International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 02 | Feb-2018 www.irjet.net p-ISSN: 2395-0072

SMART TRACKING AND NAUTICAL BORDER ALERT SYSTEM

Aarthy Radhakrishnan[1], A. Honeyta Gandhi[2], G.S. Nandhini[3], S. Sowmiya[4]

[1] Assistant Professor, Dept. of Electronics and communication Engineering, Jeppiaar SRR Engineering college, Tamil Nadu, India

[2,3,4]UG Student, Dept. of Electronics and communication Engineering, Jeppiaar SRR Engineering college, Tamil Nadu, India

---

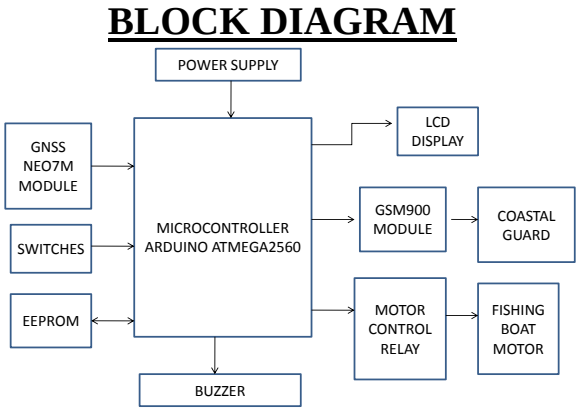
Abstract - *The main concern of the project is to track the nautical vehicle or vessel while crossing the country border. One of problems faced by the Indian fisherman is the capture by neighboring country. The main reason is that lack of knowledge of their position across the sea. In this system, we implement GNSS and GSM technology. The GNSS technology is to navigate or to track the accurate current location of the boat.GPS(Global Positioning System) is one of the component of GNSS(Global Navigation Satellite System).GSM(Global System for Mobile Communication) used for mobile communication and for alerts. Using GNSS, latitude, longitude directions are sent to microcontroller unit. Later the controller unit identifies the current location by comparing the present latitude and longitudinal directions with the pre-defined values. After the comparison, this system aware the fisherman that they are about to reach the nautical border. Even if they dint stop the boat, we use a motor driver to stop the boat, so that boat will be automatically stopped. This system is mainly designed to meet the difficulties of the coastal people.*

***Key Words*: GNSS (Neo-7M),GSM900, ARDUINO mega, Motor driver, Piezoelectric buzzer, LCD display**

1. INTRODUCTION

From Tamil Nadu about 18,000 boats of different kinds conduct fishing along the India-Sri Lanka maritime border. The people livelihood in coastal areas purely depends on fishing occupation in the sea. Crossing the border is being treated as a serious offence. Due to unawareness about the boundary limit, the fisherman used to cross the maritime borders. Once they cross the border, they arrested or killed by the relevant navy and they are being abducted and their boats are being captured by the neighborhood countries coastal guards. Under such situation the lives of fishermen continues to be in danger. And it has become one of the major factors for loss in humans as well as their country economic. To eliminate such difficulties a system has been developed which helps the fishermen to be aware of crossing the border line. we introduce system called advanced SMART TRACKING AND NAUTICAL BORDER ALERT SYSTEM using GNSS(spatial dual) provides wider range of navigation and timing services with the combined interlocked usage of the GSM technology.

1.1 Block diagram



In this Project it is proposed to design an embedded system which is used for tracking and positioning of any vehicle by using Global Navigation Satellite System (GNSS) and Global system for mobile communication (GSM).

