

Maritime Border Alert And Smart Tracking System

Mr. Rejiram R
Asst. Professor
Dept. of ECE
MESCE, Kuttippuram
rejirammes@gmail.com

Mr. Salmanul Faris. C
Ms. Sajna, Ms. Shahana Haseen. S
Mr. Vibindas, Mr. Sayed Muhammed Ashiq
B.Tech students, Dept. of ECE
MESCE, Kuttippuram
sfcsalman@gmail.com

Abstract— Fishermen from our country are being abducted by the other security forces for crossing the Indian maritime border, which is unintentional most of the time. This paper proposes a system which makes a total control over the fishing boat which is a multilevel warning system that helps the fishermen to indicate that their boat approached the Indian maritime border. At the same time GPS (Global Positioning System) collects the information about the present location of the boat and by using the GSP (Geo Satellite Phone) module connected in the system, sent an alert message along with the location to the control room located at the seashore for making necessary actions. The proposed system also provides a 'RED ALERT' switch on the boat, which is very much useful for the fishermen when they are under trouble like terror attack or unfavorable weather. By pressing the switch the control station will get a danger alert and present location of the boat, that information is immediately sent to the border security, nearest boats for taking the necessary action. We provide a real time voice recording and tracking system to identify the status of the boat for the last 15 days like black box in an aircraft. Also we propose a smart band system to track the fishermen around a specified range when they meet with a disaster. For proliferation a finger print oriented data collection system is incorporated. The module placed in the boat with a water proof casing such that the module is not prone to any damage. The paper aims at providing a system that will alert the fishermen well in advance and ensure maximum safety and peace at the borders and also notify the family members about the details of the fishermen.

Keywords:- GSP, GSM, GPS, Latitude, Longitude.

I. INTRODUCTION

The Islands and the coastal countries like India are separated by their maritime borders. The people lives in coastal area of those countries purely depends on fishing occupation in the sea. Crossing the border is being a serious offence. Especially, In Kerala nearly 10,000 boats perform fishing activities. Due to carelessness or unknowing the boundary limit, the fisherman used to cross the maritime borders. Once they cross the border, they arrested or killed by the relevant navy or they are being abducted and their boats are being captured by the neighborhood country's coastal guards and also if the boat is under trouble other than border crossing issues the rescue may not be functions as fast due to the delayed details from the

boat. In such situation the lives of fishermen continue to be difficult. It is a major threatening issue and leads to loss in the both humans as well as their economic incomes. Not only the border crossing issue, the Mumbai terror attack pointing out that our marine surveillance is not secure.

In order to avoid all this issue, there is a need for producing significant realization among our fishermen to avoid crossing over into water boundary. The technology proliferation will be an apt choice for resolving the nautical boundary crossing issue and other dangerous situations. Hence there is a great requirement of a system which ensures maximum level of national security as well as fishermen's security.

II. EXISTING SYSTEM

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 time and 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. The challenges are extended to cooperative localization is that multiple hops nodes cannot be localized using single hop localization algorithms. In sensor network technology, the localization of sensor needs to be tagged with sensor data. Cost and energy depletions are the notable drawbacks of the sensor networks. 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. This also acquires increased levels of safety and efficiency.

III. PROPOSED SYSTEM

The proposed system mainly interfaces with three functional units, such as:

1. Boat with GSP module
2. Control room
3. GSM device

Figure 1 shows the simple block diagram of the proposed system includes data collection unit, Processing unit, Controlling unit and Transmission unit .The data collection

unit consists of location detection components like GPS, GSP module and other components attached in the boat that accomplish the boat localization by collecting the geographical positions. The processing unit holds the set of latitude and longitude values of the sea in the form of databases that can be used for comparing the present boat position with legal border limits. The controlling unit resides in the sea shore. All the communication among these two units is handled by GSP module .The information tracked in the control room is sent to family members through a GSM system and the information is immediately sent to the border security and the necessary action is taken.

