

INTELLIGENT NAVIGATION SYSTEM FOR FISHING BOATS USING GPS

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Abstract - Surveillance is a critical problem for border control or the security of commercial facilities. The sea border between the countries is not easily identifiable, which is the main reason for this cross border cruelty for fishermen. The moto behind this work is to provide a user friendly and well understandable environment to avoid accident and to alert the fishermen about the border areas. Here a system will be designed using microcontroller unit which protects the fishermen by notifying the country border to them by using Global Positioning System (GPS) and Global System for Mobile communication (GSM). GPS receiver is used to find the current location of the fishing boat or vessel. Using GPS, the current latitude and longitude values can be found and is sent to the microcontroller unit. Then the controller unit finds the current location by comparing the present latitude and longitudinal values with the predefined value. Then from the result of the comparison, this system alerts the fishermen that they are about to reach the nautical border.

Key Words: Global Positioning System, Global System for mobile communication, PIC Microcontroller, DC Gear Motor, Alarm.

1. INTRODUCTION

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 arrests the particular fishermen. This leads to the loss of human life. Frequent incidents of fishermen from Tamil Nadu getting shot in the Sri Lankan's maritime boundary have enraged all citizen of the state. From Tamil Nadu about 18,000 boats of different kinds conduct fishing along the India-Sri Lanka maritime border. From the fishermen's point of view, straying takes

place inadvertently, due to sheer ignorance about maritime boundaries. At that time, the drift is because of engine failure or strong currents. At the same time however, -quite a few Indian fishermen engage in free floating to exploit marine resources in Sri Lankan waters, knowing full well, the risks involved in crossing the IMBL.

A system is proposed to save the life of the fishermen by making an alarm system and a motor controlled device, which is to be mounted in the boat/ship. If fishermen navigate near country's border, an alarm is generated indicating that the boat/ship is near the border of our country. With the help of GPS, they would find the location of the boat/ship and the Indian Navy could rescue the fishermen.

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.

2. METHODOLOGY

GPS receiver is used to find the current location of the fishing boat or vessel. Using GPS, the current latitude and longitude values can be found and is sent to the microcontroller unit. Then the controller unit finds the current location by comparing the present latitude and longitudinal values with the predefined value. Then from the result of the comparison, this system alerts the fishermen that they are about to reach the nautical border. The area is divided into four zones-normal zone, warning zone, zone near to restricted zone and finally the restricted zone. If the boat is in normal area, then the LCD displays normal zone. Thus they can make it clear that the boat is in normal area. In case it moves further and reaches the warning zone, the LCD displays warning zone. If the fishermen ignore 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 fishermen 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 speed will be decreased partially and the motor will takes a reverse action.

3. BLOCK DIAGRAM

The Global Positioning System (GPS) is a satellite based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides the user with information.

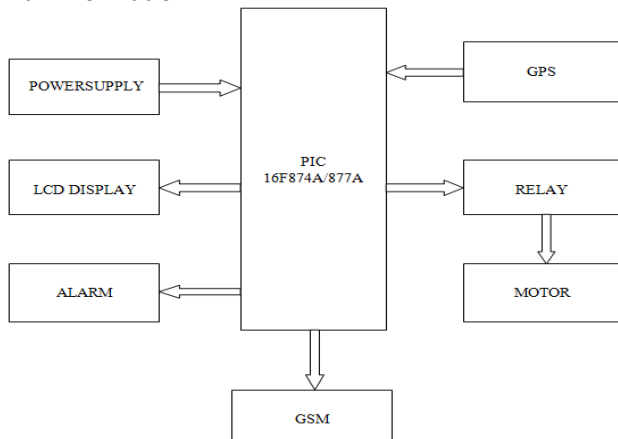


Fig-1: Block diagram of the proposed system

3.1 Transmitter Side

The GPS receives the geographical latitudinal and longitudinal values of the boat/ship from the satellite through antenna. The border latitudinal and longitudinal values are already fed to the microcontroller. The microcontroller receives the GPS value and compares that value with the preset value. If the value matches beyond 1 Km then the microcontroller actuates the alarm signal and also displays a warning message in the LCD display. If the GPS value exceeds the preset value then the GSM is actuated by the microcontroller. Then the GSM will send a message to the coastal guards in the Navy.

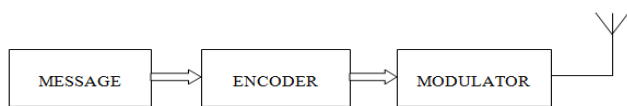


Fig-2: Transmitter side

3.2 Receiver Side

Antenna is connected with GSM modem which is interfaced with the personal computer using RS232 communication. If boat/ship cross the border an emergency message will send automatically to the coastal guards to rescue the fishermen. The message will send to the coastal guards by GSM with the help of antenna, where they have the boundary values which are already fed into the personal computer. The personal computer will

compare the boundary values by message from the boat/ship by the use of VB coding. From this comparison they can identify the current position of the boat/ship.

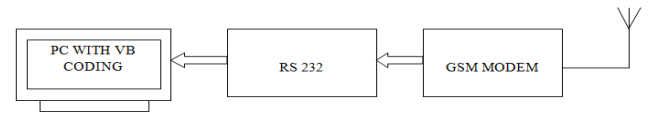


Fig-3: Receiver Side

3.3 PIC Microcontroller

PIC16F877A Microcontroller-most advanced microcontroller. PIC16F877A is a modified and advanced version of Microchip. This controller is widely used for vast applications in the field of Electronics, Embedded, Virtual and all integrated type Systems. It is unique because of its ease of availability, embedding mode, precise measurement and so on. The PIC 16F877A have the capability of easy programming than any other Microcontrollers. The high performance of the PIC micro devices can be attributed to a number of architectural features commonly found in RISC (Reduced Instruction Set Computer) microprocessors.

