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GPS based Border Alert System using Arduino

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***Abstract*- This paper describes about the border alerting for fishermen using GPS and engine control unit. In day-to-day life, we hear about the many problems confronted by the Indian fishermen, were captured by the neighboring countries because of crossing the border. The target of this system is utilized to encourage the fishermen to explore inside our sea nation border Using GPS (Global Positioning System) and GSM (Global system for mobile communication), GSM sends the message to the coastal guard office. If the boat nearer to the restricted zone the alarm will turn on and the sound keep on increasing and also speed of the engine will get reduced. If the fishermen fails to ignore the warning and they move to reaches the restricted zone automatically engine gets off and send through the message.**

Keywords-GPS, GSM, Microcontroller (At mega- 328)

I. INTRODUCTION

Sri Lanka and India seaside nations are isolated by their sea borders. In Tamilnadu 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.

II.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 the 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. If so the mariner is alerted and the message is transmitted to nearby coast office through RF signals at VHF (30-300MHz) range which covers wide area.

Naveen Kumar.M 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.

III. METHODOLOGY

The GPS device will repetitively give the signal which determines the latitude and longitude and indicates the position of the fishermen and which gets read and displayed in the LCD. The hardware which interfaces with microcontroller, LCD display, GSM modem and GPS Receiver. GPS provides consistent positioning, navigation, and timing services to users on a continuous basis in every day and night.

Then 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 the alarm will turn on and the sound keep on increasing and also speed of the engine will get reduced by using pulse width modulation. In its simplest pulse width modulation output signals are constructed by comparing two signals. The signals are restricted position (carrier signal) and current position (modulation signal) pulse width modulation operating at a low power frequency. While carrier frequency higher than the modulation frequency, the alarm will keep on increasing, if the other case carrier frequency lowers than the modulation frequency, the alarm will keep on decreasing.

Then the fishermen fails to ignore the warning and they move to reaches 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.

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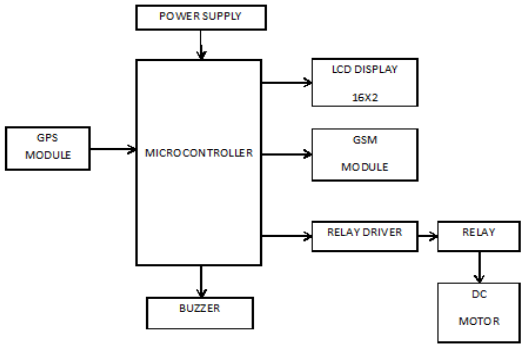
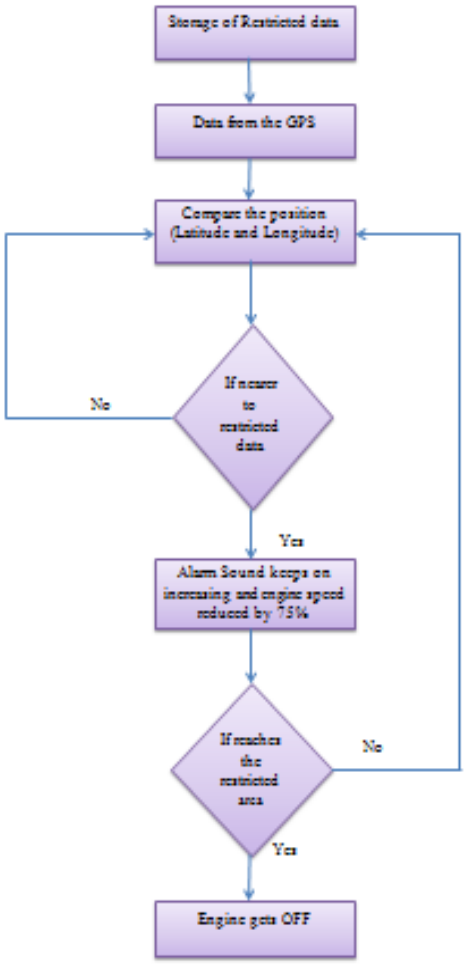


Fig-1: Block diagram of the system

V. FLOWCHART



VI.HARDWARE COMPONENTS

A) GSM MODULE

GSM network operate in a number of different carrier frequency and its frequency up to 900MHz or 1800MHz. GSM module is utilized for transmission of message looking for help. The GSM makes use of narrowband Time Division Multiple Access (TDMA) technique for transmitting signals. It cannot be utilized as a 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.

B) GPS

The **Global Positioning System** (**GPS**) is a space-based navigation system that provides location and time information in all weather conditions.. The GPS detects the latitude and longitude of the boat's position and sends the data to the microcontroller. This capability allows finding out whether the boat has crossed the restricted area or not. This gives the current position of the boat to the ATMEGA 328 Microcontroller in the Engine Control Unit. It compares the current position and stored restricted 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.

$$a=\sin^2(\Delta\varphi/2)+\cos\varphi_1 \cdot \cos\varphi_2 \cdot \sin^2(\Delta\lambda/2$$
$$c=2\cdot\operatorname{atan2}(\sqrt{a},\sqrt{(1-a)})$$
$$d = R \cdot c$$

```
dist = sin(deg2rad(lat1)) * sin(deg2rad(lat2)) +
cos(deg2rad(lat1)) * cos(deg2rad(lat2)) * cos(deg2rad(θ));
```

ϕ is latitude, λ is longitude, R *is earth's radius (mean radius = 6,371km)*

C) ENGINE CONTROL UNIT

The ECU consists of an AT mega 238, random access memory (RAM), read only memory (ROM), and an input/output interface. This unit is used to stop motor when it is reaches the restricted area. If it is nearer the restricted area, the motor speed reduced by using pulse width modulation. The Electronic Control Unit (ECU) can control almost every operation in an engine together with

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explosion systems.. In electronic control unit operate at electronic fuel injector with a solenoid valve to control the fuel supply in the engine When the alarm is generated it is necessary to stop the engine from moving forward The fuel injector is fitted with a solenoid valve which is a electromagnetically controlled mechanical valve. When the GPS position matches the stored restricted value, the result of the value give to the fuel injector. So this in turn reduced the fuel supply which stops the engine from moving forward.

D) POWER SUPPLY

The power supply is provided DC motor and microcontroller. The DC power supply with both positive and negative output voltages, a center-tapped transformer is used and Arduino operates at low power.

E) RELAY

A relay is an electrically operated switch. Where many relays are used to an electromagnet to mechanically operate 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 controlled by one signal. The first relays were used in long distance telegraph circuits as amplifiers they repeated the signal coming from one circuit and re-transmitted it on another circuit.

F) BUZZER

If the boat nearer to the restricted area the alarm will keep on increasing by means of pulse width modulation. It ranges from (0-255).

CONCLUSION

In the recent times the capture of Indian fishermen across Sri Lanka border has been increased. It is difficult for the fishermen to discover the borders and lost into other country' borders. Our objective is to give wireless support to those fishermen and aside from to go out after them if they are found missing. This project is a low cost efficient method of wireless tracking. It also gives sufficient information to both ship and coastal guardians of anyone crossing the border.

FUTURE SCOPE

The process of directing the fishermen can be enhanced by placing the engine control unit system in the coastal office. They remotely control the engine to restart the boat for the safety of fishermen.

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