Asian Journal of Applied Science and Technology (AJAST)
Volume 1, Issue 4, Pages 43-47, May 2017

Fishermen Alert System for Border Crossing

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Article Received: 11 April 2017 *Article Accepted: 14 May 2017* *Article Published: 17 May 2017*

ABSTRACT

The application can be widely used by people in the border to find the appropriate path to reach the destination. In this mechanism, we have implemented embedded system to save the fishermen life and to avoid the problems between two countries hence make good relationship between them. The fishermen crosses the sub border then the warning signal is given to both the countries and alarm is indicated to fisher men. The boat will automatically stop and OTP is given to the opposite country, when fishermen arrives the national border. The reputed person contains the OTP, if matched to fishermen id, they can proceed to sail the boat or may take any action for crossing border. ATMEGA 164 microcontroller is used in this process. RFID system plays a major role with 125 kHz. Here the fisher man life is safe and can know the status of both the countries. The application operates based on device tracking mechanism. This provides ease to operate even for illiterate people.

Keywords: RFID Reader, RFID Tag, GPS, GSM, RF transmitter and Receiver.

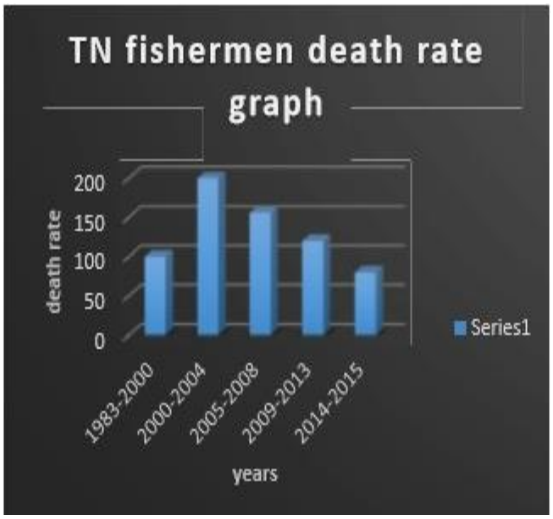
1. INTRODUCTION

The Indian Coastguard was formally inaugurated on 18 August 1978. It is set as an independent armed force of the Indian Union, through an act of parliament. It is the fourth armed force under the Ministry of Defense- the first three being the Army, the Navy and the Air Force. It has a specific character for nonmilitary security but addresses to National Defense. It normally deals with marine safety, maritime security, lifesaving, law enforcement, maritime environmental security and fisheries. These call for monitoring, control, surveillance and response. The Coastguard has multiple responsibilities and strengthening the safety of fisher. The Indian coastguard cannot assist fishers exclusively but concern for fishers is central to its aims. The strategic role of the Coastguard is to protect the maritime zones from illegal activities including infiltration through maritime routes and environmental damage and provide humanitarian and scientific assistance within the maritime domain.

The Indian Coastguard too has its exclusive duties and functions as spelled out in the Coastguard Act 1978 include:

1) Safety and protection of islands and offshore structure.
2) Protection and preservation of maritime environment.
3) Prevention and control of pollution in maritime zone.
4) Assistance to the customs in anti-smuggling operations.
5) Assistance to fisherman in distress at sea.
6) Safeguarding life and property at sea.
7) Preventing poaching in Indian water.
8) Assisting in ocean research.
9) Enforcing maritime law.

Even though we have this much of coastguard security, all things happening opposite to our thinking. Indian Coastguard has openly admitted its failure in failure in preventing. Mumbai attack even after getting a warning from intelligence sources prior to the attack. This clearly shows that our sea defense is weaker than we believe. The foreign trawler easily overcoming our coastguard security force. Every day we hearing news about fishermen killed or imprisoned when they cross the national sea border inadvertently. The most outstanding problem is being going on for trans-border fishing i.e., on the Indo-Srilankan border. Here two distinct issues are arising. Historically there is no border problem which is being raised and fixed in 1974 and having no conflicts till civil war in 1983. After this both country authorities restricted due to security concern. After that restriction also, smaller scale fisherman undergo for fishing and get attacked. In India, they have always been at loggerheads with the trawls fleet.