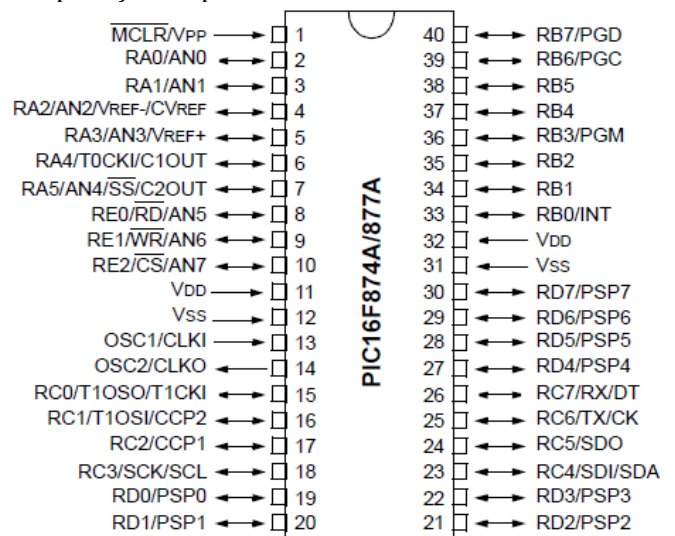


Fig-3: Pin diagram of PIC 16F874A/877A

3.4 Global Positioning System

The use of GPS may appear at first complicated, but the principle is quite simple. GPS stands for Global Positioning System-a shorter term for NAVSTAR GPS(Navigation Satellite Timing and Ranging)-a system for locating ourselves on earth. It is a satellite-based system created and controlled by the US Department of Defense, initially for military purposes but extended later for civilian usage. It consists of a constellation of 24 satellites (4 satellites in 6 orbital planes) orbiting at an approximate altitude of 20200km every 12 hours. Each satellite broadcasts two carrier waves in L-Band (used for radio) that travel to earth at the speed of light. The L1 channel produces a

Carrier Phase signal at 575.42 MHz as well as a C/A and P code. The L2 channel produces a Carrier Phase signal of 1227.6 MHz, but only P Code.

3.5 GSM

Bonrix SMS Server 4 GSM Modem is robust and easy-to-use software that will enable your desktop or web based applications for 2-way SMS. It can be used with any GSM modem or mobile phone handset connected to the PC serial port using a data cable or Infrared device etc.

Bonrix SMS Server 4 GSM Modem is only compatible with devices which are compatible to "Hayes AT Commands". So, ETSI 07.05 compliant GSM modem or mobile phone handsets are recommended. This software doesn't require Internet Access to send sms.

3.6 LCD Display

Liquid Crystal Displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal. The LCD's are lightweight with only a few millimeters thickness. Since the LCD's consume less power, they are compatible with low power electronic circuits, and can be powered for long durations. The LCD's do not generate light and so light is needed to read the display. By using backlighting, reading is possible in the dark. The LCD's have long life and a wide operating temperature range. Changing the display size or the layout size is relatively simple which makes the LCD's more customer friendly.

3.7 Power Supply

- Brief description of operation: Gives out well regulated +5V output, output current capability of 100mA
- Circuit protection :Built-in overheating protection shuts down output when regulator IC gets too hot
- Circuit performance: Very stable +5V output voltage, reliable operation
- Availability of components: Easy to get ,uses only very common basic components
- Power supply voltage: Unregulated DC 8-18V power supply
- Power supply current: Needed output current +5 mA

3.8 Alarm

Initially this device was based on an electromechanical system which was identical to an electric bell without the

metal gong (which makes the ringing noise). Often these units were anchored to a wall or ceiling and used the ceiling or wall as a sounding board. Another implementation with some AC-connected devices was to implement a circuit to make the AC current into a noise loud enough to drive a loudspeaker and hook this circuit up to a cheap 8-ohm speaker. Nowadays, it is more popular to use a ceramic-based piezoelectric sounder like a Sonalert which makes a ceramic-based piezoelectric sounder like a Sonalert which makes a high-pitched tone. Usually these were hooked up to "driver" circuits which varied the pitch of the sound or pulsed the sound on and off.

3.9 Motor

An electric motor is an electromechanical device that converts electrical energy to mechanical energy.

- An electric current in a magnetic field will experience a force.
- If the current carrying wire is bent into a loop, then the two sides of the loop, which are at right angle to the magnetic field, will experience forces in opposite directions.
- Practical motors have several loops on an armature to provide a more uniform torque and the magnetic field is produced by electromagnet arrangement called the field coils.
- Hence the motor speed will be decreased partially and the boat will take a reverse action.

4. CONCLUSIONS

It is a useful device for safer navigation, especially for fishermen. Since Sri Lanka and India have got lots of problems regarding the maritime boundary of the country, this device is made to identify the maritime boundary and to provide assistance if needed. If the fisherman are about to cross the border alarm will be generated continuously in the boat/ship. GSM will send an emergency message to the navy control room. With the help of the continuous information from the GPS the fisherman can find the location of the boat/ship. So the fisherman can prevent themselves from the neighborhood militants.

The GPS will be interfaced to a device with micro controller unit. When the boat is at 1000 meters from the border the alarm will indicate and when the boat is at 500 meters from the border the motor will take a reverse action. This idea is proposed to save the life of the fishermen whose life is unsecured in sea. By using this system, the disputes with neighboring countries could be reduced and hence peace can be preserved. Efficiency can be improved by implementing more accurate GPS systems. This application can be integrated with mobile phones.

This helps in extending its scope not only to maritime boundary identification, but also to other ideas.

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