Journal of Computer Applications ISSN: 0974 – 1925,
Volume-5, Issue EICA2012-3, February 10, 2012

Protecting of Fishermen on Indian Maritime Boundaries

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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 mechanised 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.

Keyword: *Automatic Identification System , International Maritime Boundary Line, Global Positioning System.*

I. INTRODUCTION

The project induces the new methodology for saving the fishermen's valuable life and their properties from the srilanka navy. This system makes use of arduino which is open source embedded kit available for much major purposes. Arduino is an open-source single-board microcontroller, descendant of the open-source Wiring platform, designed to make the process of using electronics in multidisciplinary projects more accessible. The hardware consists of a simple open hardware design for the Arduino board with an Atmel AVR processor and on-board input/output support. The software consists of a standard programming language compiler and the boot that runs on the board. The GPS72h is the equipment used normally by all the fishermen in the navigation in sea for the purpose of identification. It is a Satellite Navigation based Equipment also GPS 72H acquires satellite signals quickly and tracks your location in challenging conditions, such as heavy tree cover or deep canyons. The GPS 72 H floats in water and its IPX7 waterproof to withstand the accidental dunk or splash in the lake. Whether on water or land, the GPS 72H can save up to 500 of your favourite places in memory and point you to your destination (no street or terrain maps). The GPS 72H is NMEA 0183 compatible. To transfer data to your device, GPS 72H easily connects to your computer via USB. If you're into boating, hunting or fishing, you can use the 72H's built-in celestial data, which includes sunrise/sunset times and

a hunting and fishing calendar. The important system is RADAR detector used in our proposal. Radar detectors use a super heterodyne receiver to detect these electromagnetic emissions from the radar gun, and raise an alarm to notify the motorist when a transmission is detected. False alarms can occur however due to the large number of devices, such as automatic door openers (such as the ones at supermarkets), that operate in the same part of the electromagnetic spectrum as radar guns.

Objective: Protect the Tamilnadu fishermen from crossing the Indian-Srilanka maritime boundaries and thus save their life, economic status of fishermen.

II. EXISTING SYSTEM

At present, there are few existing systems which help to identify the current position of the boats/ships using GPS/RADAR Navigation system and view them in an electronic map. This provides the fastest and most accurate method for mariners to navigate, measure speed, and determines location. This enables increased levels of safety and efficiency for mariners worldwide and accurate position, speed and heading are needed to ensure the vessel reach its destination safely. 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 boats. In this case there may be manual error to find the boats crossing our boundaries. 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 and warn the boats.

Another system is GPS72H by the GARMIN which is mostly used by the fishermen is battery based power supply it stands for 18 hours but the fishermen may be unfortunately missing their backup batteries will lead to danger . Also another problem is this GPS72H also to be manually watched to identify whether they crossed the boundary.
There is no indication for the fishermen whether they are traced by the foreign navy.

According to the project of Mr.Naveen from St.Joseph College of engineering Chennai .A equipment which can stops the fuel connection to the engine of the fishermen vessel when they tend to cross the boundary. They will give a chance to restart the engine with reverse motion if not they fuel supply is permanently disconnected. This system leads to make the vessels to trap on nearer to boundaries and which may turn too caught by the foreign navy. Also this system can be applicable only to the inboard engine and not for the outboard engine based vessels.

III. PROPOSED SYSTEM

The proposed work consists of three major modules in order avoid all the shortcomings of the existing system. The modules are Vessel tracking module, RADAR identification module, up gradation in GPS72H.

The first module Vessel tracking has the theme of tracking the vessels by using the RADAR Navigation used in the Indian coastal vessels. In the existing system of RADAR Navigation the Indian costal vessels using the Rajendra Prasad Radar which is a passive Phased Array Radar developed by the Indian DRDO. It is multifunction radar, capable of surveillance, tracking and engaging low radar cross section targets. It is the heart of the Akash Surface-to-air missile system and is the primary fire control sensor for an Akash battery. This navigation shows the status of the vessels in an electronic map. The electronic map should be properly and periodically watched by men who could be creating a manual error to miss their concentration towards the vessels tracked. In order to avoid this we are going to made an system which would send the data of electronic map i.e. the position of each vessels which is saved in the RADAR system to the a normal pc which run the our vb program in infinite times . Each time the program receives the value checks with the constant boundary values of the Indian maritime boundary (The values are expressed instead of the latitude and longitude position of the particular point). 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 person's vessels who trying to malpractice. Another advantage added with this system is if the navy coast has not respond for the certain fixed time a message in the form of text contain the details of the position of the vessels which going to cross the boundary is pushed to cell phone of higher officials. This will grab the attention of the higher officials to the fishermen when they are in danger even though the respected navy coast been not responded. These vessels tracking system is the complete updating of new system (Pc based warning) with existing RADAR Navigation in the coastal vessels.