2. LITERATURE SURVEY

Literature survey earlier to begin a research project is essential in understanding fishermen border alert system, as this will supply the researcher with much needed additional

information on the methodologies and technologies available and used by other research complement around the world. This chapter provides a compressed summary of literature reviews on key topics which related to fishermen border alert systems. The comparison between the present project and the related topics of the existing information will also be discussed.

2.1. ALERT SYSTEM FOR FISHERMEN BORDER CROSSING USING ANDROID

The application can be widely used by people in the border to find the appropriate path to reach the destination. The notification will be sent to the border security forces which act as the server to all other devices that are operated by people in ships. The application will notify the information of where the devices are being located and intimate them about the issues that occur due to opponent forces in ships to server. This is processed mainly for Tamil fishermen's who are involved in fishing. The application uses the Global Positioning System (GPS) to provide the latitude and longitude information and its being used for tracking devices. The system entirely uses the device based tracking which avoids failure in the system due to network problems. The tracking here totally depends on the device and not on the signal/network that is currently used.

2.2. LOCATION BASED SERVICES USING ANDROID

Initially mobile phones were developed only for voice communication but now days the scenario has changed, voice communication is just one aspect of a mobile phone. There are other aspects which are major focus of interest. Two such major factors are web browser and GPS services. Both of these functionalities are already implemented but are only in the hands of manufacturers not in the hands of users because of proprietary issues, the system does not allow the user to access the mobile hardware directly. But now, after the release of android based open source mobile phone a user can access the hardware directly and design customized native applications to develop Web and GPS enabled services and can program the other hardware components like camera etc. In this paper we will discuss the facilities available in android platform for implementing LBS services (geo- services).

2.3.REMOTE MONITORING OF VEHICLE DIAGNOSTICS AND LOCATION USING A SMART BOX WITH GLOBAL POSITIONING SYSTEM AND GENERAL PACKET RADIO SERVICE

A distributed system that offers remote monitoring of on-road vehicle location and diagnostics using an OBSB with GPS/GPRS is described. This system which can be pre-programmed with the permitted speed limits, offers a highly reliable and accurate supervision from inside the vehicle. This may effectively minimize the over-speed violations which are categorized as one of the major causes of accidents in many countries. Furthermore, the system also transmits the real-time position and other critical parameters of the vehicle to the remote server. The transmitted parameters which are saved on the server memory for a configurable period of time, can serve many purposes such as the vehicle path tracking of stolen cars, automatic accident notification, accident investigations and remote diagnostics of engine functions. A workable system prototype has been developed and its performance is assessed experimentally. The on-road experiments demonstrate robustness and high efficiency of the proposed system.

3. DESIGN OVERVIEW

A block diagram is the total blue print of the proposed project. The total essence and functioning of the project is represented in a single block diagram. It depicts the pictorial representation of working function of a project. Block diagram is something which gives the overview of a project. The block diagram consists of the following components:

- Microcontroller-AT MEGA 164
- RF transmitter and receiver
- RFID Reader
- GSM Module
- GPS Module
- LCD
- Motor Driver

