

# Designing and Implementation of Digitalized Boat Navigation System Using GPS

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**Abstract-**The occupation of fishermen is such that he crosses the country boundary unintentionally and poses fear to them by being killed or caught. One of the major problem is, it is very difficult to recognize marine boundaries between two countries. This project "Implementation of digitalized boat navigation using GPS" explains about a system which helps the fishermen by identifying the country border. We use Global Positioning System (GPS) and Global system for mobile communication (GSM) modules. The aim of GPS tracker is used to find the present location of the fishing boat. With the help of GPS current latitude and longitude values are sent to microcontroller unit. After that the controller unit notifies the current location by comparing the present latitude and longitudinal values with the reference values. After the comparison, this system alert the fishermen that they are about to approach the marine border. On the basis this type of comparison it was classified into two zones they are normal zone and warning zone. Hence it is clear that the boat is in normal area. If the boat travels further and reaches the warning zone then the LCD displays warning zone and running of the motor will stop.

## 1. INTRODUCTION

Sri Lanka and India seaside nations are isolated by their sea borders. In Tamil Nadu about 20,000 vessels make spinning in the Bay of Bengal. The main aim is to give a well equitable user friendly environment for Indian Fisherman to handle hazardous situation with the help of engine control. This paper comes with a consistent solution for this problem and protects the Indian fisherman from dangerous situation and being crossing the maritime boundary and save their life and improve the safety of fisherman. The system is designed by using GPS and GSM. A GPS route device is a device that precisely discovers natural area by getting data from GPS satellites. This device can track the GPS data every single time at whatever point the fisher man's cross the Indian border. It is a significant depression issue and encourages trouble in the both people and also their economic expenditures

## 2. LITERATURE SURVEY

D.Jim Isaac et al [1] the paper titled as "Advanced border alert system using GPS and with intelligent Engine control unit "In our system using GPS and GSM, where GPS is used to find the location of the boat. If the boat nearer to the boundary primarily it warning for a fishermen with the alarm and emits the location of the boat to the nearest coast 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. and its low cost maritime. By this method, we can alert the fishermen and also monitor them

thereby avoiding banned activities such as smuggling, intruders, etc

S. Kiruthika et al [2] the paper titled as" A Wireless mode of protected defence mechanism to mariners using GSM technology "In our system using only GPS to receive the information from the satellite and stored border locations to detect whether the boat has crossed the border or not which covers wide area.

M.Naveen Kumar et al [3] the paper titled as" border alert and smart tracking system with alarm uses DGPS and GSM and this system uses DGPS to track the location of the boat and to activate an alarm which consists of a Piezo-buzzer, when the border is move toward or crossed. Also, in addition, the DGPS information is sent to control office, and also the information is sent to the family at regular time intervals that are in expectation about their family member's safety.

## 3. METHODOLOGY

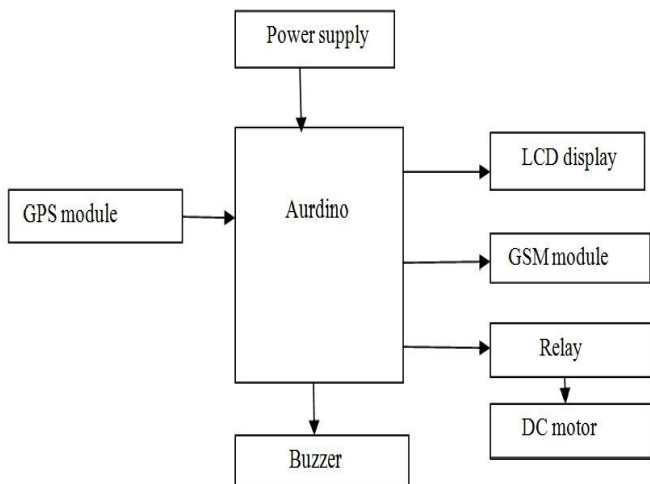
- In this project the following changes are implemented
- On board controlling of the whole system
- Aurdino based system
- Uninterrupted GPS location value is processed
- Since design is for real time the output is obtained instantly
- Manual operator and Bluetooth is not required

The GPS device will continuously give the signal which determines the latitude and longitude and

specify the location of the boat and it is displayed in the LCD. The hardware which interfaces with microcontroller, LCD display, GSM modem and GPS Receiver. GPS provides accurate positioning, navigation, and timing services to users on a continuous basis in every day and night. GPS store the storage of the maritime position. While comparing the previous maritime restricted position and current position and result will be the latitude and longitudinal degree of the boat's location is determined. If the boat nearer to the restricted zone, automatically warning message will be send to the LCD display which is in boat. The warning message is send by using a GSM Modem. Then the fishermen fails to ignore the warning and they move to reach the restricted zone automatically engine gets off by means of relay and send through the message to the coastal guard. A microcontroller is interfaced serially to a GSM modem and GPS receiver.

The block diagram of the entire system is given. Part of seas as towers cannot be placed in middle of the ocean so it place in coastal control office. Thus the coastal continuously receive the GPS information from the GPS Address. The main aim of this GSM system is to ensure continuous monitoring of each boat and information given to the coastal office. When boat crosses border, the stored message adjacent to with compared position and message sent to the desired authority person by using GSM module.

