

# Marine Navigation Assistance For Fisherman

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**Abstract-** Due to unawareness of border limits, fishermen cross the maritime borders. Once they cross the border they are being killed or captured by other country coastal guards. So to assist fisherman in the sea, a system has been developed. This system uses GPS technology and detects three borders: Indian, national and the international border. If they cross other country borders, the speed of the motor is reduced and the motor is stopped when they cross the international border. Every fisherman is given a RFID tag and has to swipe it to start the motor. If the information matches with previously stored information, the motor will start if not it is identified as an unauthorized person. Base station continuously updates the weather conditions to fisherman and helps him in finding the right path to reach the shore. This system sends a distress message to the base station and neighboring boats when the fisherman is in adverse conditions using ZigBee communication.

**Keywords-** GPS, RFID reader, RFID tags, Sensors, ZigBee.

## I. INTRODUCTION

The maritime boundary is the division of Earth's water according to the physical and geographical conditions. This allows national rights for minerals and resources for the countries accordingly. A peninsula like India has maritime boundaries between other countries. Srilanka and India share a maritime border up to Katchatheevu island. And these maritime boundaries are controlled by respective coastal guards. The coastal people livelihood depends on fishing. Without knowing the limits, they cross those maritime borders. The fishermen are considered as "trespassing" into other country's border. They are being captured or sometimes they are being killed by other countries, coastal guards. Under these circumstances the lives of fisherman becomes danger. So to assist the fisherman in border detection, we have implemented this system.[1] The system consists of four segments and they are defined as:

- Border detection
- Weather monitoring
- Distress message communication
- Unauthorized person detection

Border detection is done using GPS technology. The latitudes and longitudes are defined for the current location of the boat and are compared with the predefined border coordinates. By this result, it aware the fisherman from crossing the border. Fisherman faces a lack of communication with the authorities as well as with the neighboring boats when they are in distress. Hence this system provides a solution such that an "SOS" message is sent to authorities and neighboring boats when the fisherman presses a push button. RFID technology is used to detect an unauthorized person. If he is an authorized person, then the motor will start. If he is an unauthorized person, it alarms and sends a message to coastal guards. The base station monitors all the information and also monitors weather conditions and sends an update to the boat each time when the weather changes. This helps fisherman to come back to the shore safely.

## II. LITERATURE SURVEY

### A. Advanced border alert system using GPS and with intel-ligent Engine control unit

In this paper, a system using GPS and GSM detects border and also where GPS is used to find the location of the boat. If the boat is nearer to the boundary, it sends warning to fisherman with the alarm and emits the location of the boat to the nearest coastal office via GSM communication. When it further nears the maritime boundary an interferer is sent to the Engine Control Unit which controls the speed of the engine with the help of the electronic fuel injector. By this method, we can alert the fishermen and also monitor them thereby avoiding banned activities such as smuggling, intruders, etc.[5]

### B. Alert System for Fishermen Crossing Border using Android

The application can be widely used by people in the border to find the appropriate path to reach the destination. The application will notify the information of where the devices are being located and intimate them about the issues that occur due to opponent forces in ships to server. This can act as an incident management application to avoid conflicts at varying situations. [10]

## Satellite and RF Enabled Assistance for Marine Navigation

In this paper using RF technology, a solution for border detection is provided. This system can be used by the fishermen to send out an SOS message with their GPS coordinates when they are under distress using ZigBee. This system included additional features such as audio and visual indicators to alert the fishermen when he is crossing the country's border. Also, sudden weather changes are immediately alerted to the fishermen using RF technology.

### [3] Design of Data Acquisition and Record System Based on Zigbee and GPS

This paper describes about the record system based on Zigbee and GPS. Used the 32 bits LPC2220 microprocessor of ARM7 as hardware platform, and combined muC/OS-II real-time embedded operating system, GPS with ZigBee of wireless local area network, the data acquisition and record system not only can collect, record, transmit (wire or wireless), display the complex industrial signals and so on, but also can control these procedures. The innovations are introducing GPS technology to implement more precise synchronization among instruments and to position the fault, and introducing ZigBee wireless communication to finish communication among instruments and to work in phase each other. The design is the subsystem of underground oil pipe online monitoring system. [11]