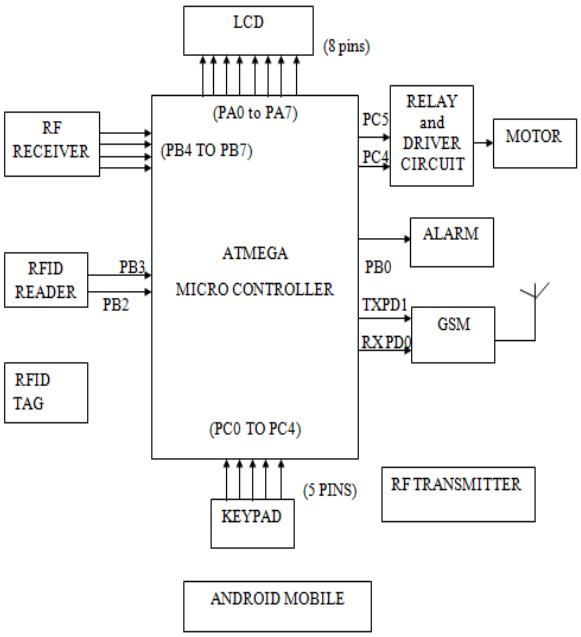


Fig.1. Block Diagram

Microcontroller

The ATmega164 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega164 achieves throughputs approaching 1 MIPS per MHz allowing the system designed to optimize power consumption versus processing speed. The device is manufactured using Atmel's high density nonvolatile memory technology.

GSM

GSM is the acronym for Global System for Mobile Communications, originally Group Special Mobile, is a standard which was developed by the European Telecommunications Standards Institute (ETSI).Which describes a protocols for second-generation (2G) digital

cellular networks was used by mobile phones. GSM supports voice calls and data transfer. The GSM speeds of up to 9.6 kbps, and also with the transmission of SMS (Short Message Service).GSM uses a time division multiple access (TDMA).It is the most widely used of the three digital wireless telephony technologies which is TDMA, GSM, and CDMA.

Fig.2. GSM Module

RFID

RFID stands for Radio Frequency Identification. The RFID device serves as same as a bar code or a magnetic strip on the back of a credit card or ATM card; it provides a unique identification to the object. The bar code or magnetic strip must be scanned to get the information; the RFID device must be scanned to retrieve the identifying information. An RFID reader's function is to check the RFID tags. The means of checking is done through wireless and because the distance is relatively short; line of sight between the reader and tags is not necessary. A reader contains an RF module, which acts as both a transmitter and receiver of RF signals.

Fig.3. RFID Reader

LCD

A 16x2 LCD means it can display 16 characters and there are 2 lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data registers. The command register stores the instructions given to the LCD. A command is predefined instruction to perform task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed. The data is the ASCII code of the character to be displayed.

DC Motor

DC shunt motors can be used where constant speed is required and very high starting torque is not required such as lathe, machine tools, centrifugal pump and etc. Series motors are used when very high starting torque is required as electric traction, trolley car, crane, etc. cumulative compound motors are used for applications where the load fluctuates such as rolling mills, printing press, reciprocating type compressors, crusher units, etc.

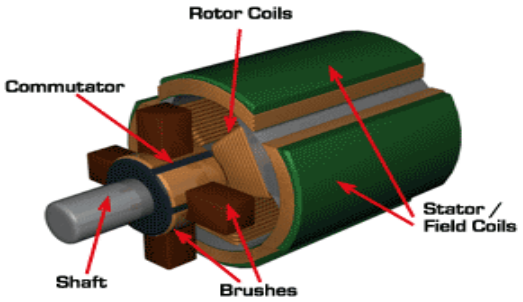


Fig.4. DC Motor

RF Receiver

The fundamental component of a radio frequency transmitter is its frequency oscillator. An oscillator modulated with an information signal then carried out to an antenna where it can be broadcast to a radio receiver. The receiver then accepts the radio signal and demodulates the signal using its own oscillator, and the original signal is obtained. Due to the variability in location of the receiver, an amplifier is used to boost the demodulated signal to a useable level. The frequency ranges used are from 3Hz – 300Ghz .The whole radio spectrum is partitioned to several different ranges in order to decrease traffic and noise. Interference will occur when multiple devices are trying to use the same frequency. Information such as audio and television pictures are modulated differently depending on the application. AM radios are broadcasted at 30Hz-300kHz, while wireless networks and door openers operate at 3Hz-30Ghz.

