

# Sea Localization

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**Abstract:** *The Tamil Nadu fishermen even today invoke the historical rights and routinely stray into the International Maritime Boundary Line (IMBL) for fishing. This has led to apprehension by the Sri Lankan Navy and in some cases even to shooting or arrest the particular Fishermen. This leads to loss in the both humans as well as their economic incomes. The reasons are the lack of Global Positioning System (GPS) in mechanized boats and a chain of Automatic Identification System (AIS) stations along the Tamil Nadu coast areas. So we are going to produce a system which uses several modules to protect the fishermen. This concept makes use of effective ways in the embedded systems and some basic principles in physics. The three major parts which makes the Indian coastal navy to respond for the issues, fishermen can protect them self from the Lankan navy and automatic warning for the unaware fishermen. This problem will be solved by using An Intelligent Boundary Alert System (IBAS).An IBAS system induces the new methodology for saving the fishermen valuable life and their properties from the Sri Lankan's navy. The main objective of this system is used to help the fishermen to navigate inside our maritime country border.*

**Key word: Sea, Localization**

## 1.INTRODUCTION

An island like Sri Lanka, a peninsula like India and coastal countries are separated by their maritime borders. The people livelihood in coastal area of those countries purely depends on fishing occupation in sea. Crossing the border is being a serious offence. About 18,000 boats of different kinds conduct fishing along the India-Sri Lanka maritime border from Tamil Nadu. 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. 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. At times, the drift is because of engine failure or strong currents. Indian fishermen engage in free floating to exploit marine resources in Sri Lankan maritime region knowing fully the risks involved in crossing the International Maritime Boundary Line (IMBL). Growing markets for marine resources has forced Tamil Nadu fishermen to take risks. At present, there are few existing systems which help to identify the current position of the boats/ships using GPS system and view them in an

electronic map. 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. GPS is made up of three segments: Space, Control and User. 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. 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. The accurate position information becomes even more critical as the vessel departs from or arrives in port. The proposed model consists of the Arduino Uno ATMEGA328 microcontroller, ultrasonic sensor and ZigBee. In which the ultrasonic sensor mounted on the buoy detects the moving vessel toward the boundary and calculates the distance. Then the microcontroller executes predefined command according to the distance of the vessel from the boundary. Then it transmits the command through ZigBee to the vessel which is received by the ZigBee in the vessel. ZigBee is the only standards-based wireless technology designed to address the unique needs of low-cost, low-power wireless sensor and control networks in just about any market. Since ZigBee can be used almost anywhere, is easy to implement and needs little power to operate. With hundreds of members around the globe, ZigBee uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world. Then the receiver module compares the command with the inbuilt command and executes the task such as triggering the alarm to warn the fisherman. Then controlling the boat motor speed and cease the forward acceleration, so that fisherman can backtrack the boat and cannot move forward further.

## **2.Related Works**

A literature survey is a body of text that aims to review the critical points of current knowledge on a particular topic. Most often associated with science oriented literature, such as a thesis, the literature review usually precedes a research proposal, methodology and results section. Its ultimate goal is to bring the reader up to date with current literature on a topic and forms the basis for another goal, such as future research that may be needed in the area. So we collect raw data and elaborate on it. Design of border alert system for fishermen using GPS was proposed by D. Arunvijay, E. Yuvaraj (2014), The proposed system uses a GPS receiver which receives signal from the satellite and gives the current position of the boat. The proposed system is used to detect the border of the country through the specified longitude and latitude of the position, not only between Sri Lanka and India but all over the world. The particular layer level i.e. border can be predefined and this can be stored in microcontroller memory. The current value is compared with predefined values and if the set values are same, immediately the particular operation will be done i.e. the microcontroller gives instruction to the alarm to buzzer. It also uses a message transmitter to send message to the base station which monitors the boats in the sea. The

system provides an indication to both fisherman and to coastal guard. Thus it saves the lives of the fisherman and alerts the base station to provide help

Protecting of Fishermen on Indian Maritime Boundaries was proposed by Karthikeyan R, Dhandapani A, Mahalingham U (2012). The proposed work consists of three major modules. The modules are Vessel tracking module, RADAR identification module. The first module of tracking the vessels by using the RADAR Navigation used in the Indian coastal vessels. This navigation shows the status of the vessels in an electronic map. This electronic map is monitored manually over a normal pc. The result of the condition checking will produce the output as alarm signal from the speaker connected to the Pc. After the alarm is blow the navy guards can easily track the vessel and even after the alarm if the navy guards do not act to it a text message will be sent to higher officials about the vessel. This text intimates about the position of the vessel

GPS based tracking of maritime line of control monitoring system was proposed by Yogesh Kumar A, A. BharaniVasanbaand S.P. ValanArasua ( 2015).The proposed work consists of two major modules. The modules are alarm triggering module, indication module. The first module an alarm will be triggered to the fishermen that they have crossed the border. In the second module an indication message is triggered to the base station that is located in the shore. This indication message will hold the position, latitude and longitude of the vessel beyond the border. This message is used to alert the navy coast guard to aid the fishermen who have crossed the border. GPS is used to for both modules, the border line is predefined to the GPS which compares the current position and the border line latitude and longitude.

