

MARITIME BOUNDARY DETECTION SYSTEM WITH CYCLONE ALERT

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ABSTRACT

Surveillance is a key factor to ensure safety in fishing boats in ocean/sea are monitored for illegal intrusion in other nations boundary. Hence an effective scheme is designed to overcome this threat with Global positioning system(GPS) which provides dynamic location of fishing vessel in water and microcontroller which competes on GPS and predefined boundary locations to determine whether the boat have crossed the border or not. If so the fisherman is alerted and the message is transmitted to nearby coast guard ships through RF signals at VHF(30-300MHz) range which covers wide area. On adumbrated the patrolling units can alert the fisherman from their position or if necessary the entire movement of the fishing vessel could be controlled remotely for trespassing.

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 the Earth. The relationship between India and Sri Lanka, two neighboring countries in the South Asia, has attained a bitter stage and has come to the fore in the form of the fishermen issue. Frequent incidents of fishermen from Tamil Nadu getting shot in the Sri Lanka's maritime territory have enraged all citizen of the state. This paper deals on the versatility and the usefulness of a GPS device in the sea.

The main objective of the project is to help the fishermen not to navigate beyond other country's border. If a fisherman navigates beyond the country's border, an alarm is generated indicating that the fisherman has crossed the border. Additionally, a Long Range RF transmitter will send a message to coast guard, which is roaming around the high seas, through RF receiver indicating that a boat/ship has crossed the border. Thus guards in the ship can assist and provide additional help to those fishermen if needed. The system also incorporates a SoS button to notify the on board distress to the nearby vessels. The system also continuously broadcasts its location, if the boat met with an accident or if the boat is capsized in a cyclone. These messages are very helpful in tracking the missed ships and to rescue the fisherman.

INTRODUCTION

The island like Sri Lanka, peninsula like India and the coastal countries are separated by their maritime borders. Crossing the border is being a serious offence. Especially, In Tamilnadu nearly 20,000 boats perform fishing in the Bay

of Bengal . Due to carelessness or unknowing the boundary limit, the fisherman used to rude the maritime borders. Once they rude the border, they arrested or killed by the relevant navy and they are being abducted and their boats are being captured by the neighbourhood countries coastal guards. In such situation the lives of fishermen continue to be difficult. It is a major threatening issue.

As far as the fishing activity has not been peaceful since the issue of maritime border crossing. Coastal route is always a choice of intruders. In 2013 Madurai bench of madras high court will quoted, In order to avoid this issue, there is a need for producing significant realization among our fishermen to avoid crossing over into Sri Lanka water boundary. If the fishermen violate the border agreement, an alarm (danger signal) is generated indicating that the fisherman has violated the rule. In addition, a Global System for Mobile communication supported TX interface will send (forward) a message to base station located on the shore indicating that a vessel has crossed the border. Thus guards in the shore can assist and provide additional help to those fishermen if needed. Keeping in mind about lives of Indian fishermen, this device has been created to help them not to move beyond Indian border.

The 10 kHz to 300 GHz frequency range that can be used for wireless communication. The TWS-434 transmitter accepts both linear and digital inputs, can operate from 1.5 to 12 Volts-DC, and makes building a miniature hand-held RF transmitter very easy. The TWS-

434 is approximately 1/3 the size of a standard postage stamp. RWS-434: The receiver also operates at 433.92MHz, and has a sensitivity of 3uV. The WS-434 receiver operates from 4.5 to 5.5 volts-DC, and has both linear and digital outputs. The TWS-434 modules do not incorporate internal encoding. If the transmit and receive module are in close proximity and data is sent to a remote receive module while attempting to simultaneously receive data from a remote transmit module, the receiver will be overloaded by its close proximity transmitter. This will happen even if encoders and decoders are used. The XBee/XBee-PRO RF Modules are designed to operate within the ZigBee protocol and support the unique needs wireless sensor networks. The modules require minimal power and provide reliable delivery of data between remote devices. This firmware is compatible with the ZigBee 2007 specification, while the ZNet 2.5 firmware is based on Ember's proprietary "designed for ZigBee" mesh stack (EmberZNet 2.5). ZB and ZNet 2.5 firmware are similar in nature, but not over-the-air compatible. Devices running ZNet 2.5 firmware cannot talk to devices running the ZB firmware. The XBee OEM RF Modules interface to a host device through a logic-level asynchronous serial port. Through its serial port, the module can communicate with any logic and voltage compatible UART; or through a level translator to any serial device. RS-232 is now widely used for direct connections between data acquisition devices and computer systems. As in the definition of RS-232, the computer is data transmission equipment (DTE). However, many interface

products are not data communications equipment (DCE).