## III. METHODOLOGY

### A. Border determination

To determine the location of any object on earth, we use GPS coordinates. There are 24 GPS satellites revolving around the earth at all times. By synchronizing with at least 3 of them we can obtain the object's exact latitude and longitude values. To determine the border, we compare previously recorded border coordinates with the current location coordinates. If the result exceeds, then the fisherman has crossed the border. [2]

### B. Distress message communication

When the fisherman is in distress, for example, his boat is sinking he needs immediate help. This system incorporates an SOS distress system where the fisherman when in distress has to press the push button. This action will send out a distress message using wireless ZigBee communication to all nearby boats and also to the base station. The distress message will contain a predefined message and

the latitude and longitude co-ordinates of the boat's current location. The coordinates will be obtained using a GPS receiver present on the boat.

### C. Unauthorized person checking

Every fisherman information is stored in the form of a database. They are given a unique RFID tag with their respective information. The fisherman has to swipe the RFID tag in the RFID card reader. If the data match with the previously stored information, then the person is confirmed as an authorized and the motor will start. If the data do not match with the records, then he is considered as an unauthorized person and alarm along with a message is sent to the base station.

### D. Weather monitoring

The base station updates weather changes to the fisherman so that he can come back to the shore safely. It sends a message to the fisherman whenever there will be a sudden change of weather. The message is sent using RF technology.

## IV. BLOCK DIAGRAM DESCRIPTION

Figure 1 shows the boat setup. The function of this setup is to determine borders, send a distress message to the base station and nearby boats, check unauthorized activities and display weather conditions sent from the base station. Border determination is done using GPS technology. Here we have defined three borders: Indian border, National border, and International border. If the fisherman crosses the Indian border, a message "Boat crossed Indian border" is displayed on LCD and alarm becomes on. If he crosses a national border, a message "Boat crossed National border" is displayed on LCD and the speed of the motor is reduced. If he crosses an international border, a message "Boat crossed international border" is displayed on LCD and the motor stops. The message is sent to the base station also.

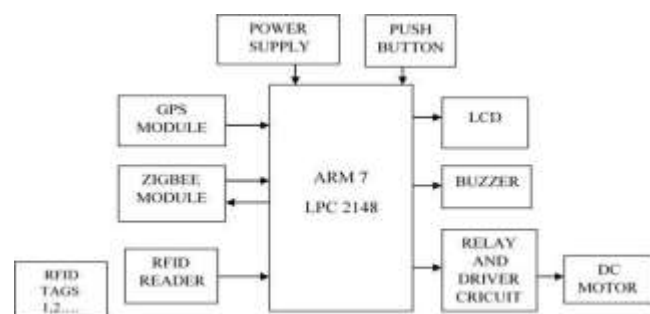


Fig. 1. Boat Setup

When fisherman presses push button, a distress message along with the coordinates of the boat is sent to the base station and neighboring boats so that they can rescue him. RFID tags are given to each fisherman with the information stored in it. The fisherman has to swipe the card in the RFID card reader. If the information matches with the stored data then the motor will start. If it does not match, then alarm buzzes and a message "unauthorized person" is sent to the base station. The messages are sent to the base station and other boats using ZigBee communication.

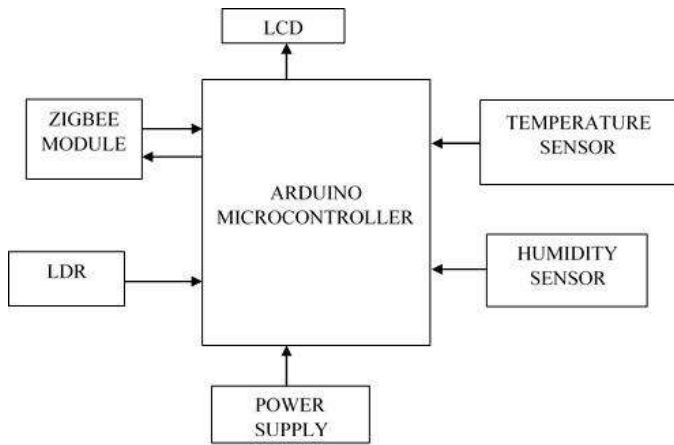


Fig. 2. Base Station

Figure 2 describes the base station whose function is to update weather changes to fisherman and guide him so that he can come back safely. The distress messages sent from the boat setup is displayed on LCD.