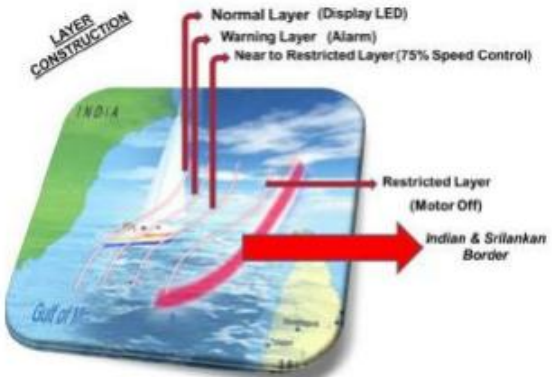
microcontroller is used for interfacing various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Boat and report the status of the Boat on demand. For doing so an microcontroller is interfaced serially to a GSM Modem and GNSS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the Boat from a remote place. The GNSS modem will continuously give the data i.e. the latitude and longitude indicating the position of the boat. The GNSS modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the

LCD. The same data is sent to the mobile at the other end from where the position of the boat is demanded. An EEPROM is used to store the mobile number. The hardware interfaces to microcontroller are LCD display, GSM modem and GNSS Receiver. The design uses RS-232 protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels.

When the request by user is sent to the number at the modem, the system automatically sends a return reply to that mobile indicating the position of the boat in terms of latitude and longitude.

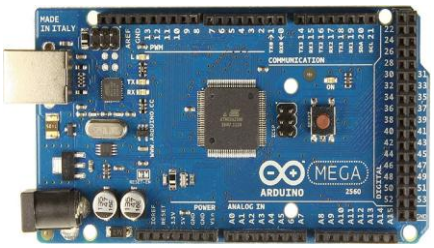
2. PRINCIPLE OF OPERATION

In this Project it is proposed to design an embedded system which is used for protect and positioning the boat using Global Navigation Satellite System (GNSS) and Global system for mobile communication (GSM). In this project ARDUINO AT MEGA A2560 microcontroller is used for interfacing to various hardware peripherals. The current design is an embedded application, which will continuously monitor a moving Boat and when the boat go beyond the level of the defined layer then appropriate information will be provided. For doing so an ARDUINO AT MEGA A2560 microcontroller is interfaced serially to a GSM Modem and GNSS Receiver. A GSM modem is used to send the position (Latitude and Longitude) of the boat from a remote place. The GNSS modem will continuously give the data i.e. the latitude and longitude indicating the position of the boat. The GNSS modem gives many parameters as the output, but only the NMEA data coming out is read and displayed on to the LCD. The same data is sent to the mobile at the other end from where the position of the boat is demanded. An EEPROM is used to store the data received by GNSS receiver The hardware interfaces to microcontroller are LCD display, GSM modem and GNSS Receiver. In order to interface GSM modem and GNSS Receiver to the controller, a MUX is used. The design uses RS-232 protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels. When a request is sent by user to the number at the modem, the system automatically sends a return reply to that particular mobile indicating the position of the boat in terms of latitude and longitude.



3. HARDWARE COMPONENTS

3.1 Arduino ATMEGA 2560



The Arduino MEGA 2560 is designed for projects that require more I/O llines, more sketch memory and more RAM. With 54 digital I/O pins, 16 analog inputs and a larger space for your sketch it is the recommended board for 3D printers and robotics projects. This gives your projects plenty of room and opportunities maintaining the simplicity and effectiveness of the Arduino platform. This document explains how to connect your Mega2560 board to the computer and upload your first sketch. The Arduino Mega 2560 is programmed using the Arduino Software (IDE), our Integrated Development Environment common to all our boards and running both online and offline.All Arduino and Genuino boards, including this one, work out-of-the-box on the Arduino Web Editor, no need to install anything. The Arduino Web Editor is hosted online, therefore it will always be up-to-date with the latest features and support for all boards.

3.2 GNSS-The **Global Navigation Satellite System** (**GNSS**)

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 which has an unobstructed view of four or more GNSS satellites. GNSS is made up of three segments: Space, Control and User. The Space Segment is composed of 24 to 32 satellites in Medium Earth Orbit and also includes the boosters required to launch them into orbit. The Control Segment is composed of a Master Control Station, an Alternate Master Control Station, and a host of dedicated and shared Ground Antennas and Monitor Stations. The User Segment is composed of hundreds of thousands of U.S. and allied military users of the secure GNSS Precise Positioning Service and tens of millions of civil, commercial and scientific users of the Standard Positioning Service. GNSS satellites broadcast signals from space that GNSS receivers use to provide three dimensional location (latitude, longitude, and altitude) plus precise time. GNSS has become a widely used aid to navigation worldwide, and a useful tool for map-making, land surveying, commerce, scientific uses, tracking and surveillance, and hobbies such as geo caching and way marking. Also, the precise time reference is used in many applications including the scientific study of earthquakes and as a time synchronization source for cellular network protocols. GNSS has become a mainstay of transportation systems worldwide, providing navigation for aviation, ground, and maritime operations.

