Deep Sea Fishermen Patrol System for Coastal Intruder Positioning

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Abstract— This study introduces a novel handheld device designed to assist fishermen in enhancing maritime security and supporting the Indian Coast Guard. The device integrates a GPS receiver, allowing fishermen to accurately detect and report unauthorized vessels or poachers. This location data is relayed to the nearest coast guard station via GSM communication, enabling a swift response and timely interception. Additionally, the device features a safety alert system that emits beeps and vibrations when fishermen approach national maritime borders, guiding them to stay within designated fishing areas for their safety and legal compliance. By utilizing a community-based surveillance approach, the coast guard can optimize patrol operations by responding strategically to alerts rather than conducting random patrols.

Keywords— GPS Receiver, GSM Communication, Community Surveillance, TFT Touchscreen, Graphical User Interface (GUI), MEMS Compass, Cooperative Localization

I. Introduction

The Indian Coastguard was formally inaugurated on 18August 1978. It normally deals with marine safety, maritime security, lifesaving, law enforcement, maritime environmental security and fisheries. 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. Even though we have this much of coastguard security, all things happening opposite to our thinking. The foreign trawler easily overcoming our coastguard security force. Every day we hearing news about fishermen killed or imprisoned when they cross the national sea border inadvertently. The most outstanding problem is being going on for trans border fishing i.e., on the Indo-Sri Lankan border. Here two distinct issues are arising. First is the movement of Indian boats into Sri Lankan water without any intimation or prior information that they crossed the border area. Also, when

fishermen sight a foreign trawler poaching in their fishing grounds, they watch helplessly, sometimes trying to fight resulting in injuries and death. This all happening in governance of our coastguard force only. Daily we get news about the happenings being going on in coastal areas. Many fishermen get injuries and even to death only because of the insecurity. Proper steps should be taken out in favor of our fishermen to have independent freedom with prior security to protect them. Here many effective measures can be taken out to reduce these accidents. Most effective solution would be to reduce the trawler fleet on the Indian Side. This can be done easily now. We are going to design a new device that would help to remove all these problems. We expect our device with GPS tracking and our concept of GSM-assisted community patrols will prove successful in India and elsewhere in the world. We are sure that this technology will benefit the poor fishermen and protect the coastal environment. The safety being carried out by this device will take out a good name for the Indian Coastguard. They can easily overcome the problems that they are facing now-a-days. Everyone fingering Indian Coastguard force whenever some problems happen. So, to overcome and protect everyone without any harm, this device is very helpful.

II. Literature Survey

1. Present scenario :-

The basic idea of this project came as increasing tensions across the Indian and Sri Lankan borders caused much havoc between the two countries. Fishermen from our country are being abducted by the Sri Lankan navy for crossing the border which is unintentional most of the times. We are supposed to design a circuit for "DEEP SEA FISHERMAN PATROL SYSTEM FOR COASTAL INTRUDER POSITIONING".

2. Existing System :-

No preliminary alert is there to avoid the problem. Only after the occurrence, the recovery force is being sanded off. Many lives have been ended up by this way. Community surveillance allows the coastguard to patrol at any call or problem occurrence only.

3. Limitations of above system :-

As no any positioning system used in the existing system hence community surveillance takes much more time to overcome the fisherman boats that needs help. Coastguard can't detect the exact location of boat. Also, the coastguard should attempt every call and patrol continuously in sea i.e., wastage of time.

4. Proposed System :-

GPS Coastguard is used to alert the coastguard when an intruder or poacher is found within the protected sea water using an innovative technology. It also warns and prevents the fishermen in not crossing the national sea border.



Fig: Block diagram

- 1. **Power Supply**: Provides the necessary electrical power to the LPC2148 microcontroller and other peripherals, ensuring stable and reliable system operation.
- 2. **GPS Receiver**: Continuously receives location coordinates (latitude and longitude) from satellites and transmits this data to the microcontroller for position tracking.
 - 3. **3-Axis Accelerometer**: Detects motion, inclination, and orientation of the boat. This sensor inputs real-time data to the microcontroller, which uses it to determine unusual boat movement or tilting.
 - 4. **Ultrasonic Sensor**: Detects nearby obstacles or intrusions around the boat. It helps in triggering alerts or actions like motor control when obstructions are detected.
 - 5. **DC Motor**: Controlled via signals from the microcontroller, it can be used to initiate movement or automatic directional correction (e.g., steering the boat away from danger).

- 6. **Buzzer**: Acts as an audible alert mechanism. It is activated by the microcontroller to warn the fisherman in case of emergencies, such as crossing national maritime borders or detecting sudden movements.
- 7. **16x2 LCD Display**: Used to display real-time system data including GPS coordinates, system status, warnings, and other important information to the user.
- 8. **ESP8266 Module**: This Wi-Fi communication module sends data wirelessly to the control station or cloud. It allows remote monitoring and can transmit alert messages over the internet.

IV. FLOWCHART



V. ALGORITHM:-

• Start.

• GPS continuously receives the signal from satellite and feed to microcontroller and check the output of the 3-axis accelerometer.

