

Marine Boundary Detector

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ABSTRACT

The problems of Indian and Sri Lankan fishermen in the Palk Bay appear everlasting. The attributable causes are the instances of Indian fishermen being prevented from fishing, facing harassment and arrest by the Sri Lankan Navy (SLN), and also the nearly 200 deaths resulting from SLA operations involving interdictions and firings on suspicion of the Indian trawlers aiding LTTE and gun running while fishing in the area, as reported over the past decade. Since fisher men cannot predict where the boundary is, they often violate the International Maritime Boundary Lines (IMBL). Our proposed idea is to overcome the issues of border crossing by installing GPS for marking the boundary location which gives an alert sound while reaching the boundary. Our project also adds up a feature of attaching the fluorescent lights in the boats which attract the fishes towards the boats. There is no need of crossing the border in search of marine catch. Thus our proposed idea helps the fisherman to solve their needs, and so they can safeguard their lives.

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. Crossing the border is being a serious offence. Both Indian and Sri Lankan fishermen have been fishing into Palk Bay area for centuries. More than 15,000 boats of different kinds from TamilNadu conduct fishing along the India-Sri Lanka maritime border... 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. But they get shot by the Lankan navy by crossing the border accidentally without knowledge. This leads to loss in the both humans as well as their economic incomes. 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. At the present time there are few existing systems which help to identify the current position of the boats/ships using GPS System and view them on an electronic map. For the purpose of identification the fisherman are using the GPS72h, equipment used for the navigation in sea. It provides the fastest and most accurate method for mariners to navigate, measure speed, and determines location. This system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely. The accurate position information becomes even more critical as the vessel departs from or arrives in port. This system eliminates such problems and save the lives of the fishermen. If the fisherman ignores the warning or fail to see the display and move further and if the boat enters the zone nearer to the restricted zone the alarm will turn on and the speed of the boat engine automatically gets controlled by 50%. If the fisherman did not take any reaction about the alarm and move further, then the boat will enter into the restricted zone, the alarm continues to beep as before, and once it touches the restricted zone, the boat engine gets off by the control of fuel supply to engine. Christo Ananth et al. [7] proposed a system about Efficient Sensor Network for Vehicle Security. Today vehicle theft rate is very high, greater challenges are coming from thieves thus tracking/ alarming systems are being deployed with an increasingly popularity. As per as security is concerned today most of the vehicles are running on the LPG so it is necessary to monitor any leakage or level of LPG in order to provide safety to passenger. Also in this fast running world everybody is in hurry so it is required to provide fully automated maintenance system to make the journey of the passenger safe, comfortable

and economical. To make the system more intelligent and advanced it is required to introduce some important developments that can help to promote not only the luxurious but also safety drive to the owner. The system “Efficient Sensor Network for Vehicle Security”, introduces a new trend in automobile industry.

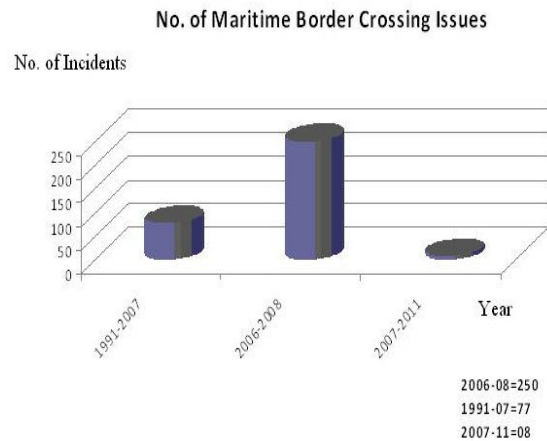


Fig 1 India-Sri Lankan maritime boundary line

EXISTING SYSTEM

At present there are few existing systems which helps us to identify the current position of the boats/ships using GPS System and view them on an electronic map. At first the wireless networks are utilized by many applications where the locations of the nodes in the networks need to be tracked based on the calculation of communication factors among nodes. Hence many secure sensitive applications require the deployment of mobile Ad-hoc networks. Mobile Ad-hoc Networks (MANETS) can also used for addressing these issues by algorithms called cooperative localization. .