Wireless communication is one of the most important communication system at sea. But lack of knowledge in radio channel characteristics limits the development of various wireless communication techniques for maritime applications .The problem arises when fisherman crosses the international boundary of their country, thus many people are arrested in some cases it may even lead to death. From the fishermen's opinion, erring occurs unknowingly, because of ignorance on maritime boundaries. Sometimes times drift is because of strong currents or engine failure, though some cross boundary intentionally. Thus to overcome this a secure surveillance and control system is required. In order to carry out these tasks, long distance communications is essential between the sea vessels .This communication must be reliable at all times and it must withstand all climatic changes happens in a sea environment .To establish communication at sea many approaches are used at present, but the criteria is whether the communication is reliable, robust and secure at all times. In TRITON model, the coverage at sea is achieved through setting up a mesh or adhoc network between the fishing boats. The transceiver unit present in each fishing boat act as signal repeater/regenerator until it reaches the sink /base station in water or in land. Here the communication fails if the intermediate boats are not present at a particular distance from the transmitting boat. Main drawback in GSM is

communication breaks between the sea vessels, if the link provided by the network provider fails then message cannot be transmitted.

Growing markets for marine resources has forced Tamil Nadu fishermen to take risks. GPS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and surveillance, and hobbies such as way marking. GPS is made up of three segments: space, control and user. None of the present GPS systems satisfy the requirements for the safety of civilian navigation in the sea as the maritime boundary of a country cannot be marked.

We cannot expect proper signal strength in the mid of the sea. Where the popular satellite phones are expensive to install in fishing boats, moreover they are meant for talking purpose hence activities can't be monitored by coastguards. Individual monitoring of all vessels through RADAR is practically not possible. Thus in this proposed method is to achieve reliable communication at sea through RF communication. In this system, GPS module updates the dynamic locations of the boat. The controller unit which compares the

METHODOLOGY

In our project the following changes are implemented :

- On board controlling of the whole system
- PIC microcontroller based system

- Continuous GPS location value is processed.
- Since design is for real time the output is obtained instantly.
- No manual operator is required

The technology proliferation will be an apt choice for resolving the nautical boundary crossing issue. Global Positioning System (GPS), Global System for Mobile communication (GSM) and Wireless Networks can be the best choice for addressing the maritime border crossing issue. The proposed system is used to devise a low cost alert system for fisherman that gives an alert when the boat/ship crossed beyond other country's border. It helps the fishermen not to go far of border.

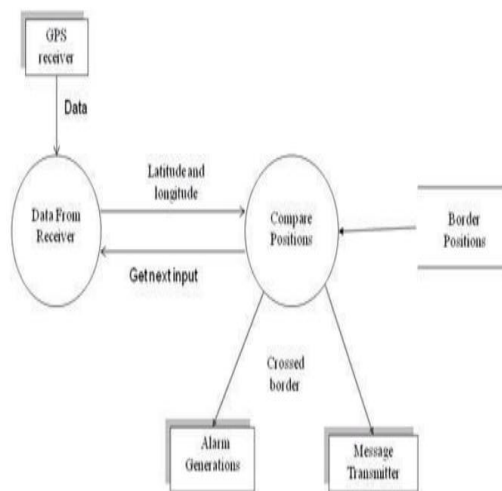


Fig 1:Proposed system workflow diagram

The GPS receiver receives the signal and converts it into desired data message. The data is sent to microcontroller and microcontroller extracts the latitude and longitude from the data. The positions are compared with the stored boundary latitude and longitude positions. If a boat/ship is found beyond the

border, then an alarm is generated along with a message transmission by the RF transmitter. The message is subsequently received by the coast guards in the base station, located at the sea shore, through RF receiver. Figure 1 shows the overall flow diagram of the proposed system. Boundary location: The maritime boundary between Sri Lanka and India in the Gulf of Mannar shall be arcs of great circles between the above countries.



