

International Nautical Periphery Observing, For National Retreat

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ABSTRACT — Though there are so many means and agreements between the adjacent countries in sharing the maritime boundary, the issues in connection with the sharing of water and hence the related resources have not come to an end. As a perfunctory measure the issues between India and Sri Lanka in sharing the Sea border has been dealt in herewith. The major diplomatic problem between India and Sri Lanka is the shooting of fishermen on the pretext of trespassing international waters. This mission demonstrates a novel technique to identify international sea boundary with the use of GPS enabled boats along with protective measures for proper usage of boats. Any intrusion within hundred meters of the international nautical waters will be promptly determined and an appropriate alert signal will be given. Further movement in the direction will lead to cut off of fuel supply. Apart from this an anti-smuggling mechanism is integrated into the boat using RFID tags. This module also incorporates temperature and humidity sensors for weather monitoring. This plan will be a pioneer effort in making the countries sharing the maritime border to have a harmonious and peaceful relationship by saving the precious human lives. Now a days as countries face number of threats and terrorists intrusion spoiling the good wealth and the sanity of the sea sharing countries this will give a clear idea to dodge such inhumane activities by the disruptive evils

Keywords—Maritime,Defense,nation,security.GPS,GPRS

I. INTRODUCTION

. The maritime boundary (with latitude and longitude) is fed to the ARM7LPC2148 micro controller. It has two UART terminals, a unique feature which allows for the interfacing of GPS and GPRS. The controller runs a recursive algorithm which compares the position of the boat with the preset value. As GPS works best in open air conditions and as it does not depend on external weather conditions, it enables continuous operation without any signal interruptions. The data from the GPS antenna is sent to the control room using the GPRS module. In case of any emergencies or trespassing over the boundary, the position of the boat can be tracked. This establishes an effective communication between the coast guard and the fishermen. Tags are given to goods while loading and checked while unloading.

The fishing rights of a country extend up to 12 nautical miles from its land boundary. However the total distance between India and Sri Lanka is only 10 nautical miles. Hence, there have been many issues on deciding a fishing boundary. The main problem happens to be the islands of Katchathivu. Katchathivu is a controversial uninhabited island administered by Sri Lanka. This island was given to Sri Lanka by India in 1974 on a conditional basis. The water surrounding this island has rich fish population. This triggered fishermen from both India and Sri Lanka to fish in that area. This resulted in problems which led to the Indian fishermen being

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prohibited from fishing in that area. They were allowed limited rights like allowing fishermen to dry their nets and visit tourism spots. This continued for two years before the agreement of 1976 was signed. According to this agreement, Indian fishermen were banned from entering the territory of Katchathivu. This was revoked in 2009 by the Tamil Nadu government. According to this declaration it was decided to allow Indian fishermen fishing rights in all territories that extended between Indian boundary and Jaffna line.

The proposed system primarily aims at overcoming the demerits of the existing system. It will be a distinct technological advancement and will serve to eliminate maritime boundary issues between countries. It will also significantly change the lifestyle and security of fishermen. To overcome the primary issue of boundary detection, Global Positioning System (GPS) technology is incorporated. It is a fail-safe system which will work at all weather conditions. Communication between the fishermen and the coast guard is the next main difficulty. As a solution to this continuous tracking of the boat by the coast guard is enabled using General Packet Radio Service (GPRS) technology. Various other features have also been incorporated which completely changes the existing fishermen boat to one which is equipped with all tools and services.

II. TOPOGRAPHY AND LOCATION

The maritime boundary between Sri Lanka and India in the Gulf of Mannar shall be arcs of great circles between the following positions, in the sequence given below, defined by latitude and longitude:

POSTIONS	LATITUDE	LONGITUDE
Position 1	09° 06'.0 N	79° 32'.0 E
Position 2	09° 00'.0 N	79° 31'.3 E
Position 3	08° 53'.8 N	79° 29'.3 E
Position 4	08° 40'.0 N	79° 18'.2 E
Position 5	08° 37'.2 N	79° 13'.0 E
Position 6	08° 31'.2 N	79° 04'.7 E
Position 7	08° 22'.2 N	78° 55'.4 E
Position 8	08° 12'.2 N	78° 53'.7 E
Position 9	07° 35'.3 N	78° 45'.7 E