Presently there are few existing systems using GPS technology to track and identify the current position of the boats/ships. These systems used electronic map that provides an effective method for navigation and localization detection by the native users. An equipment GPS72h is used for the identification of the ship navigation in the sea. It provides the fastest and most accurate method for mariners to navigate, measure speed, and determines location. This system enables increased levels of safety and efficiency. It ensures whether the ship reaches its destination safely. The accurate position information becomes even more critical as the vessel departs from or arrives in port.

The system is a low cost maritime border crossing alert system mainly focused on the small scale fisherman. This system includes data collection unit, processing unit, controlling unit and transmission unit.

1. Data collection unit: It consists of the location detection components like GPS, Transmitter and other components attached in the boat that accomplishes the vessel location by collecting geographical positions.
2. Processing unit: It holds the latitude and longitude values of the sea in the form of databases.
3. Controlling unit: The controlling unit resides in the sea shore (remote station) from where the decision has been made if the vessel crossed the maritime border.
4. Transmission unit: It handles all the communication among the three units.

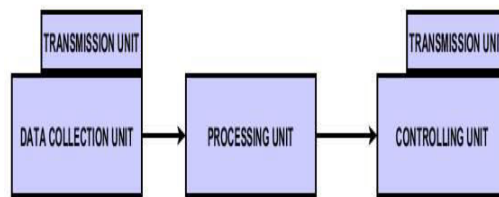


Fig 2 control units

PROPOSED SYSTEM

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. It also uses a message transmitter to send message to the base station which monitors the boats in the sea.

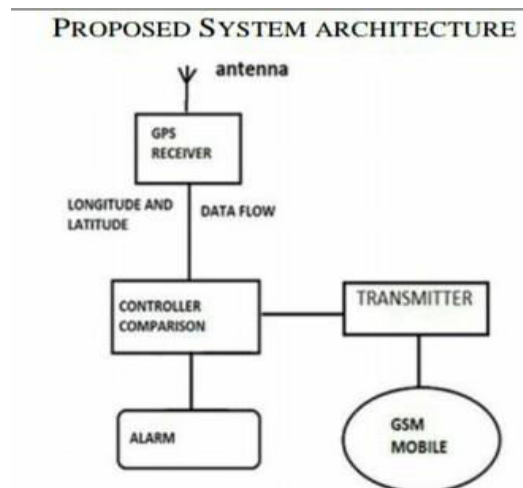


Fig 3 System Architecture

The system provides an indication to both fisherman and to coastal guard. The message is subsequently received by the coast guards in the base station, located at the sea shore, through RF receiver. The particular layer level i.e. border can be predefined and this can be stored in memory.



Fig4. Digital GPS

The current value is compared with predefined values and if these values are same, immediately the controller gives instruction to the alarm to buzzer. In our proposed system the instructions are given at three levels as L1, L2, and L3.

L1→when the boat is at a particular distance from the boundary the alert message will be sent to both the base station and fishermen.

L2→when the boat is nearly close to the boundary, a danger light will be glowing and the speed of the engine will be controlled using Arduino.

L3→ when the boat reaches the boundary line the motor gets stop.

Thus it saves the lives of the fisherman and alerts the base station to provide help.



Fig 5.Fishes Attracted to Lights

Some of the fishermen knowingly crosses the border in order to get good marine catches. In our system we are also implementing the trick of attracting the fishes by using the fluorescent lights fixing under the base of the boats/ships.



Fig 6.GPS SATELLITE

CALCULATING THE POSITIONS

The GPS receivers do not have atomic clocks, there is a great deal of uncertainty when measuring the size of the spheres. Each radius corresponds to the distance calculated to the satellite. All possible distances to the satellite are located on the circumference of the circle. If the position above the satellites is excluded, the location of the receiver is at the exact point Where the three circles intersect beneath the satellites. Although the distance to the satellites can only be roughly estimated at first, a GPS receiver can precisely calculate these distances relative to each other. Because the relative size of the spheres is known, there is only one possible point where they can intersect.