**4. BLOCK DIAGRAM**



**4.1 GPS The Global Positioning System (GPS) :** GPS is a space based navigation system that provides position and time information in all weather situation. The GPS detects the latitude and longitude of the boat's position and sends the information to the

microcontroller. This ability allows finding out whether the boat has crossed the confidential area or not. This gives the current position of the boat to the Aurdino in the Engine Control Unit. It compares the present position and stored controlled position if the boat is at a distance of Three kilometer from the restricted area and then processor to generate an alarm keep on increasing and also reduced the speed of the engine, The latitudes and longitudes received from the microcontroller is compared with the stored restricted area values and reaches the restricted area, the engine will get off.

$$a = \sin^2(\Delta\phi/2) + \cos\phi_1 \cdot \cos\phi_2 \cdot \sin^2(\Delta\lambda/2)$$

$$c = 2 \cdot \text{atan2}(\sqrt{a}, \sqrt{1-a})$$

$$d = R \cdot c$$

$$\text{dist} = \sin(\text{deg2rad}(\text{lat1})) * \sin(\text{deg2rad}(\text{lat2})) + \cos(\text{deg2rad}(\text{lat1})) * \cos(\text{deg2rad}(\text{lat2})) * \cos(\text{deg2rad}(\theta));$$

$\phi$  is latitude,  $\lambda$  is longitude, R is earth's radius (mean radius=6,329)

**4.2 GSM Module:** GSM system work under number of different carrier frequency and its frequency up to 900MHz or 1800MHz. GSM module is utilized for passing the information looking for help. The GSM utilize the narrowband Time Division Multiple Access (TDMA) manner for transmitting signals. It cannot be used as a part of seas as towers. it cannot be placed in centre of the ocean so it is placed in coastal control office. Thus the coastal regions always collect the GPS information from the GPS Address. The major aspire of this GSM system is to make sure continuous monitoring of each boat and information given to the coastal office. When boat crosses boundary, the stored message closest to with compared location and message sent to the preferred authority module.

**4.3 Engine control unit:** The ECU contains an Aurdino, random access memory (RAM), read only memory (ROM), and an input/output interface. This unit is used to prevent the motor to reaches the limiting area. If it is nearer to the limited area, the motor speed reduced by using pulse width modulation. The Electronic Control Unit (ECU) can supervise almost every operation in an engine mutually with flare-up systems. Electronic control unit activates at the electronic fuel injector with a solenoid valve to control the fuel supply in the engine. When the alarm is generates, it is necessary to stop the engine from stirring ahead. The fuel injector is fixed with a solenoid valve which electromagnetically prohibits mechanical valve. When the GPS position matches the stored

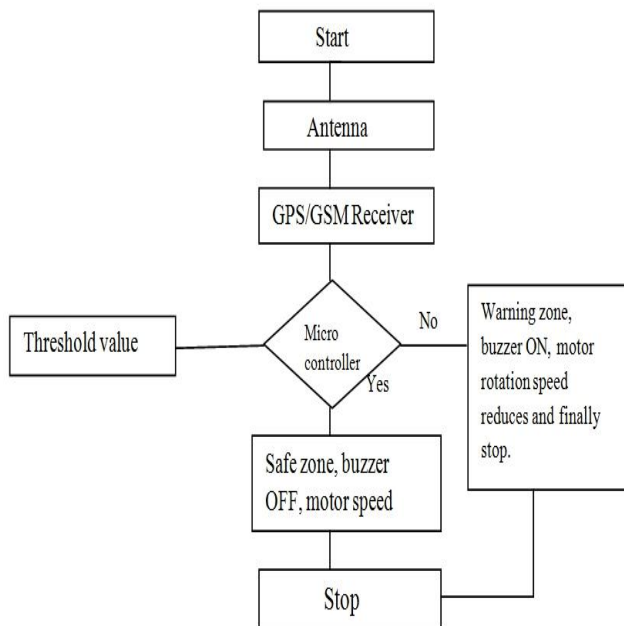
cutoff value, the result of that particular value give to the fuel injector. So this in turn decreases the fuel supply which stops the engine from moving.

**4.4 Power supply :** The power supply provides DC motor and microcontroller. The DC power supply contains both positive and negative output voltages, a center-tapped transformer is used and Arduino operates at low power.

**4.5 Relay:** A relay is an electrically operated switch. Wherever many relays are used to an electromagnet that mechanically operates a switch, but other operating principles are also used, such as solid state relays .Relays are used where it is necessary to control a circuit by a low-power signal where several circuits must be prohibited by one signal. The first relay is used in long distance telegraph circuits as amplifiers. They repeats the signal coming from one circuit and re-transmit it on another circuit.

**4.6 Buzzer:** If the boat is closer to the constrained area, the alarm will keep on increasing by means of pulse width modulation. It ranges from (0-255).

**5. FLOW CHART**



**6. EXPERIMENTAL RESULT**



Fig1:These are the warning images appeared on the mobile by GSM.



Fig2: when boat crosses boarder this alert will be displayed on LCD.

**7. CONCLUSION**

The present times the capture of Indian fishermen across Sri Lanka border will be increased. It is complicated for the fishermen to determine the borders and misplaced into other country' borders. Our objective is to offer wireless support to those fishermen and to one side from to go out after then if they are found missing.

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