Maritime boundary in Gulf of Mannar

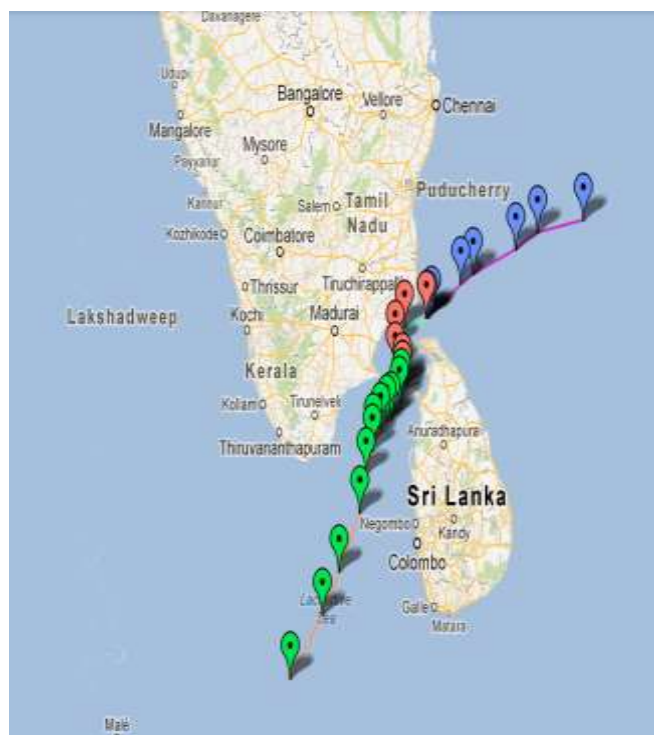
The maritime boundary between Sri Lanka and India in the Bay of Bengal shall be arcs of great circles between the following positions, in the sequence given below, defined by latitude and longitude:

POSITIONS	LATITUDE	LONGITUDE
Position 1	10° 05'.0 N	80° 03'.0 E
Position 2	10° 05'.8 N	80° 05'.0 E
Position 3	10° 08'.4 N	80° 09'.5 E
Position 4	10° 33'.0 N	80° 46'.0 E
Position 5	10° 41'.7 N	81° 02'.5 E
Position 6	11° 02'.7 N	81° 56'.0 E

Position 7	11° 16'.0 N	82° 24'.4 E
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Maritime boundary in Bay of Bengal

The main problem between India and Sri Lanka is the shooting of fishermen. The territory that causes such tensions is Katchathivu. This happens due to the inability to decide a specific maritime boundary by either nations. The current maritime boundary decided by India includes the island of Katchathivu within Indian waters.



India-Sri Lanka Maritime boundary

III. EXISTING SYSTEM

The current systems being used are Distress Alert Transmitters (DAT) and Ship Security Alert Systems (SSAS).

In Distress Alert Transmitters, a module is fixed in the boat. In case of emergencies, the fishermen need to switch on the DAT unit. Once the unit is switched on, the user needs to select the specified message. This message is combined with the position of the boat determined by the GPS module which will be transmitted to the hub or the control room.

The mechanism behind the working of SSAS is as follows: When the maritime security staffs comprehend probable danger from pirates or terrorists a Ship Security Alert System (SSAS) alert is triggered. The beacon transmits a specific country code, reacting to which the Rescue Coordination Centres (RCCs) or SAR Points of Contact (SPOCs) of that particular region is notified discreetly. Once receiving the signal the national authorities of the area that are notified dispatch appropriate military or law-enforcement forces to deal with the terrorist or pirate menace.

IV. PROPOSED SYSTEM

The proposed system involves the use of Global Positioning System and General Packet Radio Service. The GPS module is used to identify the location of the boat and this data is transmitted to the microcontroller. A preset value corresponding to a 100m ahead of the maritime boundary is fed into the controller. The data received is compared with the preset value and a buzzer is sounded. When the boat moves forward further and moves within 50 m of the boundary, the fuel supply is cut off. Apart from this the other safety measures include an anti-smuggling mechanism and an intelligent weather monitoring system. The sensors included are temperature and humidity sensor. This helps the fishermen in safe navigation.

V. WORKING

The transmission of GPS data requires the availability of signals from a minimum of three satellites. This data contains the latitudinal and longitudinal data of the specific boat. This data is transmitted from the receiver to ARM7LPC2148 microcontroller through Universal Asynchronous Receiver Transmitter (UART). The UART 0 is used for reception of data from GPS module. The main function used in the program to facilitate transmission is `UART_getkey()`. These 32 bytes of data are stored in an array. The specific latitude and longitude values are extracted and compared with the preset value fed into the microcontroller. The preset value corresponds to the position 50m and 100m ahead of the maritime boundary. When the received data (value 1) corresponding to current position of the boat equals the preset value for 100m boundary, buzzer is triggered. This buzzer is integrated with the microcontroller development board present in the boat. This functions as the initial warning to the fishermen to redirect their boat.

Further movement in the same direction can be monitored by the GPS receiver. This data is transmitted to the microcontroller which prevents the boat from crossing the 50m boundary. This data v1 is compared with another preset corresponding to 50m boundary v3. When these two values are equated and when the `if()` condition attains a true value a relay circuit is switched on. This 12V relay is connected to the motor and on being powered on, it opens up the circuit and the motor is cut off.

