



Safety System For Fishing Boats To Prevent From International Border Crossing

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Abstract— This system provides safety to fisherman and prevents them from crossing international border. A Geo fencing concept has been used in this system to identify the Indian sea border. Nowadays many fisherman and people traveling in sea are punished by other country due to crossing border. This is happening because they don't know the border limit while sailing. This project is designed to help those people. The major application of this system are to give an intimation to the fisherman that they are heading border nearly, to send emergency message to the control room or Coast Guard if any natural disasters or any other issues and to track missed boat's location using GPS. The fencing area is defined by using latitude and longitude values of border line. The GPS receiver continuously receives signal from satellite to obtain the boat location when the boat enters the danger zone. The GSM modem sends signal to the server which is operated by Coast Guard and the boat can be controlled and tracked by Coast Guard.

Keywords— GEO fencing; ECU; signal transmission; GPS unit; GSM modem; Embedded systems;

I. INTRODUCTION

Geofencing is a technology used to monitor mobile objects (vehicles, persons, containers...), located by GPS. The geographic coordinates of the tracked object are automatically and regularly sent to a control center, via mobile phone networks. In parallel, another set of geographic coordinates is used to constitute a virtual boundary (geofence) around a geographic area. The system determines whether the tracked object is located inside or outside the geofenced area. An alert is generated when the tracked object crosses the geofence. This technology can also allow the detection of spatial proximity between tracked mobiles and a specific geofenced area. Some vehicle tracking systems make it possible to control vehicle remotely, including block doors or engine in case of emergency. This system has two output controls so it is very easy to control either Petrol or Diesel engine.

II. FENCING ZONES

1. Safe Zone

The area which is inside the international border is called as Safe Zone. In safe zone, Boats can move without any interruption or any alert.

2. Danger Zone

It is the area between safe zone and International border. When boat enters to danger zone, the alarm system generates alarm to intimate sailor that they are near to border so they can able to turn back the boat to avoid crossing international border.

3. International border

It is the actual international border of the country. This border has been defined in the embedded program with actual coordinates. When the boat crossed this border, the message will be automatically sent to the server. Also, the notification will be sent to coast guard so they can able to monitor and control the specific boat.

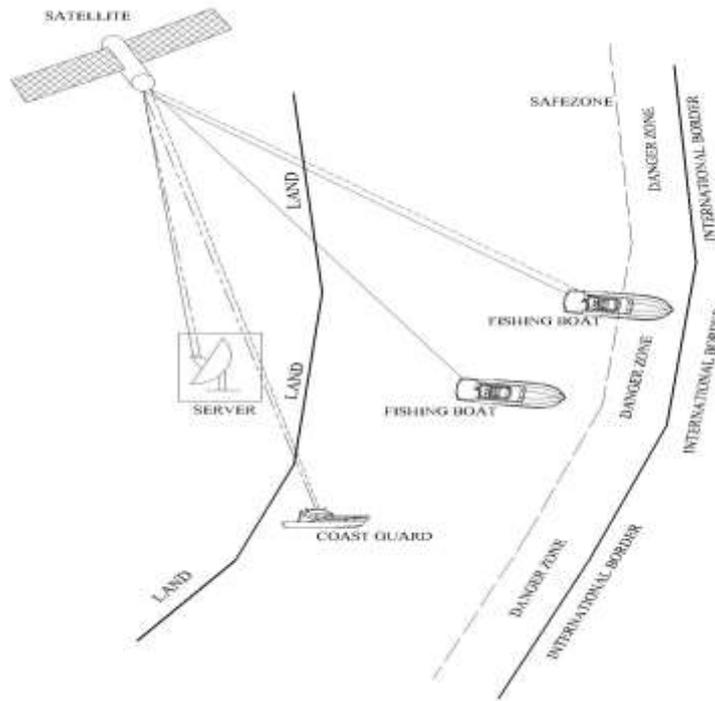


Fig.1.Zone diagram

4. Server

This server is used to provide centralized monitoring. All communications from GSM modem will be received by server. Then based on the type of signal, the required action will be taken by the coast guard.

III. SIGNAL COMMUNICATION

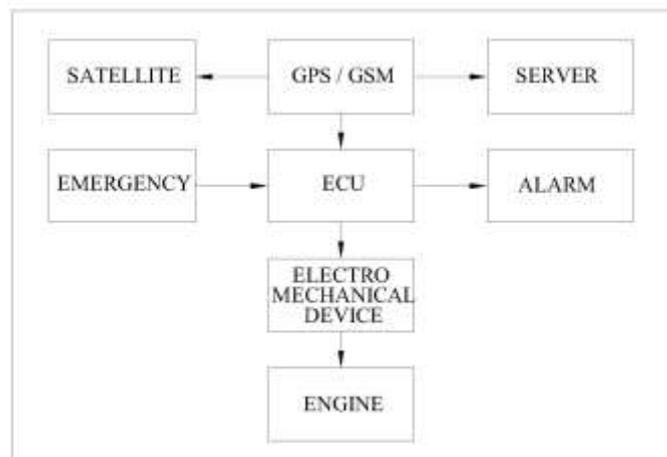


Fig.2.Signal Communication

1. Mechanical Part

The main mechanical part of this system is Engine. In critical stage, the engine will be turned off by Coast guard. This Engine will be controlled by embedded system and electromechanical devices such as relays and solenoid valves.

