

Marinetime Boundary Detection System With Cyclone Alert

A.Madhan ME¹, V.Mothiraj², S.M.Raghul³, J.R.Deepak Raja⁴

Assistant professor, Electrical And Electronics Engineering,
Velammal college of Engineering And Technology, Madurai, Tamil Nadu, India¹

UG student, Electrical And Electronics Engineering,
Velammal college of Engineering And Technology, Madurai, Tamil Nadu, India²⁻⁴

Abstract— This project gives an ability to track the boat location in the high sea and warn the fishermen if they cross their country's nautical boundary. This system enables the GPS module to track the location and use a vibration sensor to detect the abnormal wave networks. The data coming from sensors and GPS receiver is transmitted wirelessly using LORA module if the boat is heavily collapsed or crosses the country's nautical boundary. This system involves a GPS that keeps on tracking the location of the boat. When fishermen cross the boundary, they intimate the navy patrol about border crossing boats. The system also consists of an SOS switch for emergency call. The GPS, SOS switch and vibration sensor. Then the motor is stopped by using the motor control when they cross the boundary with navy intimation. If the boat is, collapse the buzzer and high beam LED indicate the emergency to the nearby boats for faster help.

Keywords— Boundary crossing intimation, cyclone alert, Arduino Uno, Arduino IDE.

I. INTRODUCTION

In today's world, science and technology were growing rapidly with new inventions, innovations and with an advance level of their implementations. These merging advance technologies are firmly adopted by defense services to provide some safety systems to our fishermen. There are many parameters by which defense services can provide safety to fishermen. Base stations can also know the location of fishermen by tacking them through the Global positioning system (GPS) and can guide them to a safe area. In this project, all the processes are in real time because of the use of Microcontroller. The sensed data and the tracked location of fishermen will be transmitted wirelessly using LORA module. In military operations, one of the fundamental challenges is that the fishermen are not able to communicate with the control room and sometimes not even with the other fellow fishermen. Once a troop or fishermen become lost during a fight on the battlefield due to some unfavorable environment or adverse fight conditions, then it becomes more difficult to search for them and bring them back to the army base station. In addition, every defence organization needs to design and develop some advance, small, portable and robust system to provide safety measures to their fishermen. There are many problems which are faced by fishermen during wars on the battlefield, like: 1. Sometimes fishermen want to know their location when they become lost, but they are not able to do so. 2. Sometimes fishermen need some help during panic situations, but they are not able to ask for help. 3. Sometimes fishermen are not able to get help when they get injured during war. The system proposed by us is composed of two parts, one is a small portable unit for fishermen and the other is for the army control unit. The unit consists of a microcontroller, GPS tracking device, LORA transceiver. Where a GPS device is used to track the location of the fishermen with the help of satellite communication, a vibration sensor is used to detect the boat imbalance due to abnormalities in waves like tsunami. All the processed and sensed data are transmitted through a LORA module, which is a low power, low data rate transceiver used to transmit and receive the data wirelessly. In this project, our main aim is to improve the communication between fishermen and the army control room by using advanced and highly efficient, powerful systems. This project helps to solve above-mentioned problems as follows: 1. By using a GPS device, it is possible to provide proper information about the location of fishermen when it is needed. 2. It will become possible to help the fishermen in panic situations when it is asked, by communicating with them, using LORA technology. 3. It will become easy to provide medical assistance to fishermen when they get injured.

II. CONVENTIONAL METHOD

Initially, the wireless networks are used by many applications where the locations of the nodes within the network have to be track supported for the calculation of communication factors. But in today's world, there are a few existing systems using GPS to trace and identify the position of the boats/ships. These systems use the electronic map that has an efficient method for navigation and localisation detection by users. This application will be widely utilized by people

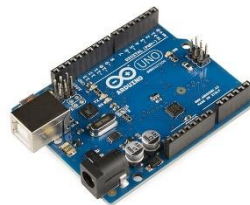
within the border to seek out the acceptable path to achieve the destination. The notification/alert is sent to the border security forces which are able to act because the server is connected to all or any other devices that are operated by people on ships. This application will notify us about the data of where the device is being located and intimate them about the problems that occur because of external forces in ships to the server.

III. COMPONENTS

- Arduino
- Power supply
- GPS
- LCD
- Relay
- Buzzer
- Lora TxRx.

A. *Arduino*

The Arduino Uno is a microcontroller board which is developed by a corporation that goes by the name Arduino. It is an open-source microcontroller board and is based on ATmega328P microcontroller. The Arduino Uno features a set of digital further more as well as analog input and output pins which will be employed in various circuits and expansion boards.



ARDUINO BOARDS

It has 6 analog pins and 14 digital pins. It is programmable with Arduino IDE (Integrated Development Environment) employing a B USB cable. It works fine with voltages between 7volts and 20 volts, although it's mostly used with a 9-V battery. The name Uno is because it is the 1st USB-based Arduino board.

