

A Noval Approach Of Geofencing And Geotagging System Based Sea Border Identification Using Embedded System

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Abstract--*The main theme of this paper is to save the lives of poor fishermen who is severely punishing by the other country coastal guards. This is achieved with the help of GPS and embedded system. [1][2][3]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. This paper deals on the versatility and the usefulness of a GPS device in the sea. The main objective of the paper 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 GSM transmitter interface will send a message to base station located on the sea shore indicating that a boat 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 the border. On the whole, it is an attempt to build a suitable device for the fishermen at a reasonably low cost.*

Keywords-- Embedded System, GPS, Encoder, Decoder Voice synthesizer.

1. Introduction

A sea is a large body of saline water that may be connected with an ocean or may be a large saline lake. Oceans, seas, islands and coastal areas form an integrated and essential component of the Earth's ecosystem and are critical for global food security and for sustaining economic prosperity and well-being of many national economies, particularly in developing countries. Oceans and seas cover over 70 per cent of the Earth's surface. [4][5] They have a large influence on global heat transport and precipitation (climate and weather patterns). They provide a large proportion of the oxygen we breathe and are a major source of bio-diversity and natural resources.

Nearly one billion people worldwide already rely on oceans and seas as a major source of nutrition. This dependence will be continue to grow as human populations increase. The degradation of the oceans and seas seriously threatens food security and the eradication of poverty across the globe. In addition to food, oceans and seas provide us with a wide variety of goods, services and other benefits, including oil and gas, renewable energy generation potential, transportation corridors and recreational opportunities.

A healthy society depends on healthy seas and coasts. But, today it is well known that, there are so many problems due to border crossing in both land and sea. It may sometimes results in their loss of life.

Nowadays many fisherman and people are traveling in sea are punished by other country due to crossing border. This is happening because they don't know the border limit when in sea. To help those people this project is designed. In this project GPS and embedded system plays a major role. This project consists of two units named control unit and guiding unit. Control unit is placed in lighthouse. And guiding is placed with the fisherman.

Control unit consists option keypad, embedded system and transmitter. Power supply unit supplies essential power required to this system. Option keypad uses to inform the emergency signals to the fisherman like rain, tsunami, etc. when a key is pressed in keypad embedded system receive that signal. Embedded system is programmed to analyze the signal and it is given to the transmitter through encoder. Whereas signal from the embedded system is a digital signal that can't be transmitted directly so with the help of encoder, the signal is converted and modulated. Receiver in guiding unit receives the signal and it is given to embedded system after decoding. When the guiding unit moves out of the specified limit a signal is given to embedded system in this unit. Here embedded system is programmed to analyze the signal whether it is for emergency or crossing border. If it is emergency signal it display that emergency condition in a display. If it is a crossing [6][7]border signal it activates the alarm driver to produce alarm sound to indicate the people. Voice Synthesizer and speaker used to produce the corresponding voice announcements. GPS receiver is used to identify the location of the boat or ship. Therefore this system protects fisherman and boating people from emergency cases as well as from the crossing country border.

2. Existing System

There are few existing systems which helps to identify the current position of the boats/ships using GPS system and view them in an electronic map. GPS provides the fastest and most accurate method for mariners to navigate, measure speed, and determine location. This enables increased levels of safety and efficiency for mariners worldwide and accurate position, speed and heading are needed to ensure the boat reach its destination safely. The accurate position information becomes even more critical as the boat departs from or arrives in port. In olden days there is no efficient technique for identifying the border in sea. The prevention techniques followed were

roaming near the boundary with the help of man power and they guided the fishermen. Usage of connected large sized balls along the boundary, even though it is a good method, but big fishes can disturb the alignment of fence and it is difficult to recognize.

3. Proposed System

By overcoming the past and present techniques it will be better if we introduce a audio announcement, which is nothing but the device will communicate in their local language which could be easily understood by the fisherman. And at the same time, we can make the people to be aware before reaching the border. In addition to that it is possible to give the alert about the natural calamities to the ship sailing at the sea from the light house. It may be may be, [8]Tsunami, heavy rain, storm. With the help of geo tagging technique it is possible to locate the places where we can find particular variety of fishes and the areas where fishing is possible. A buzzer facility is also added. When any damage or sinking of boat causes ,the fishermen can easily alert the guards near to them. When the buzzer is pressed, an RF signal carrying the latitude and longitude information will be send to the sea shore and it is possible to locate them easily where they are.

4. Main Units Of Project

There are two units implemented in this project and they are control unit and a guiding unit. The communication established between the two units is done with the help of RF transmitter.

A. Control Unit

Control unit is placed at the light house in that there will be a option keypad, PIC microcontroller, encoder, decoder, transmitter and receiver, [9]LCD display .and a power supply for giving the input power .Option keypad is used for sending emergency information. There will be a LCD display for displaying the information from the guiding unit.