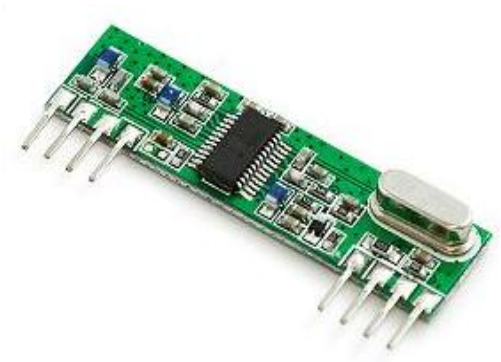


Fig.5. RF Receiver

RELAY

Relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains

circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

4. PROJECT OUTCOME

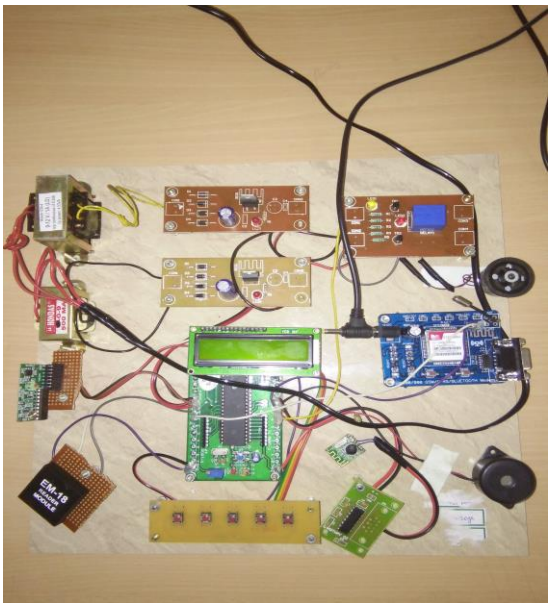


Fig.6. Fishermen border alert system

Radio transmitters and receivers are at the heart of wireless communication. Radio transmitters and receivers have a variety of applications and continue to be a lead research field for wireless communication. The RF receiver is used to receive the encoded data which is transmitted by the RF transmitter. An RF receiver module receives the modulated RF signal, and demodulates it. There are two types of RF receiver modules: super heterodyne receivers and super-regenerative receivers. Super-regenerative modules are usually low cost and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and power supply voltage. Super heterodyne receivers have a performance advantage over super-regenerative; they offer increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in turn leads to a comparatively more expensive product.

Then the received data is given to transistor which acts as amplifier. Then the amplified signal is given to carrier demodulator section in which transistor Q1 is turn on and turn off conducting depends on the signal. Due to this the capacitor

C1 is charged and discharged so carrier signal is removed and saw tooth signal is appears across the capacitor. Then this saw tooth signal is given to comparator. The comparator circuit is constructed by LM558. The comparator is used to convert the saw tooth signal to exact square pulse. Then the encoded signal is given to decoder in order to get the decoded original signal. The output data signal is given to microcontroller or any other interfacing device. Cell phones with GPS receivers communicate with units from among the 30 global positioning satellites in the GPS system. The built-in receiver trilaterates your position using data from at least three GPS satellites and the receiver. GPS can determine your location by performing a calculation based on the intersection point of overlapping spheres determined by the satellites and your phone's GPS receiver. Trilateration uses the distance between the satellites and the receiver to create overlapping "spheres" that intersect in a circle. The application works as an automatic incident management application that intimates the user if sub border crossing occurs. Alarm is a signaling device. It most commonly consists of a number of switches or sensors connected to a control unit that determines if button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound. The sailor crosses the sub border the alarm is used for identification of fisher man and alert message is given to both countries. The device was based on an electromechanical system which was identical to an electric bell without the metal gong.

When Fishermen Proceeds further and reaches the national border, motor will automatically stops. A DC motor is an electric machine which converts electrical energy into mechanical energy. DC motor works on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force. DC shunt motors can be used where constant speed is required and very high starting torque is not required.

RFID Reader Module, are also called as interrogators. They convert radio waves returned from the RFID tag into a form that can be passed on to Controllers, which can make use of it. RFID tags and readers have to be tuned to the same frequency in order to communicate. RFID systems use many different frequencies, but the most common and widely used & supported by our Reader is 125 KHz. An RFID system consists of two separate components: a tag and a reader. Tags are analogous to barcode labels, and come in different shapes and sizes. The tag contains an antenna connected to a small microchip containing up to two kilobytes of data. The reader, or scanner, functions similarly to a barcode scanner; however, while a barcode scanner uses a laser beam to scan the barcode, an RFID scanner uses electromagnetic waves.