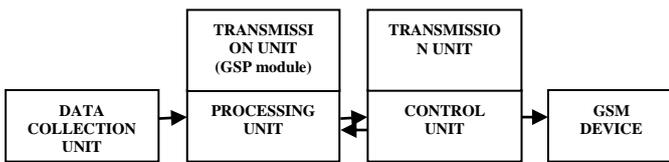


Fig. 1: Simple Block diagram of the proposed system

IV. DETAILED WORKING OF PROPOSED SYSTEM

Our primary objective of this work is to develop a warning system which can solve the above issue very effectively. In the proposed method there is a three level warning system which inform to the fisher man's if they reach the maritime border.

The three levels may be named as L1, L2 and L3. The L3 level is just near the border and L2 and L1 are 200 and 500 meters before the border respectively. The figure 2 shows the Indian maritime boundary.

Our proposed equipment is connected in the boat, having a unique identification number based on the registration given by the Government licensing authority. If the boat crossed the level 1 then an alarm is generated and danger alert message will be displayed on the 3.5 inch touch screen display, also the system interfaced with the proposed system on the boat, and sends the current location of boat to the control room, and then the boat will be under special surveillance.

If the boat crossed the level 2, then an alert message from the control room is send to the boat directly. If the boat crossed the level 3 then again an alert message is send to the boat and engine of the boat will get turned off, and the crossed location is send to the control room through GSP module from there a dangerous alert is sent to coast guards/navy and to the registered mobile numbers using the GSM module for taking the necessary action.

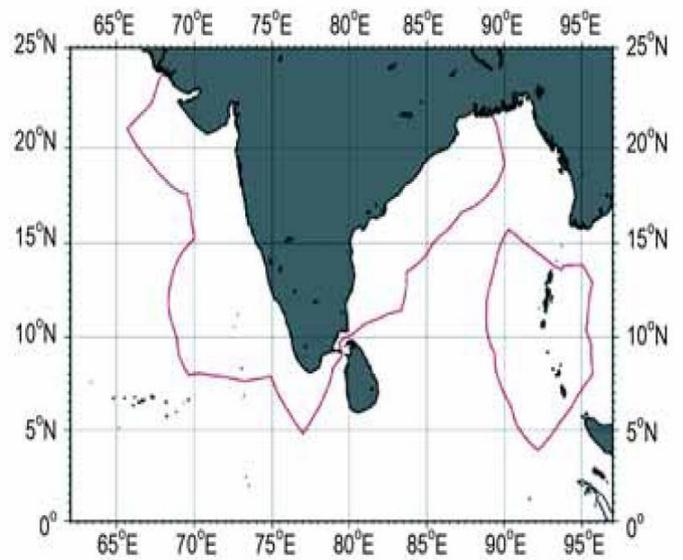


Fig. 2: Indian Maritime Boundary

Figure 3 and figure 4 shows the detailed block diagram of proposed system :