GPS ACCURACY

The accuracy of GPS depends on the type of receiver. Most hand-held GPS units have about 10-20 meter accuracy. Other types of receivers use a method called Differential GPS (DGPS) to obtain much higher accuracy. Differential GPS requires an additional receiver fixed at a known location nearby. Observations made by the stationary receiver are used to correct positions recorded by the roving units, producing an accuracy greater than 1meter. Microcontroller receives the data from the GPS receiver through UART (Universal Asynchronous Receiver/Transmitter). Christo Ananth et al. [8] discussed about Intelligent Sensor Network for Vehicle Maintenance System. Modern automobiles are no longer mere mechanical devices; they are pervasively monitored through various sensor networks & using integrated circuits and microprocessor based design and control techniques while this transformation has driven major advancements in efficiency and safety. In the existing system the stress was given on the safety of the vehicle, modification in the physical structure of the vehicle but the proposed system introduces essential concept in the field of automobile industry. It is an interfacing of the advanced technologies like Embedded Systems and the Automobile world. This “Intelligent Sensor Network for Vehicle Maintenance System” is best suitable for vehicle security as well as for vehicle’s maintenance. Further it also supports advanced feature of GSM module interfacing. Through this concept in case of any emergency or accident the system will automatically sense and records the different parameters like LPG gas level, Engine Temperature, present speed and etc. so that at the time of investigation this parameters may play important role to find out the possible reasons of the accident. Further, in case of accident & in case of stealing of vehicle GSM module will send SMS to the Police, insurance company as well as to the family members.

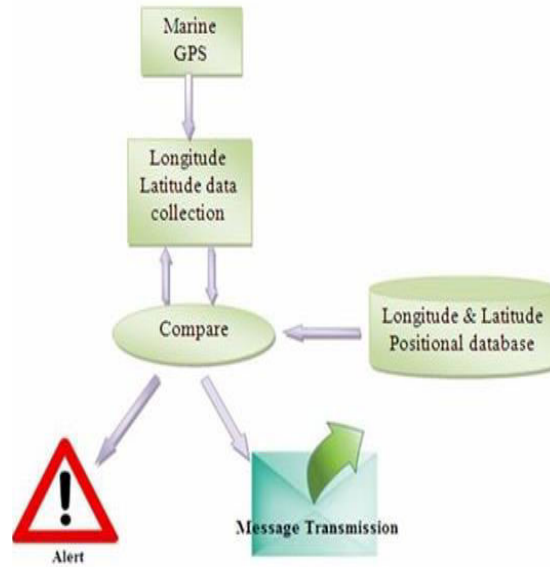


Fig 7. Working Flow Diagram

The data received contains many details along with latitude and longitude. The latitude and Longitude of the current position is separated from the detailed data from GPS.

Table 1: Maritime boundary in bay of bengal
 (Positions of Latitudes and Longitudes)

Positions	Latitude	Longitude
1	10° 05'.0 N	80° 03'.0 E
2	10° 05'.8 N	80° 05'.0 E
3	10° 08'.4 N	80° 09'.5 E
4	10° 33'.0 N	80° 46'.0 E
5	10° 41'.7 N	81° 02'.5 E
6	11° 02'.7 N	81° 56'.0 E
7	11° 16'.0 N	82° 24'.4 E

Table 3: Maritime boundary of Gulf of Mannar
 (Positions of the latitudes and longitudes)

Positions	Latitudes	Longitudes
1	09° 06'.0 N	79° 32'.0 E
2	09° 00'.0 N	79° 31'.3 E
3	08° 53'.8 N	79° 29'.3 E
4	08° 40'.0 N	79° 18'.2 E
5	08° 37'.2 N	79° 13'.0 E
6	08° 31'.2 N	79° 04'.7 E
7	08° 22'.2 N	78° 55'.4 E
8	08° 12'.2 N	78° 53'.7 E
9	07° 35'.3 N	78° 45'.7 E
10	07° 21'.0 N	78° 38'.8 E
11	06° 30'.8 N	78° 12'.2 E
12	05° 53'.9 N	77° 50'.7 E
13	05° 00'.0 N	

ARDUINO BOARD

Arduino used for controlling whole the process with a GPS Receiver. GPS Receiver is used for detecting coordinates of the vehicle. And an optional 16x2 LCD is also used for displaying status messages or coordinates.