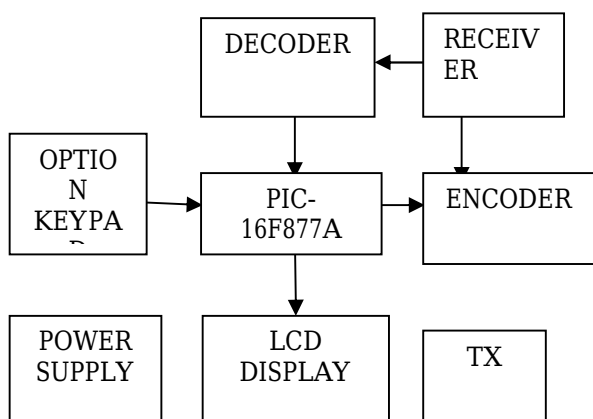


Fig.1 Block Diagram Of Control Unit

B. Guiding Unit

The guiding unit is placed in the boat with the fisherman. In the guiding unit there will be a receiver decoder, PIC microcontroller ,GPS receiver, LCD display, alarm driver, alarm, voice synthesizer, speaker. From the GPS receiver the latitude and longitude values are fed into the PIC microcontroller and the values are compared to the border values when it exceeds the border values an alarm will be generated. In addition to that information will be send to the

control unit. There will be a speaker for guiding them in their local language. The block diagram for guiding unit can be given as follows.

Table 2. The Boundary Between Sri Lanka And India In The Gulf Of Mannar Can Be Given By The Following Latitude And Longitude Values

POSITIONS	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 N
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
Position 10	07° 21'.0 N	78° 38'.8 E
Position 11	06° 30'.8 N	78° 12'.2 E
Position 12	05° 53'.9 N	77° 50'.7 E
Position 13	05° 00'.0 N	77° 10'.6 E

Table 2. The Boundary Between India And Srilanka From Adam's bridge to Palk Strait Is Given By The Following Latitude And Longitude Values

POINT	LATITUDE NORTH	LONGITUDE EAST
1	10° 05'	80° 03'
2	09° 57'	79° 35'
3	09° 40'.15	79° 22'.60
4	09° 21'.80	79° 30'.70
5	09° 13'	79° 32'

The boundary location between India and Sri Lanka. These boundary values are fed into the [10]PIC-microcontroller. The latitude and longitude values from the GPS receiver are compared to the boundary values. If it exceeds the boundary values alarm will be generated and the information is send to the control unit.

C. GPS

The Global Positioning System (GPS) is a global navigation satellite system[5]. A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high above the Earth. Each satellite continually

transmits messages containing the time the message was sent, precise orbital information, and the general system health and rough orbits of all GPS satellites. The accuracy of a position determined with 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.

D. Controller

The controller used is PIC-microcontroller PIC is "peripheral interface controller" PICs are popular with developers and hobbyists alike due to their low cost, wide availability, large user base, extensive collection of application notes, availability of low cost or free development tools, and serial programming capability. Some of the features of PIC-microcontroller are, A small number of fixed length instructions Most instructions are single cycle execution, with single delay cycles upon branches and skips A single accumulator (W), the use of which is implied. PIC-16F877A is a 40 pin controller from that controller pins encoder,decoder,RS-232,LCD display are connected to the pins.

PICs have a set of registers that function as general purpose RAM. Special purpose control registers for on-chip hardware resources are also mapped into the data space(RAM). The addressability of memory varies depending on device series, and all PIC devices have some banking mechanism to extend the addressing to additional memory. Later series of devices feature move instructions which can cover the whole addressable space, independent of the selected bank. In earlier devices any register move had to be achieved via the accumulator. This PIC is used because it is possible to connect more number of peripherals.368 bytes of RAM,256 bytes of EEPROM data memory,15 Interrupt Sources, Two 8-bit Timers / counters with pre scalers, One 16-bit timer / counter, Two 16-bit compare / capture PWM modules,10-bit 8-channel ADC, Two analog comparators, Programmable UART Serial Channel, Programmable Watchdog Timer.

E. Alarm

It will be given in their local language. in addition to that a information is send to the control unit that the boat has crossed the border. The device used for the system is given as follows, it consists of battery from which power is being generated and from the GPS the values are compared to the boundary values.

F. Geofencing

The control unit is placed at the light house and the guiding unit is with the fisherman. Already the border values are fed into the pic -microcontroller, when the boat crosses the border an alarm is generated along with the voice announcement in their local language from the speaker. in addition to it the information about the boat is send is send to base station immediately and it can displayed on the LCD display..The GPS receiver receives the data, then the latitude and the longitude values are extracted and compared with the actual boundary values in the PIC microcontroller. When the values exceeds the boundary values an alarm will be generated and can guide them by voice announcement. The latitude and the longitude values are displayed in the LCD display .In the control unit there will be an option keypad which is used to

send information about the natural calamities like Tsunami, earthquake, cyclones to guiding unit.

The above diagram will display the latitude and longitude values at a location .it can be displayed through the LCD display .and by using geo tagging technique it is possible to find where the best variety of fishes are available and the area where fishing is possible can be also find using geo tagging. The possible fishing areas (latitude and longitude values)are fed into the PIC-microcontroller and when the boat reaches that area the information will be passed to the fisherman through alarm and voice synthesizer.

5. Results And Discussion

In the olden days there is no proper system to identify the border. The fisherman while fishing they cross the border unknowingly and these may lead them to serious effects. It is so because there is no proper identification systems. During those days they use magnetic compass and other natural identification system. Because of the inadequate knowledge of the fisherman, they face serious consequences while crossing the border. These are the problems that are faced in the present system. By overcoming this it is possible to introduce new ideas for identifying the border. The best area for fishing. On an account to it is able to give warning from the base station that some natural calamities is about to happen. cost and it will be more advantage to the fisherman. Even after these services provided to fishermen, there are some future enhancements is given here. It is able to intimate the fishermen about the boundary before some kilometers of distance by feeding the latitude and longitude values of places before the boundary into the PIC and an automatic engine disable system can be implemented if the fishermen are going to reach the boundary or the speed of the boat can be gradually controlled depends on their further navigation to boundary.

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