DESIGN OF BORDER ALERT SYSTEM FOR FISHERMEN USING GPS

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ABSTRACT

In day-to- day life we hear about many Tamil fishermen being caught and put under Srilankan custody and even killed. The sea border between the countries is not easily identifiable, which is the main reason for this cross border cruelty. Here we have designed a device using embedded system which protects the fishermen by notifying the country border to them by using Global Positioning System (GPS) and Global system for mobile communication (GSM). We use GPS receiver to find the current location of the fishing boat or vessel. Using GPS, we can find the current latitude and longitude values and sent to the microcontroller unit. Then the controller unit finds the current location by comparing the present latitude and longitudinal values with the predefined value. Then from the result of the comparison, this system aware the fishermen that they are about to reach the nautical border. The area is divided into four zones- normal zone, warning zone, zone near to restricted zone and finally the restricted zone. If the boat is in normal area, then the LCD displays normal zone. Thus they can make it clear that the boat is in normal area. In case it moves further and reaches the warning zone, the LCD displays warning zone. If the fisherman ignores the warning or fail to see the display and move further and if the boat enters the zone nearer to the restricted zone the alarm will turn on and the speed of the boat engine automatically gets controlled by 50%. If the fisherman did not take any reaction about the alarm and move further, then the boat will enter into the restricted zone, the alarm continues to beep as before, and once it touches the restricted zone, the propeller will get reversed and the message will be sent to the rescue team with help of the LoRaWAN to secure the fisher man who had stuck there in the restricted zone.

Keywords: *LoRaWAN, Global Positioning System, Global System for Mobile Communication, nautical border*.

1. INTRODUCTION

The main aim of this paper is to save the lives of the people who unintentionally or unknowingly cross their country border. Recently 12 Indian fishermen were arrested by Sri Lankan navy for illegal entry and also they allegedly shot dead a 21 year old fisherman and injured some others when they opened fire on fishermen. Not only in Srilankan border there is a threat to the lives of the fishermen at Gujarat. Gujarati fishermen those who go for fishing near the Pakistan borders are under threat. Recently 25 fishermen were abducted by Pakistan soldiers and many were injured.

Following this one of the top most comment and suggestion from social activists is "why can't the government develop certain app that indicates the fisherman their country border in their phone?". We tried to achieve this with our project where the maritime border is clearly indicated to the fisherman in the boat and it also warns them when they are about to cross their border limit. In case of emergency SMS is sent to the control station and their family members.

This project alerts the fishermen by notifying the country border using wireless and Global system for mobile communication (GSM). RF module is used to determine the normal and warning zones. If the fisherman ignores the warning and moves further, or if the boat enters the zone nearer to the warning zone, then alarm will alert and slowdown the boat. Further it includes a pulse detector to monitor the health issues of the user. This information is send to the control station.

2. LITERATURE SURVEY

2.1.1D. ARUNVIJAY et al "DESIGN OF BORDER ALERT SYSTEM FORFISHERMEN USING GPS", MARCH 2014

Figure 2.1India and Srilankan Border

In this method the author uses the pre-determined values of latitude and longitude points of the maritime border shown in the fig 2.1; this is stored in the microcontroller. When the boat approaches the border, boats position (latitude and longitude) is measured using GPS and compared with the stored value, if it exceeds then the boats seems to be crossed and alert message is sent to the fisherman.The advantage is accuracy range is high with the use of GPS.but the drawback is the memory required saving each point of latitude and longitude is more.

2.1.2 VIGNESH M et al, "GPS BASED BORDER ALERT SYSTEMFOR FISHERMEN WITH BOAT SPEEDOMETER", MARCH 2015

In this method the author foresee the use of GPS tracking system. The boats position is measured using GPS and the speed of the boats motor is controlled in case of emergency. The alert message is sent to the user (fisherman) .The advantage is for the purpose of identification the fisherman are using the GPS72h, equipment used for the navigation in sea and it provides the fastest and most accurate method for mariner navigate, measure speed, and determines location and this system enables increased levels of safety and efficiency. The disadvantage here is that border alert is intimated only to the fishermen but not to the control station.