B. *Power supply*

DC motor and Microcontroller require some power source. This power is supplied employing a DC power supply starting from +5 V to +12 V. The available energy source is 230v and 50Hz, and a centre tapped step down transformer is used here. The Arduino operates at 5V and therefore the DC motor works at 12V.

C. *GPS*

It is a worldwide navigation satellite system that has geolocation and time information that is given to a GPS receiver anywhere on or near the planet where there's an unobstructed line of sight has one or more than one GPS satellite. The GPS system doesn't require any user to transmit the data, and its operation is independent of any internet reception or telephonic reception.

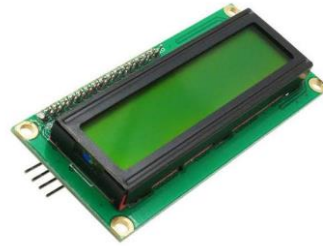


GPS

The GPS system provides critical positioning capabilities to all users around the world such as commercial or military. GPS satellites continuously transmit their position and also the current time of the receiver. A GPS receiver monitor has multiple satellites and solves the equation to find the exact position of the receiver, and it is a deviation from the true time.

D. *LCD*

The LCD (Liquid Crystal Display) is the technology used for displaying the output. All LCD displays have some 14 pins (0-13) or 16 pins (0-15). Alphanumeric displays are utilized in a large range of applications.

**LCD**

It comes in many sizes. Many multinational companies make their own special LCD's to be utilized in their products. When the LCD is interfaced with a microcontroller, it mustn't exceed 5v of power supply.

E. RELAY

A relay is an electrically operated switch. It consists of a collection of input terminals for one or more control signals for operation, and also has a group of operating control terminals. Relays are used where it's needed to control a circuit by an independent low-power signal. It is additionally used where it's needed to control several circuits by one signal. The standard style of a relay is an electromagnet to close or open the contacts. There are several other operating principles that are invented, one in every of those are in solid state relays. It uses semiconductor properties for control and doesn't depend on moving parts.

F. BUZZER

A Buzzer or beeper is an audio device. It is an integrated structure of electronic transducers. Active Buzzer 5V rated power will be directly connected to a continual sound.

**BUZZER**

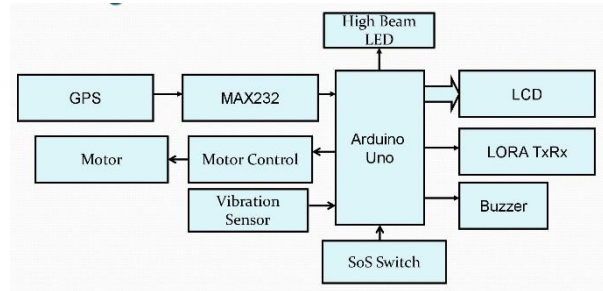
The uses of buzzers and beepers typically include timers and alarm devices. It generates a consistent single tone sound that is due to apply DC voltage.

G. Lora TxRx

Lora TxRx could be a wireless technology developed as an open global standard to handle the unique needs of low cost, low-power wireless IOT networks. Its communication is specially made for sensor network and control. This communication system is less expensive and simpler than the other short-range wireless sensor networks such as WIFI and Bluetooth.

IV. WORKING

- Using the microcontroller in this project is the heart of our system. We use this microcontroller to access and analyse all the data received from the sensors and GPS receiver. In our project we use Arduino Uno for processing all data in real time. We have the vibration sensor for giving physical input (i.e.,) analog input to the microcontroller. This input is necessary to detect the high wave disturbance to the boat. The GPS system is adopted with the controller for tracking the boat in the sea (i.e., fixing the boat with the latitude and longitude of the globe).
- The SOS (save our Souls.) switch is used by the fishermen for their emergency call to naval forces. The inputs for the controller are weak analog signals. This signal is processed by a signal conditioning circuitry. This conditioning is done by analog to Digital Converter (ADC), which converts the analog signal to a strong digital one. Digitalisation is performed because Arduino Uno can recognise only digital signals.



BLOCK DIAGRAM

- Now the Arduino will give the output as instructions for the device under the provision of a microcontroller.
- The LORA module of a transceiver will be used for transmitting and receiving the data from the boat and land respectively.
- The GPS modem used in the project is RS 232 level data which is interfaced with the Arduino using MAX 232. The purpose of the MAX 232 is to convert the RS 232 voltages to 5V TTL/CMOS level.
- A 2×16 alphanumeric LCD is used to display data from BSN's and from GPS modem.
- Though we have all the digital signal for help, we also require additional support with the physical alarm signal by a buzzer and a high beam LED to show the fisherman's emergency to nearby boats for helping them from their troubles

V. OUTPUT

Problem statements	Output of the project
Crossing the nautical boundary of the sea.	Motor of the boat stops running
During abnormal high waves or tsunami	Vibration alert to fishermen and intimate naval force.
During a emergency condition.	SOS is used to alert naval force to help the fishermen.