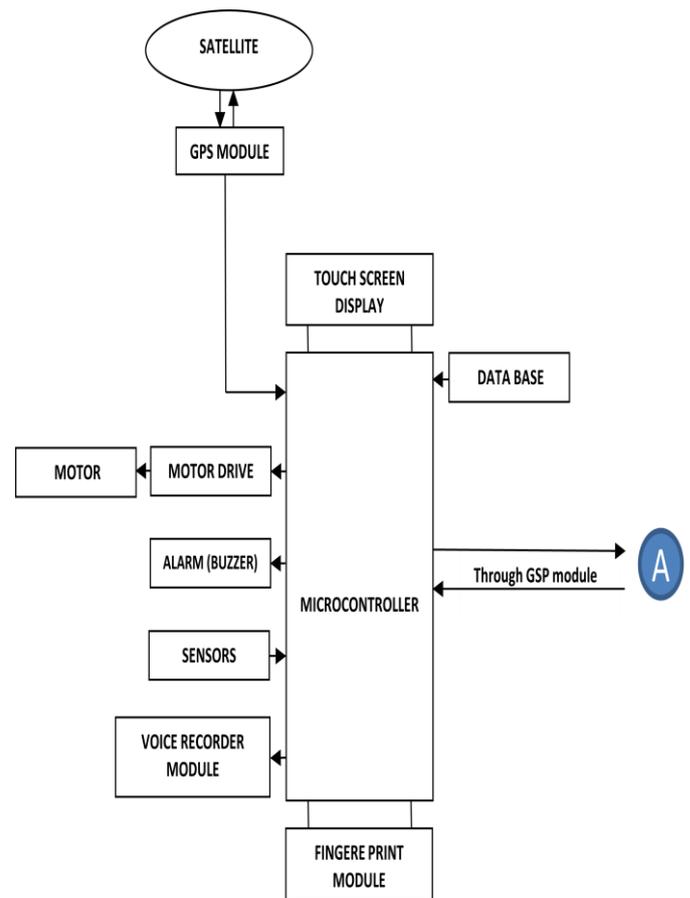


Fig. 3: Block Diagram of Proposed Module in Trawlers.

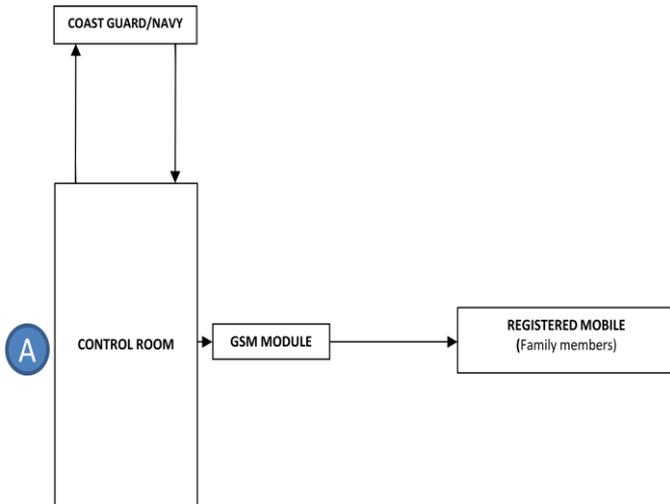


Fig. 4: Block Diagram Of Proposed System at in Control Room.

The GPS receivers are used to identify the longitude and latitude values of the current geographical location. The corresponding that data is transmitted to the MICROCONTROLLER and it is compared with the latitude (N) and longitude (E) positional database values which predetermined border details stored in the memory. If the boat is found beyond the border, then an alert is generated immediately and is transmitted to the control room (through GSP module in practical case), from where the boat is located and further action can be initiated.



Fig 6: Arduino mega

The Mega 2560 is a microcontroller board based on the Atmega2560. It has 54 digital input/output pins (of which 15 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Fig 7: GSP module (ROCKBLOCK Mk2)

The GSP Module allows you to send and receive short messages from anywhere on Earth with a clear view of the sky. It works far beyond the reach of WiFi and GSM networks. Maybe you want to transmit weather information from mid-ocean? Or use it to control your robot in the middle of the desert? Perhaps you need to communicate in an emergency, when other networks might not be available? GSP can help you.

At the heart of GSP (RockBLOCK) is an Iridium 9602 modem, and provides it with an antenna, and its power supply requirements.

The proposed system also providing a 'RED ALERT' button on the boat, which is very much useful for the fishermen when they are under trouble like terror attack or