Fig 2: Complete setup of working module

GPS receiver receives the Longitude and Latitude data. Then GPS data is fed to the Micro controller. Data is displayed in LCD.If the data exceeds certain boundary value, then micro controller sends a warning data. The warning data is transmitted through RF Transmitter.In the time of cyclonic storms, the system continuously monitors the boat parameters.If any mis-happening occurs, the system continuously broadcasts the location information to the coast guard boats nearby.

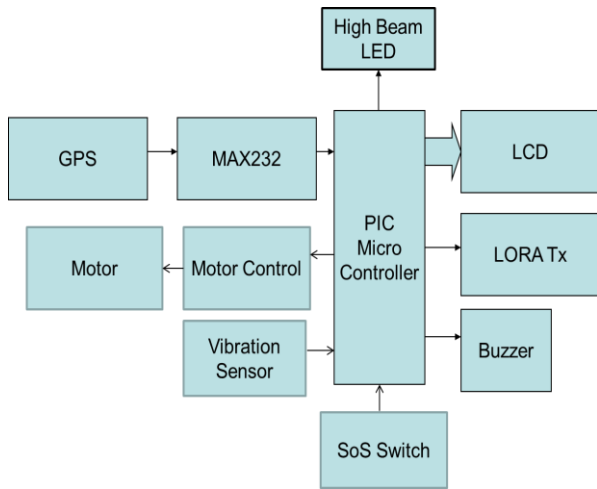
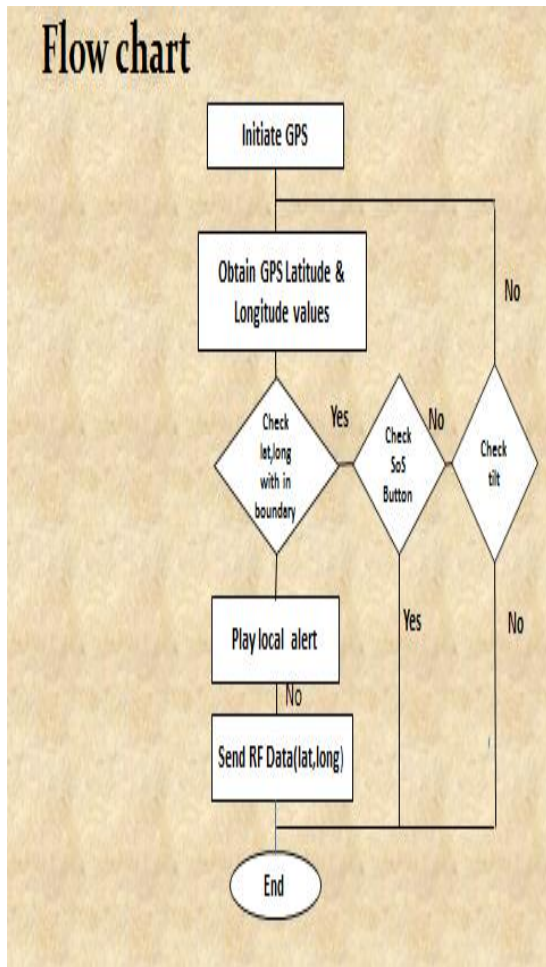


Fig 3: Block Diagram



RESULT



Fig 4: Display of boundary values



(A)



(B)



Fig (A),(B),(C): Alert Message Displayed In LCD

CONCLUSION

- This project contributes a significant step forward in the field of “Monitoring system”, and further paves a road path towards faster developments in the same field.
- From this prototype it is possible to track the location of the fisherman in high seas, in order to alert the fisherman when they are crossing the border, by sending the sms alert to the coast guard for protecting them.

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