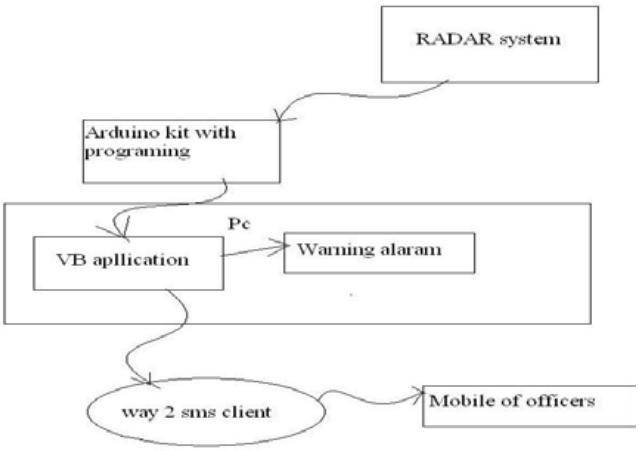

Figure1:Vessels Tracking Module

The second important system is RADAR identification module. In this equipment called as RADAR Detector is used. Radar detectors use a super heterodyne receiver to detect these electromagnetic emissions from the radar gun, and raise an alarm to notify the motorist when a transmission is detected. False alarms can occur however due to the large number of devices, such as automatic door openers (such as the ones at supermarkets), that operate in the same part of the electromagnetic spectrum as radar guns. Using this principle the same

receiver is going to mount in the boats of Indian fishermen. The output i.e. the indication of the RADAR will gives the alarm which may understood as that they are traced by the foreign navy so the fishermen can easily navigate from that place before they caught by the foreign navy. In normally the fishermen are visually indentifying the foreign navy which may not give a time to escape themselves from the foreign navy. But this RADAR detector is very help full for the fishermen to protect themselves.

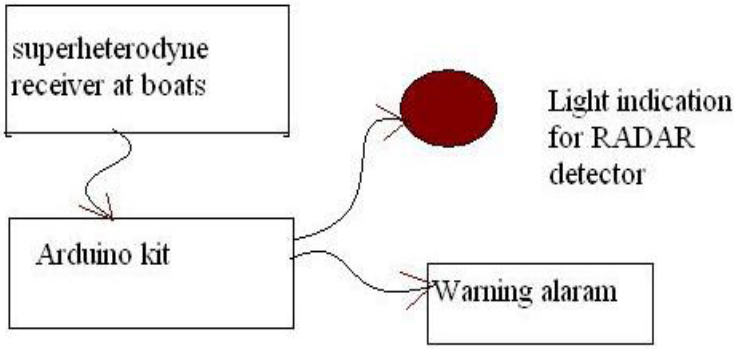

Figure 2: Radar Detection System

The third module is the Updating GPS72H. The Garmin GPS 72H is a handheld, waterproof GPS receiver that floats. It measures 2.7 x 6.2 x 1.2 inches and has a 1.6 x 2.2 inch high contrast display with a resolution of 120 x 160 pixels. The display is capable of displaying 4 levels of gray for improved readability. The unit operates up to 18 hours on 2 AA batteries, and weighs only 7.7ounces with batteries. The unit is waterproof to IPX7 standards and will float if dropped in water. It includes serial and USB interfaces for PC connection, can save up to 500 waypoints, 50 routes and a 2,048 point track log with up to 10 tracks. The unit has a 9-button user interface that is suitable for one-handed operation however the GPS 72H has no street or terrain map capability. As we know that the GPS72H is the battery based power supply. To avoid the disadvantage of GPS72h which mentioned earlier a solar panel based charger is to be upgraded with the equipment in order to make the equipment not to lose their power and another major updating is the GPS72H receiver equipment is to be embedded with the Arduino kit for the process of automatic warning system. The Automatic warning system includes the saved waypoints values of the display in GPS72H are checked with the constant maritime boundary values (The values are expressed instead of the latitude and longitude position of the particular point). If the results of the comparison shows the boats/vessels is beyond the Danger area (area which is 0.5 km nearer to maritime boundary) the alarm attached to the arduino kit will supplied with the 5V and make it to blow until the fishermen stops that. This makes the illiterate fishermen to understand that they are at the danger area which makes them to fishing at the safer zone.

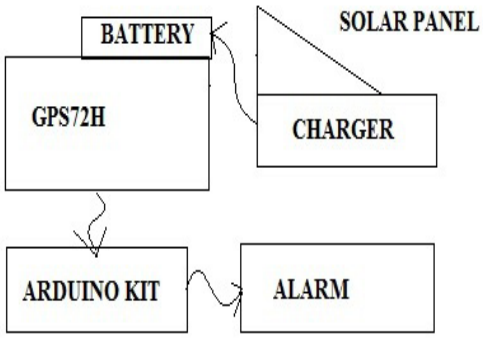

Figure 3: Updating GPS72H

These three modules are comprised of many programming parts. The vb code and arduino kit code for the vessel tracking module.