• If no any inclination occurs then go to step 1 and display message on LCD 'BOAT IN SAFE ZONE'.

• If any inclination occurs then buzzer will be buzz, send the text message as current position (latitude and longitude) of the boat with status of inclination.

• If boat is in the safe zone, then display message on LCD 'BOAT IN SAFE ZONE' also display latitude and longitude.

• If fisherman try to cross national sea border (compare the saved coordinates and the received coordinates) then immediately motor should be rotate in reverse direction for the few seconds, buzzer will be buzz, display message on LCD 'BOAT IN DANGER ZONE' and send current position of the boat as a text message to control room.

• Stop.

IV. TESTING:-

• PCB Making:-

Take proper scale of components and PCB chip. In our Project we are using PCB of size 12.5X12.5. Then according to our scale make component layout of project circuit, on PCB designer software. Make this layout simple as well as small in size. Then draw mirror image of PCB layout on your copper clad board.

• Artwork (Painting and Drilling):-

Take copper clad of size 12.5X12.5 and transfer mirror image layout on board. Drill for connection on proper track. Using the paints i.e., mirror image drawn by the mirror does the painting. After some time, check whether painting is proper alignment with track and if in case there is any fault then corrects it. Take solution of FeCl3 in pot and deep PCB in solution we see that copper is removed from copper clad board except the copper, which is painted.

• Precautions In PCB Design:-

1) Before mounting any component, examine PCB carefully for cracks, breaks or other defects in the conduction path.

2) Drill the holes in PCB according to requirements.

3) Carefully cut the lead of the components so that 3 mm o the end extends beyond the wire inside the PCB. The ends of the lead are bent at right angle to make fine contact with surface to which it is to be soldered.

4) In case of semiconductor likes transistor, diode the length of the leads extending above the components side of

PCB should about 1 cm. this will also be useful for measuring voltage at their leads.

5) Certain components like transfer and variable capacitor, which are meant for used with PCB's are provided with pin type terminal, which can be simply inserted into the holes and soldered.

• Soldering:-

PCB soldering requires proper soldering techniques as explain below:-

- 1) A light duty soldering iron of 25-30W should be used to prevent the damage printed circuit wiring by excessive heat.
- 2) Do not used excess solder to prevent solder flowing to adjustment conducting path, which cause a short circuit. Thus, solder has thin. Tip because of closed spacing of the tin number 12.SWG wire wrapped around iron tip can also be used for soldering.
- 3) When soldering semiconductor hold led to be soldered by a crocodile clip, which serve as heat sink to prevent components.

• Power Supply Testing:-

- 1) AC or DC is checked using multimeter.
- 2) If no supply voltage is observed the following possibilities may occur:
 - a. Loose connection or faulty power cord.
 - b. Fuse wire melted.
 - c. Rectifier not working properly.

• Component Testing:-<u>Testing Of Resistor:-</u>

- 1) Measure the resistance of the resistor, by selecting the desired range.
- 2) If the measured value is not within the limit, then resistor is faulty.
- 3) If the multimeter shows the infinite, then the resistor is not fixed properly.
- 4) If the multimeter shows the zero, then the resistor is shorted.

Testing Of Capacitor:-

- 1) Capacitor is tested by using LCR meter.
- 2) The value of capacitor and the leakage resistance are to be checked.
- 3) It can be also checked by using multimeter.
- 4) The capacitor shows zero value if it is leaky.

Testing Of Diodes:-

Most commonly a diode becomes short circuited or open circuited. This can be changed by using multimeter operated in the resistance range.

Testing Of 16×2 LCD Display:-

- 1) We checked the supply voltage at pin2 of LCD.
- 2) The LCD was tested by using digital IC tester. It was inserted into ZIF socket
- 3) & its number was given.
- 4) If IC tester shows, LCD OK it is in working condition.

Checking Of The Power Supply:-

- 1) The first step in trouble shooting is to check AC & DC supply voltages using multimeter.
- 2) If no supply voltage is observed the following possibilities may occur.
 - a. Loose connection or faulty power cord.
 - b. Fuse wire melted.
 - c. Rectifier not working properly.

V. IMPLEMENTATION MODEL OF PROPOESD SYSTEM



VI. CONCLUSION

The system proposed will not only alert the fishermen but also carries the information to the control station and also notifies the family members through the GSM system.

In case the boat is lost due to rough conditions of the sea or intentional crossing of the border is done, then the information is immediately sent to the control room and the necessary action is taken. So, coastguard system can patrol efficiently.

The project also aims at providing peace at the borders and reduces the tensions between the two countries.

VII. FUTURE SCOPE:-

Technique that we have implemented is used to know exact position of fisherman (latitude and longitude) through GPS.

The same methodology can be further implemented in future if we make some improvements such as we can create visual basic form to see current position of fisherman /boat. Thus, control room can easily observe position of fisherman/boat and if we create database of multiple fishermen then coastguard system can observe number of fishermen simultaneously. Hence this system allows the coastguard to patrol efficiently because they could go only on an alert call and not to patrol at random.

We can also make use of Use of graphical user interface.

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