Fig 8. Arduino Board

CONCLUSION

The fisherman, while navigating crosses the maritime boundary, unknowingly as they are unable to visualize it in the sea which causes loss to their life. Through this project a GPS based security system is provided to the fisherman so that they can find out when they are in danger. Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering their area. Thus saving their lives and providing good relationship with the neighboring countries. Thus the fishermen can easily identify the national sea borders and therefore prevents them from entering another country's boundary. Also, the piracy of ship can be easily brought under control and the hijack of the ship by the pirates can be eradicated and the lost ship wrecks due to natural calamities can be identified. Then by keeping the kits in the entire boats and by knowing the locations of all the boats we can use our kit to assist the traffic. In case of any accident on the sea. It can be detected by the system and the accident location of the boat is sent to the rescue team. This will increase the accuracy up to 3m by increasing the cost of the GPS receivers. The Lights fixed under the base of the boats helps them by attracting fishes. The need of getting good marine catch is to be solved. We can use the EEPROM to store the previous Navigating Positions up to 256 locations. We can navigate up to N number of locations by increasing the memory of EEPROM. We can reduce the size of the kit by using GPS+GSM on the same module of GPS navigator. We can increase the accuracy up to 3m by increasing the cost of the GPS receivers.

REFERENCE

- [1] K. Suresh Kumar ET. al. / Design of low cost maritime boundary identification device using GPS system/International Journal of Engineering Science and Technology Vol. 2(9), 2010, 4665-4672.
- [2] M Sivaramaganesh/International journal of innovative research in electrical, electronics, instrumentation and control engineering vol. 2, issue 3, march 2014
- [3] http://www.thehindu.com/multimedia/dynamic/01689/TH_09_GROWING_rev_1689954g
- [4] S. Mani Sunder/Deep sea fishermen patrol system for coastal intruder positioning/Scientific Engineering and Technology (ISSN :1581)Volume 2 Issue 3, PP : 129
- [5] Google MAPS API <http://code.google.com/apis/maps>
- [6] P.Satheesh, Maritime Border Refuge System [MBR]/National Conference on Emerging Trends in Computer, Communication & Instrumentation in Strength Security paper. Dr. K., Ms. Sundari, M.E AP-

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- I, and the of Electronics ndtheirendlessupportpaper.2014.1689954g./International Journal of2277-129132 1 April 2013.
- [7] Strengthening National
- [8] Christo Ananth, I. Uma Sankari, A.Vidhya, M.Vickneshwari, P.Karthiga, “Efficient Sensor Network for Vehicle Security”, International Journal of Advanced Scientific and Technical Research (IJST), Volume 2, Issue 4, March-April 2014,pp – 871-877
- [9] Christo Ananth, C.Sudalai@UtchiMahali, N.Ebenesar Jebadurai, S.Sankari@Saranya, T.Archana, “Intelligent sensor Network for Vehicle Maintenance system”, International Journal of Emerging Trends in Engineering and Development (IJETED), Vol.3, Issue 4, May 2014, pp-361-369
- [10] Bullet, E, and Szymanski, B, A, Wang “Distributed Energy-Efficient Target Tracking with Binary Sensor Networks,” ACMTrans. Sensor Networks (TOSN), vol. 6, no. 4, pp. 1-32, 2010.
- [11] Chand, Kaiya, V, Kumar, “An Intelligent Transportation Systems Architecture Using Wireless Sensor Networks,” Intel. Computer Applications (CA), vol. 14, no. 2, pp.22-26, 2011.
- [12] Callen, G.W, Waterman, J., and Welsh, M., “IDEA: Integrated Distributed Energy Awareness for Wireless Sensor Networks,” Proc. Eighth Int’l Conf. Mobile Systems, Applications, and Services (MobiSys’10), 2010.
- [13] <http://timesofindia.indiatimes.com/city/madurai/85-fishermenkilled-by-Sri-Lanka-in-10-years-Govt/articleshow/15540452.cms>
- [14] K. Suresh Kumar et al., “Design of low cost maritime boundary identification device using GPS system”, International Journal of Engineering Science and Technology, Vol. 2(9), PP. 4665-4672,2010
- [15] <http://softwarecrackandhack.blogspot.in/2013/06/proteus-pro-74p3.html>
- [16] <http://my.opera.com/kelompok9/blog/proteus-7-4>
- [17] <http://www.isro.org/satellites/satelliteshome.aspx>