ARDUNIO CODING

```
SoftwareSerial port
  mySerial.begin(4800);
  mySerial.println("Hello, world?")
}
int l;
void loop()
{
  l=analogRead(3);

  if (mySerial.available())
    Serial.write(mySerial.read());
  if (Serial.available())
    mySerial.write(Serial.read());
```

Figure 4: Arduino Programming

The shown programming is uploaded in to the Arduino kit in order to read the analog value from the RADAR Navigation system and write those values into the serial port of the pc which is further used for the condition checking in vessel tracking module.

VB CODE FOR SERIAL READING

```
Public Static Sub ShowData(TextShow As Control, Data As
   Const SpeedBaud = 16000
   Dim LngSize As Long, X
LngSize = Len(TextShow.Text)
   If TermSize > SpeedBaud Then
     TextShow.Text = Mid$(TextShow.Text, 4097)
     LngSize = Len(TextShow.Text)
   End If
   TextShow.SelStart = SpeedBaud
   Do
    X = InStr(Data, Chr$(8))
    If X Then
      If X = 1 Then
        TextShow.SelStart = SpeedBaud - 1
        TextShow.SelLength = 1
                  Data = Mid$(Data, X + 1)
      Else
        Data = Left$(Data, X - 2) & Mid$(Data, X + 1)
      End If
    End If
   Loop While X
    Do
      X = InStr(Data, Chr$(10))
      If X Then
        Data = Left$(Data, X - 1) & Mid$(Data, X + 1)
      End If
    Loop While X
    X = 1
    Do
     X = InStr(X, Data, Chr$(13))
     If X Then
       Data = Left$(Data, X) & Chr$(10) &
Mid$(Data, X + 1)
       X = X + 1
     End If
    Loop While X
    TextShow.SelText = Data
    TextShow.SelStart = Len(TextShow.Text)
End Sub
```

Figure 5: vb Code for Read Value from Serial Port

In case of RADAR identification module these code is slightly changed i.e. the serial port written is nullified instead of that the pin is supplied with high voltage which is connected to the alarm. The following codes are the codes for reading the written value by Arduino kit at the serial port. After this reading value at the vessel tracking module the values read is compared with the constant boundary values.

VB CODE FOR COMPARSION

```
If (a > 12 And b > 12) Then
WindowsMediaPlayer1.URL =
"E:\ALARAM.mp3"
WindowsMediaPlayer1.Controls.play
ym = MsgBox("Click OK to Proceed",
vbOKCancel, "Startup Menu")
If (ym = 1) Then
WindowsMediaPlayer1.Controls.stop
End If
End If
```

Figure 6: Alarm Code at pc

In the RADAR Detector module the same Arduino kit coding mentioned in Fig.4 is used to read the values from superhetrodyne receiver. Also in the Updating GPS72H module contain this same code for reading values from that equipment and both the module contain the checking the values with constant value then supplying 5v to the pin connected to the alarm. The constant values referred in the all the modules can be changed according to the maritime boundary values.

Boundary Locations

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

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 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

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

The boundary between India and Sri Lanka in the waters from Adam's Bridge to Palk Strait shall be arcs of Great Circles between the following positions, in the sequence given below, defined by latitude and longitude.

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'
6 09° 06' 79° 32'

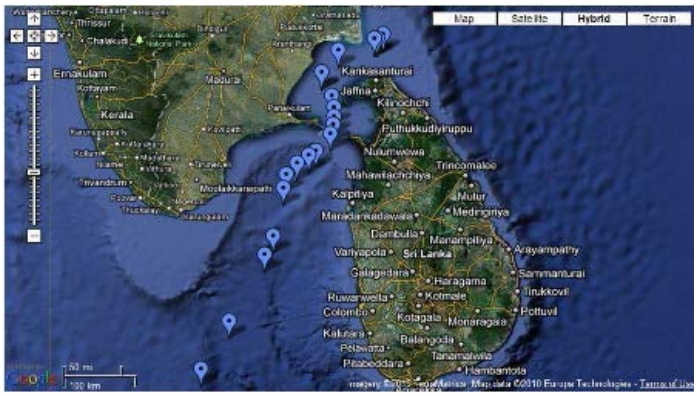

Figure7:Indian Srinlanka maritime boundaries

IV. CONCLUSION

According to out concepts the every fisherman can be traced automatically by Indian costal guards and also they can be safer and they can protect themselves from the foreign navy which leads to a pleasurable life for them.

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