The other UART of the microcontroller is connected to the GPRS module and RFID module. The GPRS module is used for communication between the control room and the boat. The data received from the GPS receiver is transmitted to the control room through GPRS. Since GPRS is used only for transmission the TXD pin of the UART 1 is connected to GPRS module. From GPRS module the data is sent through IP address specifically designed for this purpose. The area information from Google Maps is fed into the webpage. The received data is compared with the list of values stored in the database. When there is a match the corresponding location can be observed. This is a real time dynamic process and the marker moves on the screen as the position of the boat changes.

The 125 KHz RFID module is connected to the microcontroller through UART 1 by means of pins 2 and 5 corresponding to RXD and GND. This is mainly used as an anti smuggling mechanism. Each good is provided with the specific tag with a unique serial number. When this tag passes over the RFID reader the serial number is displayed on the screen and checked for its validity in the database. This is performed every time the

goods are loaded in the entry terminal. When the same process is repeated at the exit terminal the goods are again checked for any mismatch while unloading.

The intelligent weather monitoring system is integrated into the project to be of great service to the fishermen. The temperature sensor (LM35) is used to convert the temperature into voltage. The sensor is connected to the pin 13 and the supply is taken from the microcontroller board. This analog value is converted to digital using the inbuilt Analog to Digital Converter(ADC). This final output temperature value is displayed on the Liquid Crystal Display (LCD) screen.

The humidity sensor is connected to pin 14 of the microcontroller. This is used to measure the relative humidity.

$RH = \frac{\text{Moisture present in the air}}{\text{Total moisture present at the given temperature}}$
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This is used to predict the rainfall level in the specific area and it helps in safe navigation. This value is displayed on the LCD screen.

This project with its additional features aims at ensuring safety of fishermen out in the sea. It prevents unnecessary killing of fishermen on the pretext of trespassing and smuggling. It aims to provide a low cost and reliable module that can be fitted into all the boats.

GPS MODULE:

- GPS module used is SkyNav SKM53 Series
- Embedded GPS antenna enables high performance navigation in the most stringent applications
- Solid fix even in harsh GPS visibility environments.
- MediaTek 3327 single-chip architecture
- 165dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment
- 6-pin and USB connector design is the easiest and convenient solution
- 22 tracking/66 acquisition-channel receiver
- NMEA protocols (default speed: 9600bps)
- Internal back-up battery and 1PPS(Pulse Per Second) output

GPRS MODULE:

- GPRS module used is TN-84 Technido
- GSM/GPRS Modem-TTL (5V) is built with Tri-band GSM/GPRS engine
- Compact in size and easy to use a plug in module
- 5V TTL interface, which can be connected directly to 5V microcontroller
- The baud rate is configurable from 9600-115200 through AT command
- The GSM/GPRS TTL Modem has an internal TCP/IP stack which can be connected to the internet using GPRS

RFID MODULE:

- 125 KHz working frequency
- Consists of a RLC series circuit
- Produces a magnetic field which acts as a power source to the tag
- Data can be transmitted by means of modulating the field
- Radio waves from tag are converted into microcontroller compatible form
- RFID tags contain at least two parts: an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, collecting DC power from the incident reader signal, and other specialized functions; and an antenna for receiving and transmitting the signal.

The disputes in front of the world now

Though we the human beings all want to have a Peaceful life with no worries on the losing the health and Wealth aspects the distresses are there among the oceanic border Sharing countries .The following table portrays the setbacks that the world has in the global scenario.

Disputed Islands	Claimants
Hans Island	Canada - Denmark
Machias Seal Island	Canada – United States
Corisco Bay Islands	Equatorial Guinea – Gabon
Falkland Islands	Argentina – UK
Sapodilla Cayes	Belize – Honduras
Navassa Island	Haiti – United States
Quita Sueña, Roncador	Colombia – Nicaragua
Ceuta & Melilla and associated islands	Morocco – Spain
Imia/Kardak islets	Greece – Turkey
Matthew and Hunter Islands	France – Vanuatu
Wake Island	US – Marshall Islands
Kuril Islands/Northern Territories	Japan – Russia
Liancourt Rocks	Japan – South Korea
Senkaku/Diaoyu Islands	China – Japan – Taiwan
Paracel Islands	China – Vietnam
Spratly Islands	Brunei – China – Malaysia – Philippines – Taiwan – Vietnam

The recommended proposal can be implemented between all of the above said countries so that the goodwill nature of the respective countries would make the world to have a peaceful living.
The Authors wish this work will let the world bloom to have a heavenly living

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