdoors.
The TWS-434 transmitter accepts both linear and digital inputs, can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy. The TWS-434 is approximately 1/3 the size of a standard postage stamp.

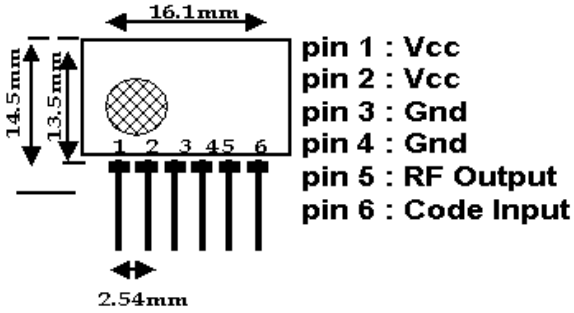

Figure 11: TWS-434 Pin Diagram

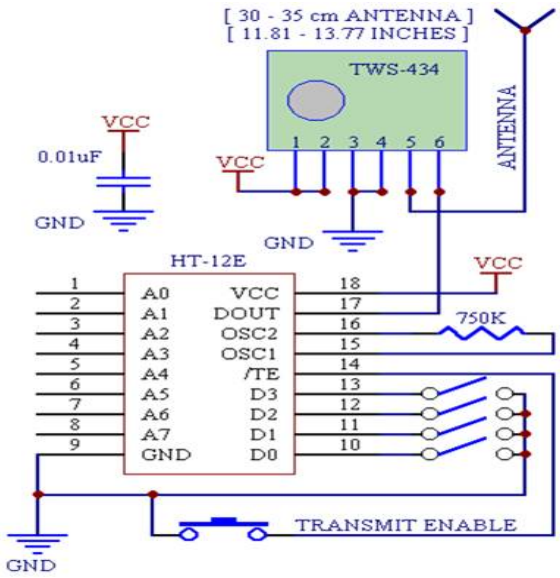

Figure 12: Transmitter Application Circuit

4.13 RECEIVER

RWS-434: The receiver also operates at 433.92MHz, and has a sensitivity of 3uV. The WS-434 receiver operates from 4.5 to 5.5 volts-DC and has linear and digital outputs.

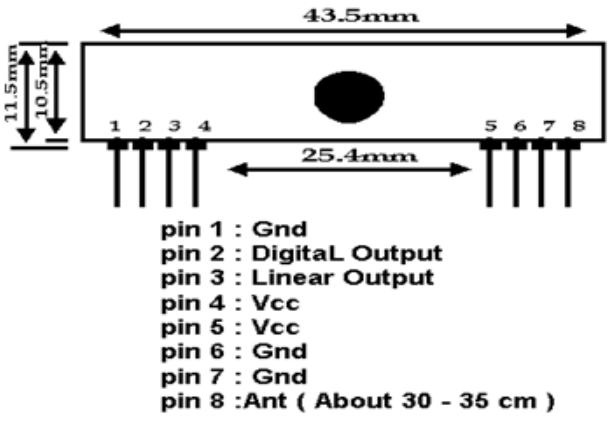

Figure 13 Pin-Out Diagram

4.14 GENERATING DATA

The TWS-434 modules do not incorporate internal encoding. If you want to send simple control or status signals such as button presses or switch closures, consider using an encoder and decoder IC set that takes care of all encoding, error checking, and decoding functions. Motorola and Holtek make these chips. They are an excellent way to implement basic wireless transmission control.

4.15 RECEIVER DATA OUTPUT

A 0 volt to Vcc data output is available on pins. This output is normally used to drive a digital decoder IC or a microprocessor performing the data decoding. The receiver's output will only transition when valid data is present. In instances when no carrier is present, the output will remain low.

4.16 DECODING DATA

The RWS-434 modules do not incorporate internal decoding. If you want to receive Simple control or status signals such as button presses or switch closures, you can use the encoder and decoder IC set described above. Decoders with momentary and latched outputs are available.

4.17 TRANSMITTING AND RECEIVING:

These modules do not provide full duplex or simultaneous two-way operation. When two-way communication is necessary, only half-duplex operation is permitted.

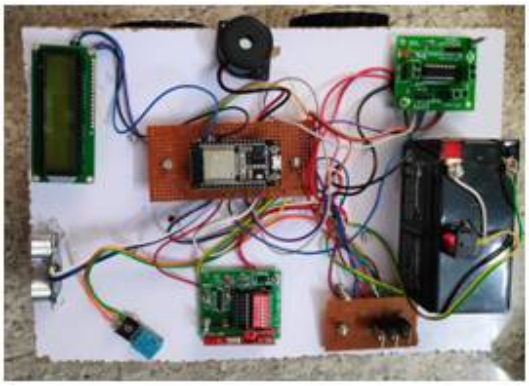

Figure 14: Model designed Kit

V. 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 categorising 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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