2. Electronic Part

In this system embedded system plays a major role. This system consists of embedded system, GPS receiver, GSM modem, level converter, driver, relay, valve, alarm, display, emergency button and

battery. GPS receiver is used to identify the location of the boat or ship. GPS receiver signal sends it to the embedded system through a level converter. Embedded system analyses the data and sends it to the GSM modem through level converter. Level converter is an interfacing unit between GSM modem and embedded system.

1.1. Embedded system overview

An embedded system is a computer system with a dedicated function within a larger mechanical or electrical system, often with real-time computing constraints. Modern embedded systems are often based on microcontrollers (i.e. CPUs with integrated memory or peripheral interfaces), but ordinary microprocessors (using external chips for memory and peripheral interface circuits) are also common, especially in more-complex systems.

1.2. GPS receiver overview

The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver. The GPS project was started in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (USDOD) and was originally run with 24 satellites. It became fully operational in 1994.

1.3. GSM overview

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dial-up modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. The working of GSM modem is based on commands, the commands always start with AT (which means Attention) and finish with a character. For example, the dialing command is ATD; ATD3314629080; here the dialing command ends with semicolon.

IV. SAFETY SYSTEM

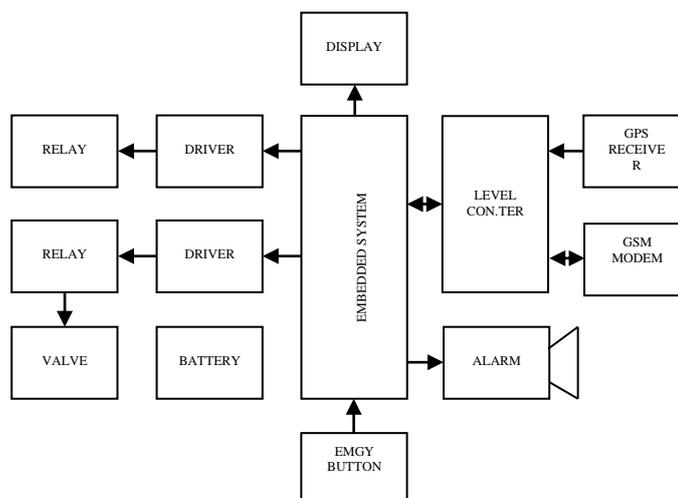


Fig.3.Schematic diagram

1. Alert to fisherman

Based on the location of the boat, the embedded system sends signal to Alarm. This alarm system works before 1000m from the border, so they will be intimated that they are nearby the border.

1.1. First level alert system: The GPS receiver receives the location of the boat from satellite.

- a) **Signal Conversion:** Level converter converts the GPS signal as voltage input to the Embedded system
- b) **Signal Comparison:** Embedded system compares the received signal with defined signal which is defined by program.
- c) **Signal Transmission:** When the received signal equal to the defined signal, the Embedded system sends signal to the level converter. Then the level converter sends the signal to the alarm to intimate.

1.2. Second level alert system: This is the second level intimation to the fisherman.

- d) **Turned off condition:** Based on the signal from the level converter, Engine goes turned off condition. This signal will be sent from level converter once the boat reaches 500m from the border.
- e) **Voltage Boostup:** The driver works as a transformer. It changes the low voltage to higher voltage which can be used to energies relays.
- f) **Switching:** The switching condition will be done by eletromechanical device such as Relay and Solenoid valve. Relay is used in S.I Engines and Solenoid valve is used in C.I engines.

2. Tracking

In addition to intimation, the tracking system also been attached in this system. This system is used to track the boat if it is missed due to any external causes.

GSM Modem sent the signal to the server through satellite. When the boat reaches the maximum position or level, embedded system generates the signal to the level converter. This signal sent to the GSM modem.

a) Emergency signal: An emergency button is provided in this system. This button will be used in critical and emergency situations. This emergency signal immediately send signal to the Coast guard through satellite. Government officials can be sent to the exact spot at from where the signal has generated.

VI. CONCLUSION

Therefore this system protects fishermen and boating people from emergency cases as well as from the crossing country border. Geo fencing concepts limits the boats travel area and GPS and GSM helps to communicate with boats. Geo fencing concept also can be implemented for all type of motorized vehicles in order to monitor and communicate with the vehicle and the driver or sailor will be alerted by Alarm system. The Emergency Button helps for the communication between the boat and server in case of emergency.

Advantages

1. Low cost
2. Easy to locate the boat
3. Can be operated by unskillful people
4. Low maintenance
5. Program can be optimized for different border
6. Can be used for both Petrol Engine and Diesel Engine
7. Power consumption is very low

Future Scope

1. Can be used for all kind of boats
2. Satellite Phones can be used instead of normal GSM modem
3. Also used for all kind of motorized vehicle
4. Solar power can be used as Power source
5. Can be implemented for all type of boats with centralized sever to monitor.
6. The cost of this system is very low so this can be used for lower range boats

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