To transmit these waves, the scanner uses an antenna that transmits a signal, communicating with the tags antenna. The tags antenna receives data from the scanner and transmits its particular chip information to the scanner. GSM uses a time division multiple access (TDMA). It is the most widely used of the three digital wireless telephony technologies which is TDMA, GSM, and CDMA. GSM digitizes and compresses the data, and then it sends down a channel with two other streams of user data, each in its own time slot.

GSM operates at 900 MHz or 1800 MHz frequency band. Many GSM network operators have operates with roaming agreements with the foreign network operators, often users can also continue to use their mobile phones when they travel to other countries. SIM cards (Subscriber Identity Module)

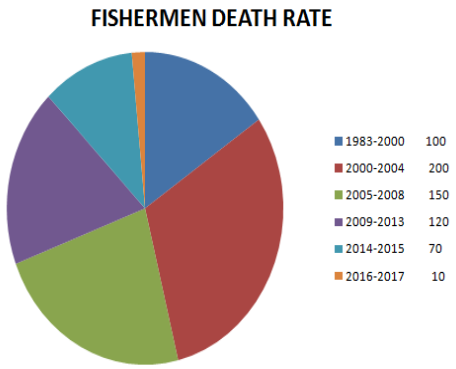
containing home network access configurations, it may be switched to those will meter local access, significantly reducing roaming costs while experiencing no reductions in service. SIM 300 is a plug and play GSM Modem with a simple to interface with serial interface. It is used to send SMS, make and receive calls, and do other GSM operations by controlling it through simple AT commands from Atmega164 micro controllers. It uses the popular SIM300 module for its operations. It comes with a standard RS232 interface which can be used to easily interface the GSM modem to micro controller .The modem consists of all the required external circuitry which is required to start Experimenting with the SIM 300 module like the power regulation, external antenna, SIM holder etc.

By using GSM, One Time Password is send to patrol's mobile. If fishermen ID is original, OTP will be generated. Hence motor starts. Thus this system saves the life of many Fishermen suffering due to border issues. Death rate will be decreased and fishermen lifetime can be increased.

5. CONCLUSION

We had introduced the fishermen border alert system controlled by ATMEGA microcontroller i.e. ATMEGA164. It is a 40 pin IC which having the property of burning a program while running another program. It is reliable, flexible and of low cost. The alert system which we have developed will provide an effective solution for fishermen's problem and prevent them from crossing other country border. The application can save the lives of many fishermen. The application works as an automatic incident management application that intimates the user if border crossing occurs. If the sailor crosses the border the alarm is used for identification of fisher man and alert message is given to both countries. When fishermen reach the sub-border, boat will automatically stop and OTP is given to the opposite countries. The reputed person checks the OTP with fisher id then proceeds to sail the boat or may take any action for crossing border. Our project mainly focuses on to maintain smooth relationship between two countries. In future this idea can be enhanced by using smart watches and satellite phones.

6. PERFORMANCE ANALYSIS



7. FUTURE SCOPE

Designed a system to give complete result for fishermen and sea border related problems such as reaching other country border without knowing the destination, lack of indication about border. It is proposed as a low cost optimized technique using RFID and GSM mobile technology. At the national border, there will be RFID checking which reduces the threat of terrorism.

At the same time, it will generate:

1. Automatic alarming system.
2. One Time Password.
3. Embedded System can design for easy to secure fishermen life using valid RFID.
4. GPS gives accurate latitude and longitude.

This can be further enhanced without using Android.

ACKNOWLEDGMENT

First and foremost we thank our guide Asst. prof C.Viji for constant encouragement and noble guidance. With great pleasure we extend our deep sense of appreciation to Dr.Sabrigiriraj, Head of ECE Department for giving us an opportunity to get done our paper and to increase our knowledge. Lastly we wish each and every person involved in making our thesis successful.

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