**V. FLOWCHART**

**A. Boat setup**

Figure 3 shows the flowchart of the boat setup where initially RFID card is checked. If it is true then the motor will start and GPS coordinates are obtained and border detection is implemented. If it is false, a message is sent to the base station. The three borders are implemented as shown in the flowchart.

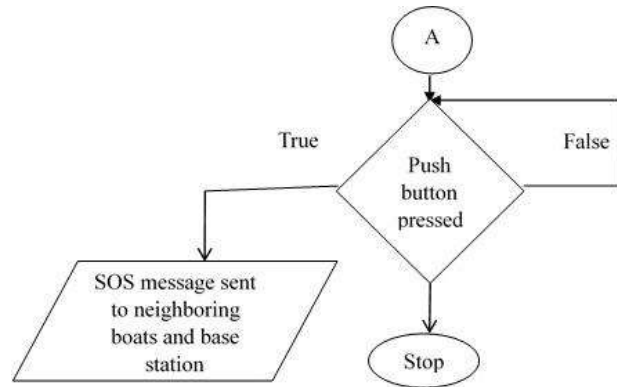


Fig. 4. Distress message Flowchart

**C. Base station**

The base station monitors weather and sends updates to the boat using ZigBee. Here sensors are used to monitor weather conditions.

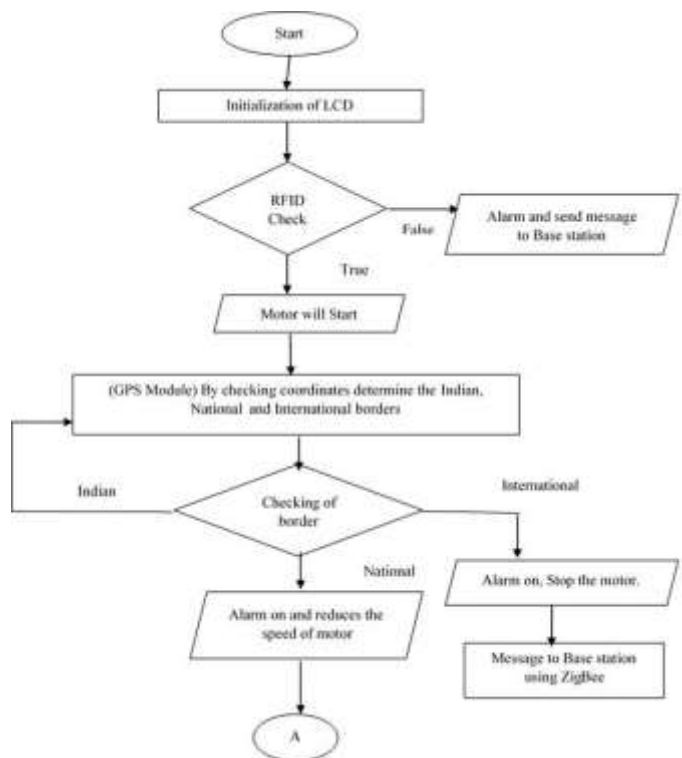


Fig. 3. Boat Setup Flowchart

**B. Distress message communication**

Figure 4 shows flowchart of the implementation of dis-tress message communication. When fisherman presses push button a message is sent to the base station and neighboring boats.

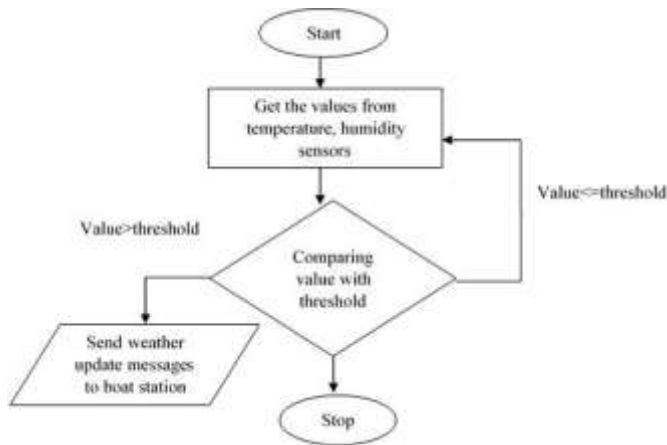


Fig. 5. Base Station Flowchart

### VI. APPLICATIONS

- Hijack prevention
- Lost ships can be identified
- Traffic assistance in sea
- Lost vehicle tracking

### VII. ADVANTAGES

- Low power consumption
- Improved security
- Less maintenance
- Highly reliable for 24x7 operations
- Easily replaceable

### VIII. RESULT

The GPS system is used to detect maritime border and alarms and visual indicators are used to display warnings whenever fisherman crosses the border.