3.3 GSM-Global system mobile communication

The switching system (SS) is responsible for performing call processing and subscriber-related functions. The switching system includes the following functional units:

Home Location Register (HLR)

The HLR is a database used for storage and management of subscriptions. The HLR is considered the most important database, as it stores permanent data about subscribers, including a subscriber's service profile, location information, and activity status. When an individual buys a subscription from one of the PCS operators, he or she is registered in the HLR of that operator.

Mobile services Switching Center (MSC)—The MSC performs the telephony switching functions of the system. It controls calls to and from other telephone and data systems. It also performs such functions as toll ticketing, network interfacing, common channel signaling, and others.

Visitor Location Register (VLR)—The VLR is a database that contains temporary information about subscribers that is needed by the MSC in order to service visiting subscribers. The VLR is always integrated with the MSC. When a mobile station roams into a new MSC area, the VLR connected to that MSC will request data about the mobile station from the HLR. Later, if the mobile station makes a call, the VLR will have the information needed for call setup without having to interrogate the HLR each time.

Authentication Center (AUC)—A unit called the AUC provides authentication and encryption parameters that verify the user's identity and ensure the confidentiality of each call. The AUC protects network operators from different types of fraud found in today's cellular world.

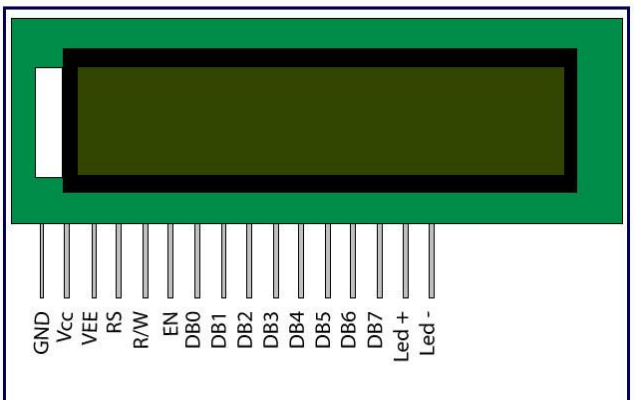
Equipment Identity Register (EIR)—The EIR is a database that contains information about the identity of mobile equipment that prevents calls from stolen, unauthorized, or defective mobile stations. The AUC and EIR are implemented as stand-alone nodes or as a combined AUC/EIR node.

The Base Station System (BSS)

All radio-related functions are performed in the BSS, which consists of base station controllers (BSCs) and the base transceiver stations (BTSs). The BSC provides all the control functions and physical links between the MSC and BTS. It is a high-capacity switch that provides functions such as handover, cell configuration data, and control of radio frequency (RF) power levels in base transceiver stations. A number of BSCs are served by an MSC.

BTS-The BTS handles the radio interface to the mobile station. The BTS is the radio equipment (transceivers and antennas) needed to service each cell in the network. A group of BTSs are controlled by a BSC.

3.4-LCD display



Using an LCD display, the micro controller displays the required information. The Liquid Controlled Display is a ready-to-use module based on the regular IC SED1278 manufactured and marketed by SEIKO EPSON Corporation, Japan. The module has 14 pins as input. The pin 1 is supply ground. The pin 2 is supply +ve of 5 V DC. The pin 3 is used to vary the contrast of the display. Generally a 10K preset connected across the supply and the center wiper connected to the pin is the suggested arrangement to vary the contrast. To make the design simple, the contrast pin is tied to ground for maximum contrast. Pin 4 is for informing the module, whether the byte given to the module is command word or ASCII character. This pin is designated as RS – Register select. By making this low, the data supplied is directed command register.