2.1.3 A. MICHALSKI et al "DESIGN FOR BORDER SAFETY SYSTEM", MARCH 2013

In this method the boats position is measured using GPS and as the boat approaches the border limit the ignition to the motor is cut which means the motor is stopped it cannot further move forward and only by taking reverse gear the boat can be restarted. As the boat reaches the restricted

zone the boat stops and only when you reverse the motor it can start again. It ensures maximum safety to the fishermen well in advance. But due to wave currents, reversing the motor may mislead the boat.

3. METHODOLOGY

3.1 EXISTING SYSTEM

At the present time there are few existing systems which help to identify the current position of the boats/ships using GPS System and view them on an electronic map. For the purpose of identification the fisherman are using the GPS72h, equipment used for the navigation in sea. It provides the fastest and most accurate method for mariner navigate, measure speed, and determines location and this system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely or not.

DRAWBACK

- It ensures whether the ship reaches its destination safely or not.
- The accurate position information becomes even more critical as the vessel departs from or arrives in poor.

3.2 PROPOSED SYSTEM

The proposed system is a low cost maritime border crossing alert system mainly focused the small scale fisherman who lives just near to the poverty line. This system includes data collection unit, processing unit, Controlling unit and Transmission unit. The data collection unit consists of location detection components like wireless transmitter and other components attached in the boat that accomplish the vessel localization by collecting the geographical positions. The processing unit holds the set of latitude and longitude values of the sea in the form of databases that can be used for comparing the present boat position with legal border limits. The controlling unit resides in the sea shore (remote station) from where the decision has been made if the vessel crossed the maritime border. They crossed the broader means LED indicator alert them by sending signal through wireless communication and also reversed the boat. All the process can be monitor in the PC with server.

ADVANTAGE

- It sure whether the ship reaches its destination safely or not.
- The accurate position information can be monitoring through the IOT.

BLOCK DIAGRAM

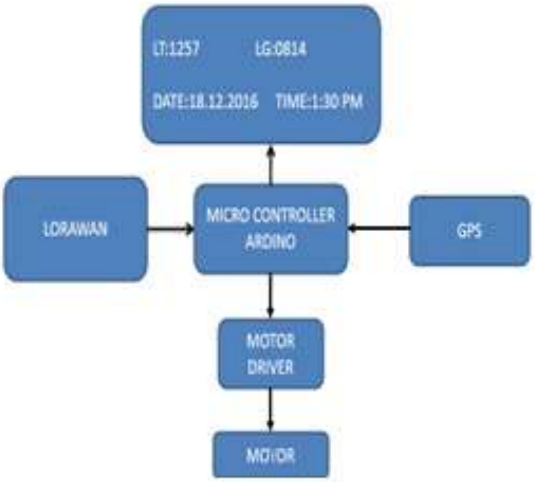

Figure 3.1 Block Diagram of Transmitter

Figure3.2 Receiver Diagram

3.3 EXPLAINATION

LoRaWAN

LoRaWAN is an LPWAN developed and maintained by the LoRa Alliance is shown in fig 3.3. This standard builds upon the LoRa modulation developed by SemTech and adds a network layer to handle traffic between end-devices and central nodes. This allows for communication over long range for low data-rate devices. The main motivation behind the network is to enable IoT, wide-area sensor networks, and other M2M applications. For the current release (v1.1), the focus of the network is on uplink communications. The LoRA Alliance defines LoRaWAN network architecture as typically laid out in a star-of-stars topology in which gateways act as transparent bridges relaying messages between end-devices and a central network server in the backend. Gateways are connected to the network server via standard IP connections while end-devices use single-hop wireless communication to one or many gateways. Data rate selection is a trade-off between communication range and message duration.

Figure 3.3 LoRaWAN

GPS

The fundamental technique of the satellite based navigation system Global Positioning System (GPS) is to measure the distances between the receiver and a few satellites that are simultaneously observed.

GSM

A GSM/GPRS Module is an IC or chip that connects to the GSM Network using a SIM (Subscriber Identity Module) and Radio Waves. The common radio frequencies in which a typical GSM Module operates are 850MHz, 900MHz, 1800MHz and 1900MHz.It consists of the GSM/GPRS Module, slot for inserting a SIM Card, RS-232 Interface for connecting with computer or a microcontroller, signal status LED, power supply and a provision for connecting microphone and speaker.

