

## **Design and Implementation of GPS Based BorderAlert and Identification system for Fishermen**

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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 system 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 is 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 boat engine gets off by the control of fuel supply to engine, and also the information or location of the fishermen and the boat will send to some specified numbers like there family members or any control station. Through this SMS they can easily know, where the fishermen is in the sea.*

**Keywords:** *Four Zones, Global Positioning System (GPS), Global System For Mobile Communication(GSM), LCD Displaysand Tamil Fishermen.*

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### I. INTRODUCTION

The Tamil Nadu fishermen even today invoke the historical rights and routinely stay into the International Maritime Boundary Line (IMBL) for fishing. From Tamil Nadu about 18,000 boats of different kinds conduct fishing along the India-Sri Lanka maritime border. But by accidentally crossing the border without knowledge, they get shot by the Lankan navy. This leads to loss in the both humans as well as their economic incomes. We have developed a system which eliminates such problems and saves the lives of the fishermen.

### II. WORKING PRINCIPLE

The GPS Modem will continuously give the signal which determines the latitude and longitude and indicates the position of the fishermen to them. Then it gives the output which gets read and displayed in the LCD. The same data is sent to the mobile of the fisherman and simultaneously the same data is sent to the Sea border security. An EEPROM is used to store the data, received by GPS receiver. The hardware which interfaces with microcontroller is LCD display, GSM modem and GPS Receiver. GPS (Global Positioning System) is increasingly being used for a wide range of applications. It provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. 28 satellites inclined at 55° to the equator orbit the Earth every 11 hours and 58 minutes at a height of 20,180 km on 6 different orbital Lanes and each one of these satellites has up to four atomic clocks on board. All we require is an accurate clock. By comparing the arrival time of the satellite signal with the onboard clock time, at which the signal was emitted, the latitude and longitudinal degree of the boat's location is determined. The current design is an embedded application, which will continuously monitor a moving Boat and once the boat goes beyond the level of the defined layer the particular operation will be done. For doing so an AT89c51 microcontroller is interfaced serially to a GSM MODEM AND GPS receiver

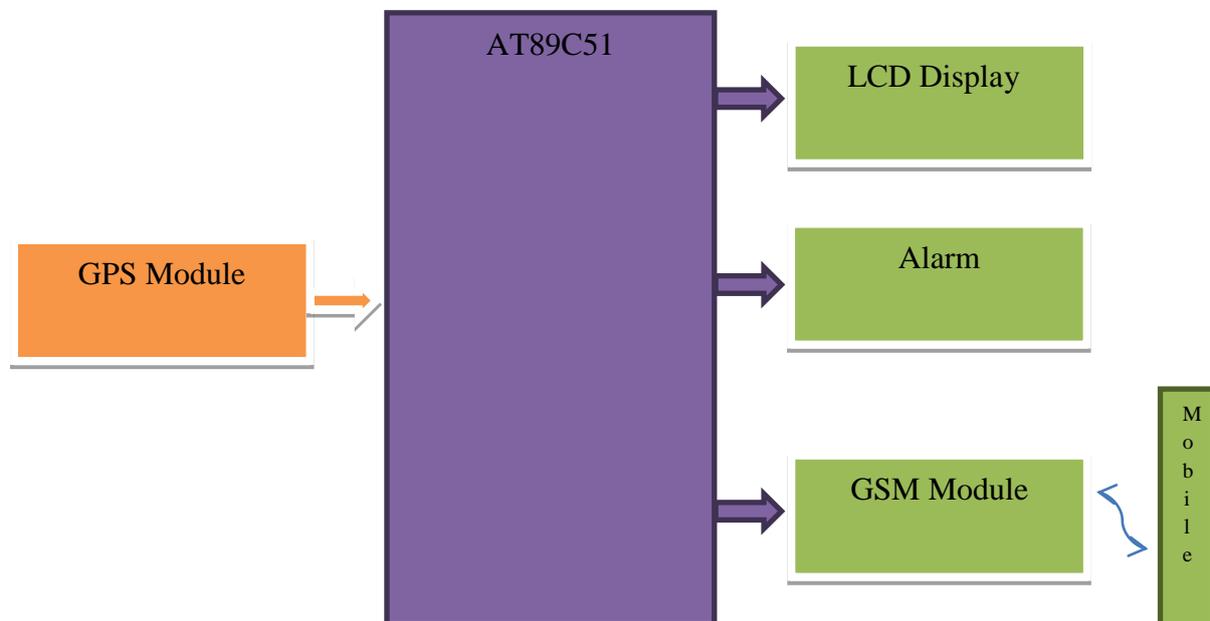
### III. EXISTING SYSTEM

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 fishermen are using the GPS72h, equipment used for the navigation in sea. It provides the fastest and most accurate method for mariners to navigate, measure speed, and determines location. This system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely. The accurate position information becomes even more critical as the vessel departs from or arrives in port.

### IV. MARITIME BOUNDARY BETWEEN INDIA AND SRI LANKA

The boundary points are marked above. These points should be stored in microcontroller. The computation is done in Microcontroller with these points. Thus vessel crossing the border is being calculated.