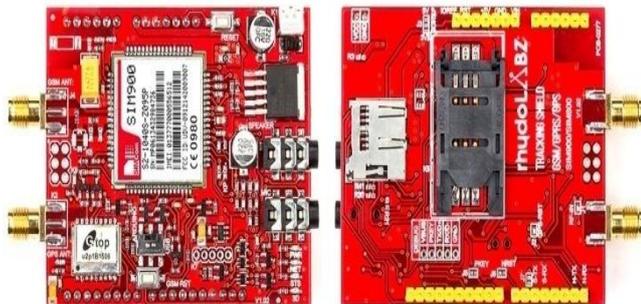


Fig 5: Tracking shield

An all-in-one arduino compatible Tracking shield , that lets helps to add location-tracking, voice, text, data connectivity, bluetooth and data storage as per our need. The shield features new generation GlobalTop GPS chipset and SIM800 Quad-band GSM/GPRS engine that works on 850/ 900/ 1800/ 1900 MHz. With GPS technology the shield supports satellite navigation along with cellular connectivity. GSM/GPRS connectivity is controlled via AT commands, while the GPS functionality follows NMEA protocol. The shield also offers data storage on microSD card.

unfavorable weather. By pressing the button the control station will get a danger alert, and the information is immediately sent to the border security, nearest boats and the necessary action is taken, when the 'REDALERT' is activated then a voice recorder attached to the proposed system will activate and the conversations between the fishermen get recorded.

The system having a storage unit (water proof) just like Black box in the airplanes, it will store the traveling path of the boat and gives a back up of 15 days, by using sufficient software we can see the path that the boat traveled.

The proposed system will also evaluates the real time engine status by making use of sensors values and the engine status can access through the 3.5 inch touch screen display.

Apart from this we are proposing a SMART BAND (a wearable device) that can easily interface with the proposed system on the boat. Which is useful for tracking the SMART BAND wore person around a specified range, which is also useful for the rescue operations.

The system also include a finger print scanner by making use of this we can feed the details of fishermen in the equipment, it will helpful to proliferation for the navy/coast guard to ensure that they are genuine fishermen. Also the proposed module in the boat will works under solar energy. The module placed in the boat having a water proof casing, such that the module is not prone to any damage.

IV. RESULTS

As for the laboratory testing it has stored some reference location as legal border and that is exactly the location of the laboratory, extracted by the GPS module. In the sequence given below, It is defined by latitude and longitude:

POSITION	LATITUDE	LONGITUDE
1	: 10° 86'.0 N.,	76° 02'.0 E
2	: 10° 83'.0 N.,	76° 05'.3 E
3	: 10°85'.0 N.,	76° 09'8'.3 E
4	: 10° 88'.0 N.,	76° 13'.2 E

By using these references, it has tested the Border crossing indication part of the proposed system and the results obtained is given below. Further work of proposed system is under progression.



Fig.8: When the device get powered.



Fig.9: When the device within the border.

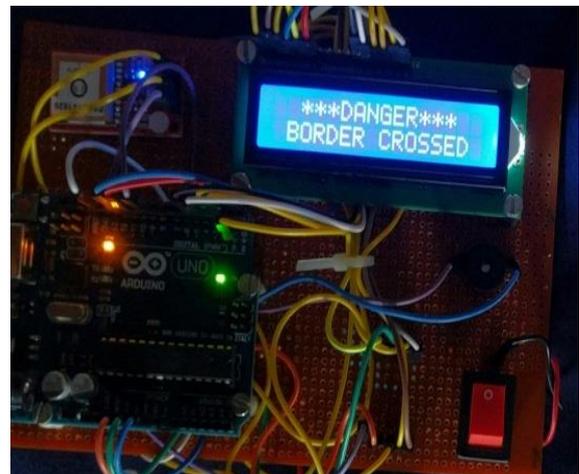


Fig.10: When the device beyond the border.

V. CONCLUSION

In the conventional, the fishermen have to keep watch the maritime border, which cannot be easily separated as land region. If they crossed certain limit on the sea. They have to pay the penalty or got arrested by the naval guards of the neighbor country. In order to avoid this issue, there is a need for producing significant realization among our fishermen to avoid crossing over into water boundary. The technology proliferation will be an apt choice for resolving the nautical boundary crossing issue. Hence there is a great requirement of a system which ensures maximum level of national security as well as fishermen's security. This paper aim to provide a complete security assuring module for fishing boats which helps to increase the fishermen security as well as marine surveillance.

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