Figure 3.4 Global Systems for Mobile

3.4 WORKING STEPS

STEP 1:

- Satellite transmitting data which is received by the GPS antenna.
- GPS Antenna sending the data (latitude &longitude to the GPS receiver).
- GPS RECEIVER sends the received data to the microcontroller.

STEP 2:

- The ARM processor processes the received data by comparing the latitude and longitude value to the pre installed latitude &longitude value.
- ARM processor sends the data from GPS to the LoRaWAN.

STEP 3:

- The LoRaWAN sends the data by the radio frequency to the LoRaWAN in the sea shore.
- The LoRaWAN in the sea shore is connected by the power supply
- The LoRaWAN then sends the data to the microcontroller which is setup in the sea shore.

STEP 4:

- The arm processor checks the condition and sends message through GSM.
- The message send by the GSM received by the tower is transmitted to the mobile phones of the navy force.

3.5 CIRCUIT DIAGRAM

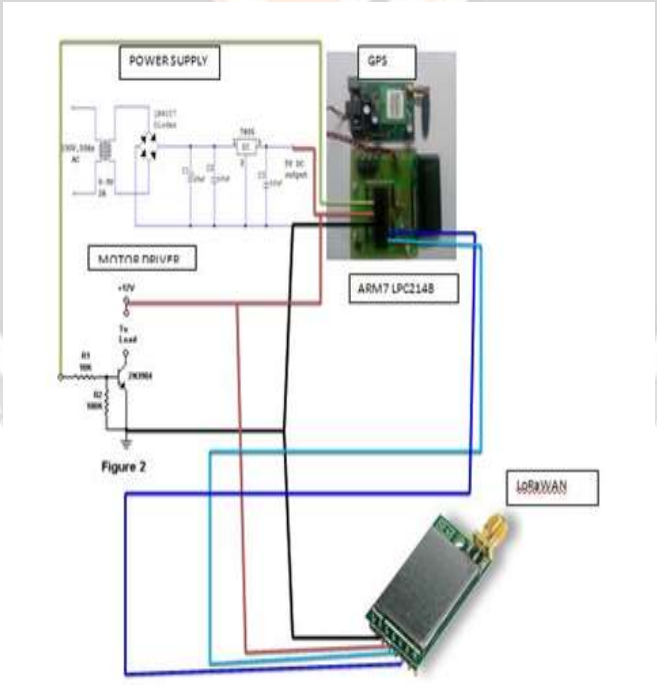

Figure3.5 Circuit Diagram for Transmitter

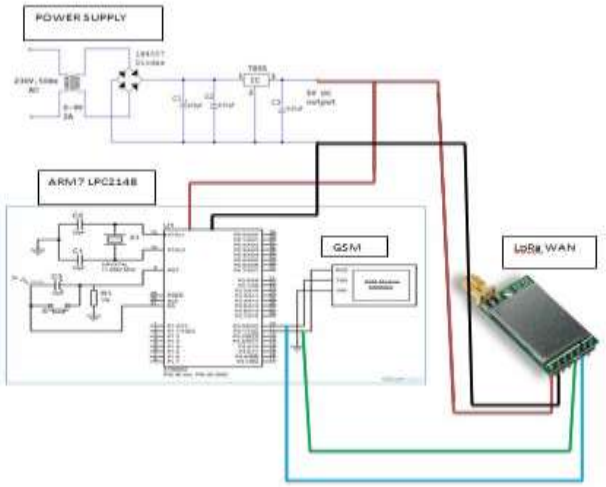

Figure3.6 Circuit Diagram for Receiver

4.0 RESULTS AND DISCUSSION

TABULATION

AT THE BOAT (RECEIVER)

ZONES	LCD DISPLAY	BUZZER	GSM/ PULSE DETECTON
Normal	Border normal	Off	Idle /pulse rate monitored
Warning	Border crossed	On	Alert Message and pulse rate sent

AT THE CONTROL STATION (TRANSMITTER)

ZONES	LCD DISPLAY	GSM
Normal	Transmitting	Idle
Warning	Transmitting	Alert message received

5. CONCLUSION

This paper aims to resolve the border crossing issues faced by the fishermen particularly India and Srilanka. Hence, we have developed a border alert mechanism by using GPS and GSM based module.

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