Fig. 6. LCD display of Boat crossed Indian border in boat setup

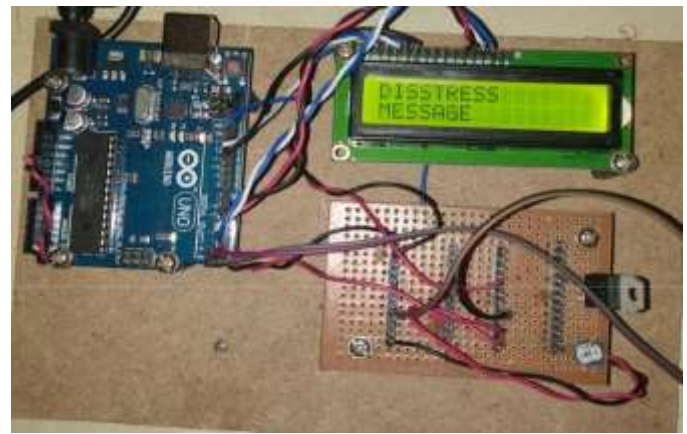


Fig. 9. Distress message display in neighboring boat

The speed of the boat is reduced using relay circuits. The speed is reduced when he crosses national border and finally stops when it reaches international border with an alert message sent to base station.

RFID reader scans the RFID tag of the fisherman before starting the motor. The data has to match with the previous records, then the motor will start. If the data is wrong, an alert is sent to the base station so that coastal guards can take necessary action.



Fig. 7. LCD display of Boat crossing National border in boat setup

Base station constantly sends weather updates to the boat setup so he can know weather conditions and come back to shore safely

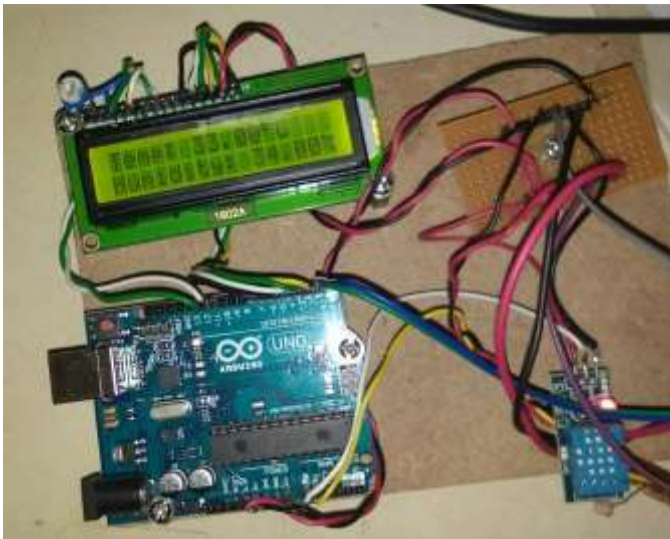


Fig. 8. Temperature and humidity values display in boat setup

Distress message is sent to base station and neighboring boats so that he can be saved when he is in danger. He needs to press push button then the distress message is sent using ZigBee module.



Fig. 10. Invalid message display

## IX. CONCLUSION

By using this system the fisherman can identify the national borders and prevent from entering to the other countries. He can maintain communication between other boats when he is in danger and can obtain instance help from them. The base station monitors the weather and sends updates to fisherman so he can come back to the shore safely. Unauthorized

activities in the sea can be controlled to some extent using the RFID technology.

## X. FUTURE SCOPE

We can use the EEPROM to store the previous navigating positions up to 256 locations. We can navigate upto number of locations by increasing the memory of EEPROM. We can increase the accuracy of GPS so that border detection is improved. We can help fisherman by indicating any tsunamis using vibration sensor. This sensor identifies any vibrations in sea and alerts him about tsunami. In the future, we can use satellite communication mode so that he can communicate through a longer distance.

## XI. ACKNOWLEDGMENT

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