#### IV. Block diagram



**Fig.1 Block diagram**

#### 4.1 GPS Receiver

A GPS navigation device, GPS receiver, or simply GPS is a device that is capable of receiving information from GPS satellites and then to calculate the device's geographical position. Using suitable software, the device may display the position on a map, and it may offer directions. The Global Positioning System (GPS) uses a global navigation satellite system (GNSS) made up of a network of a minimum of 24, but currently 30, satellites placed into orbit by the U.S. Department of Defense.

#### 4.2 Transmitter

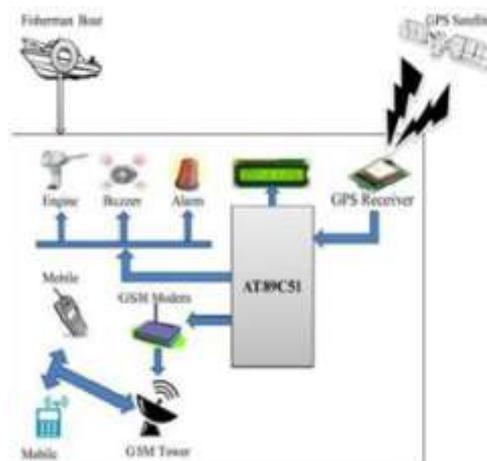
A transmitter is an electronic device used in telecommunications to produce radio waves in order to transmit or send data with the aid of an antenna. The transmitter is able to generate a radio frequency alternating current that is then applied to the antenna, which, in turn, radiates this as radio waves. There are many types of transmitters depending on the standard being used and the type of device; for example, many modern devices that have communication capabilities have transmitters such as Wi-Fi, Bluetooth, NFC and cellular. A transmitter is also known as a radio transmitter.

#### 4.3 GSM mobile

GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA)

#### 4.4 Controller

Microcontroller receives the data from the GPS receiver through UART. The data received contains many details along with latitude and longitude. The latitude and Longitude of the current position is separated from the detailed data from GPS. The current positions are compared with already stored latitude and longitude of countries boundary locations. At first the latitude is compared with stored latitude which identifies if the current position is located near to the boundary. If the latitude matches then the adjacent latitudes and longitudes of the present latitude is retrieved from the microcontroller. The current position received from GPS is stored as S1 (latitude), S2 (longitude). The latitude S1 is compared with stored latitudes.



**Fig.2 Detailed Block diagram of Controller**

#### 4.5 Display unit

A LCD display 16x2 is used for displaying the latitude and longitude. LCD display is connected to port 1 of the Microcontroller. Every pin of port 1 is connected to LCD display. Message is sent through commands via serial Communication.

## V. INDENTATIONS AND EQUATIONS

Positions	Latitude	Longitude
Position 1	12° 05'.0 N	82° 03'.0 E
Position 2	12° 05'.8 N	82° 05'.0 E
Position 3	12° 08'.4 N	82° 09'.5 E
Position 4	12° 33' 0 N	82° 46'.0 E

$$(Y-Y1)/(Y2-Y1) = (X-X1)/(X2-X1)$$

By simplification, we get  $ax + by = c$

Now, S1 and S2 are substituted in above equation of line.

Here two cases are possible:

*Case 1: If LHS < RHS, then vessel is inside country border.*

When vessel is inside country's border, the microcontroller gets the input from GPS receiver after a short delay loop. Latitude and longitude is extracted and manipulation with the new locations is done in the algorithm.

*Case 2: If LHS > RHS, then vessel has crossed border.*

When vessel crosses border, an alarm is generated immediately. Along with alarm a signal is also sent to GSM module for transmission of message to desired sender. Alarm continues until the vessel comes back inside the country's border. The boundary points are marked above of MARITIME BOUNDARY BETWEEN INDIA AND SRI LANKA. These points should be stored in microcontroller. The computation is done in microcontroller with these points. Thus vessel crossing the border is being calculated.

## VII. FUTURE SCOPE

- We can use the EEPROM to store the previous Navigating Positions up to 256 locations. We can navigate up to N number of locations by increasing the memory of EEPROM.
- We can reduce the size of the kit by using GPS+GSM on the same module of GPS navigator.

## VIII. BENEFITS

- The hijack of the ship by the pirates can be eradicated.
- The lost ship wrecks due to natural calamities can be identified
- By keeping the kits in the entire boats and by knowing the locations of all the boats we can use our kit to assist the traffic.

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## IX. ADVANTAGES

- Accuracy determination of location
- Maintenance cost is low
- Easily replaceable

## X. APPLICATION

- We can use this device also as bomb detector
- Location of any lost vehicle could be found

## XI. CONCLUSION

The “Border Alert System for Fishermen Using GPS System” is a system that implements GPS and Embedded system together to create a security system for fishermen boats. The fisherman, while navigating crosses the maritime boundary, unknowingly as they are unable to visualize it in the ocean which causes loss to its life. Through this paper a GPS based security system is provided to the fisherman so that they can find out when they are in danger. Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering their area. Thus saving their lives and providing good relationship with the neighboring countries. This system is an implication of security system for safenavigation of mariner’s auto boat. It is a helpful step in saving lives of fisherman and a useful contribution to the society.

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