Intelligent boundary alert system using GPS was proposed by C. Sheebathangapushpam (2015). The proposed system is used to detect the maritime boundary of the country, sea. The proposed system uses a GPS which receives signals from the satellite and gives the current position of the boat. With already known details of the latitude and longitude of the maritime boundary stored in the ARM processor .It compares the current position and stored boundary position if the vessel near to the boundary means it generate an alarm. It also uses a WSN to send message to the base station which monitors the boats in the sea. Our system provides an indication to both fisherman and to coastal guard.

### **3.BACKGROUND**

At present, there are few existing systems which help to identify the current position of the vessels using GPS/RADAR Navigation system and view them in an electronic map or to localize their location. These provide methods for mariners to navigate, measure speed, and determine location. It may provide increased levels of safety for mariners' worldwide and accurate position, speed and to ensure the vessel is safe. The accurate position information becomes even more critical as the vessel departs from or arrives in port and a person have to watch the system for the detecting the malpractice of the vessels. In this case there may be manual error, also the information regarding the boundary crossing boats is have to pass to the higher official, coastal guards by

manually. This will also give a time to trace the boats. Another system is GPS72H by the GARMIN which is mostly used by the fishermen which has battery based power supply as it stands for 18 hours. But the fishermen may be unfortunately missing their backup batteries will lead to danger. In another existing system the operations are performed are only after the vessel has crossed the border. There are several disadvantages like,

- In few existing systems an alarm is triggered only to alert the fisherman and not to prevent them from crossing the border.
- There is no use of send a GPS message to coast guard, base station or higher officials as sometimes they may not see the message and most of the time it will be too late to react and save them
- No existing system completely prevents the vessel from crossing border.

In the proposed model we are using an ultrasonic sensor to sense the object/vessel. We can also use GSM or GPS to implement this proposed model in real time. When the sensor senses the object/vessel it will calculate the distance between the sensor and the object/vessel. On calculating the distance the microcontroller does the comparing operation and single-outs an instruction/command to the specified constraint. The singled-out instruction is transmitted from the transmitter buoy and received at the receiver side module by via ZigBee which is a transceiver. On receiving the command/instruction the respective operation for that command/instruction is triggered and executed.

- If the vessel is at range one, the alarm will be triggered in the vessel.
- If the vessel is at range two, the motor will be shut down in the vessel.
- If the vessel is at range three, the motor speed will be diminished by half.
- If the vessel is at range four, the forward acceleration will cease and backtrack is possible.

All the above specified operations will occur before the border and not beyond the border. Thus our project prevents the vessel from crossing the border. The advantages are

- Prevents the vessel from nearing the border.
- Efficient operations are performed, thus reduces the interference of coast guards.

## 6. CONCLUSION AND FUTUREWORKS

Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering the restricted area. Thus saving their lives and providing good relationship with the neighbouring countries. Also, the piracy of ship can be easily brought under control. It is a low cost method. It is a useful device for safer navigation, especially for fishermen. Since Sri Lanka and India have got lots of problems regarding the fishermen issue, this device is made to identify the maritime boundary

and to provide assistance if needed. The main advantage of this methodology is that the proposed system is compact and affordable by fishermen. The design of the device can be made even smaller than proposed by modifying the design specifications. This helps in extending its scope not only to maritime boundary identification but also to other ideas. More specifications or methods can be used for our project. New specification and methods can be implemented based on the technology that is available at that Time . We can add a database method to this project to hold all the vessel details and fishermen details of that vessel. We can also install the vessel module in all ships, containers and boats and implement authentication key to identify the vessel uniquely. We can use GPS or GSM technology to implement this project. We can install visual aids and monitor the border and manual trigger the operations.

### Reference

- [1] Keisha Wu, Lin Go, Lionel M. Ni, Zhanjiang Lou and Zhongwen Goo(2012) "Ship Detection with Wireless Sensor Networks" IEEE Trans. Vol. 23 No.7.
- [2] Abid khan and Ravi Mishra (2012) , "GPS – GSM Based Tracking System" International Journal of Engineering Trends and Technology Volume3 Issue2.
- [3] M. Li, Y Liu and Z. Yang, (2007) "Sea Depth Measurement with Restricted Floating Sensors," Proc.IEEE 28th Int'l Real-Time Systems Symp. (RTSS '07), pp. 469-478.
- [4] "Construction of marine traffic monitoring system around the world" Shibata.D, Matsumota.H, 2013
- [5] GPS-based vessel position monitoring and display system. This paper appears in: Aerospace and Electronic Systems Magazine, IEEE Publication Date: Jul 1990.
- [6] "Vessel real time monitoring system based on AIS temporal database", Zhen pan, Shujun deng,2009