3.5 L293D Motor driver -The L293D is a famous 16-Pin Motor Driver IC. As the name suggests it is mainly used to drive motors. A single **L293D IC** is capable of running two DC motors at the same time; also the direction of these two motors can be controlled independently. So if you have motors which has operating voltage less than 36V and operating current less than 600mA, which are to be controlled by digital circuits like Op-Amp, 555 timers, digital gates or even Micron rollers like Arduino, PIC, ARM etc.. this IC will be the right choice for you. The features are,

- Can be used to run Two DC motors with the same IC.
- Speed and Direction control is possible
- Motor voltage Vcc2 (Vs): 4.5V to 36V
- Maximum Peak motor current: 1.2A
- Maximum Continuous Motor Current: 600mA
- Supply Voltage to Vcc1(vss): 4.5V to 7V
- Transition time: 300ns (at 5Vand 24V)
- Automatic Thermal shutdown is available
- Available in 16-pin DIP, TSSOP, SOIC packages

3.6 Buzzer-A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as microwave ovens, or game shows.

It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which 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.

3.7 Power Supply- As we all know any invention of latest technology cannot be activated without the source of power. So in this fast moving world we deliberately need a proper power source which will be apt for a particular requirement. All the electronic components starting from diode to Intel IC's only work with a DC supply ranging from -+5v to-+12v. We are utilizing for the same, the cheapest and commonly available energy source of 230v-50Hz and stepping down, rectifying, filtering and regulating the voltage.

4. CONCLUSION

"SMART TRACKING AND NAUTICAL BORDER ALERT SYSTEM using GNSS and GSM" a model for Boat Tracking unit can be implemented with the help of Google maps and also with the help of GNSS receivers and GSM modem. The system is used for protect and navigate the boat with an accuracy of 10 m. The positioning is done in the form of latitude and longitude along with the exact location of the place, by making use of Google maps. The system tracks the location of particular boat and sends to users mobile in form of SMS and also to EEPROM by GSM. The arrived data, is in the form of latitude and longitude is used to locate the Boat on the Google maps and also we can see the output on the LCD. To see on the Google map we need to decode the received SMS. Finally the aim of the project i.e. to protect the fisherman from the nautical border and navigate the boat with an accuracy of 10m, has been achieved successfully by using MBR (Maritime Border Refuge) system.

5. REFERENCES

1. Border alert system for fisherman using GPS system. World journal of research and review(WJRR)-may 2016
2. Border alert fishing boat security system using GPS. (IJIREEICE)-march 2016
3. Providing a border alert system for fishermen by using GPS and GSM technology in wireless sensor network(IRJET)-march 2017
4. Fishermen nautical border alert system(IJARCET)-march 2016
5. website-www.advancednavigation.com(GNSS)
6. D. Arunvijay & E. Yuvaraj (2014), "Design of Border Alert System for Fisherman using GPS", International Journal of Student Research in Technology & Management, Vol. 2, No. 02, Pp. 67–70.
7. M. Sivaramaganesh, M. Ramya, V. Gowtham, T. Bharathi & G. Jeevitha (2014), "Implementation of Maritime Border Alert System", International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering, Vol. 2, No. 3.
8. S. Mani Sundar & M. Hariharan (2013), "Deep Sea Fisherman Patrol System for Coastal Intruder Positioning", International Journal of Scientific Engineering and Technology, Vol. 2, No. 3, Pp. 129–132.
9. K. Suresh Kumar (2010), "Design of Low Cost Maritime Boundary Identification Device using GPS System", International Journal of Engineering Science and Technology, Vol. 2, No. 9.
10. Sharath Jagannanthan & Maheswarai Rajavel (2012), "Potential Fishing Zone Estimation by Rough Cluster Predictions", CIMSIM, Malyasia.