a) OUTPUT OF SOS



b) OUTPUT OF VIBRATION SENSOR



VI. CONCLUSION

The project “Maritime boundary detection system with cyclone alert” has been completed successfully and the output results are verified. The results are in line with the expected output. We tested our project with both software and hardware testing tools. In this work “Vibration Sensor, SOS switch, GPS, Micro controller, power supply and LORA ” are chosen are proved to be more appropriate for the intended application. We can enhance this project in future as it has



those avenues for improvement. The prototype model of our project fulfills all the logical requirements. With the minimal improvements we can make this project directly applicable for real-time applications. This project is adaptive towards continuous performance and peripheral up gradations for the future world. This work can be applied to various industrial and commercial applications.

A. FUTURE SCOPE

In the future this concept may be enhanced by using smart watches and satellite phones. By keeping kits altogether on boats and by knowing the locations of all the boats, we will use our kits to help the traffic. By using IR sensors, the obstacles which may damage the underside of the ship may be avoided. The density of the fishes may be found by using the sensors. The fishermen are assisted by making use of the weather reports.

REFERENCES

- [1] Hock Beng Lim, Di Ma, Bang Wang, Zbigniew Kalbarczyk, Ravishankar K. Iyer, Kenneth L. Watkin, "A Fishermen Health Monitoring System for Military Applications", 2010 International Conference on Body Sensor Networks, 978-0-7695-4065-8/10/\$26.00 © 2010 IEEE, DOI: 10.1109/BSN.2010.58, pp: (246-249).
- [2] William Walker, A. L. Praveen Aroul, Dinesh Bhatia, "Mobile Health Monitoring Systems", 31st Annual International Conference of the IEEE EMBS, Minneapolis, Minnesota, USA, September 2-6, 2009, 978-1-4244-3296-7/09/\$25.00 © 2009 IEEE, pp: (5199-5202).
- [3] M. Pranav Sailesh, C. Vimal Kumar, B. Cecil, B. M. Mangal Deep, P. Sivraj, "Smart Fishermen Assistance using WSN", International Conference on Embedded Systems - (ICES 2014), 978-1-4799-5026-3/14/\$31.00 © 2014 IEEE, pp: (244-249).
- [4] P.S. Kurhe, S.S. Agrawal, "Real Time Tracking and Health Monitoring System of Remote Fishermen Using ARM 7", International Journal of Engineering Trends and Technology, ISSN: 2231-5381, Volume 4, Issue 3, No. 1, March 2013, pp: (311-315).
- [5] Shruti Nikam, Supriya Patil, Prajкта Powar, V. S. Brendre, "GPS Based Fishermen Tracking and Health Indication System", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, ISSN: 2278-8875, Volume 2, Issue 3, March 2013, pp: (1082-1088).
- [6] Prof. Pravın Wararkar, Sawan Mahajan, Ashu Mahajan, Arijit Banerjee, Anchal Madankar, Ashish Sontakke, "Fishermen Tracking and Health Monitoring System", The International Journal of Computer Science & Applications, ISSN: 2278-1080, Volume 2, No. 02, April 2013, pp: (81-86).
- [7] Govindaraj A., Dr. S. Sindhuja Banu, "GPS Based Fishermen Tracking and Health Indication System with Environmental Analysis", International Journal of Enhanced Research in Science Technology & Engineering, ISSN: 2319-7463, Volume 2 Issue 12, December 2013, pp: (46-52).
- [8] Palve Pramod, "GPS Based Advanced Fishermen Tracking With Emergency Messages & Communication System", International Journal of Advance Research in Computer Science and Management Studies, ISSN: 2321-7782, Volume 2, Issue 6, June 2014, pp: (25-32).
- [9] Mr. Rajdeep Limbu, Prof. V. V. Kale, "GPS Based Fishermen Tracking and Health Monitoring System", International Journal for Technological Research in Engineering, ISSN: 2347-4718, Volume 1, Issue 12, August 2014, pp: (1485-1488).
- [10] Rubina.A.Shaikh, "Real Time Health Monitoring System of Remote Patient Using Arm7", International Journal of Instrumentation, Control and Automation, ISSN: 2231-1890, Volume 1, Issue 3-4, April 2012, pp: (102-105).
- [11] Ekta Madhyan, Mahesh Kadam, "A Unique Health Care Monitoring System Using Sensors and LORA Technology", International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277-128X, Volume 4, Issue 6, June 2014, pp: (501-509).
- [12] Dr. S. S. Riaz Ahamed, "The Role of LORA Technology in Future Data Communication System", Journal of Theoretical and Applied Information Technology, ISSN: 1817-3195, Volume 5, No. 2, February 2009, pp: (129-135).
- [13] Nisha Ashok Somani, Yask Patel, "LORA: A Low Power Wireless Technology for Industrial Applications", International Journal of Control Theory and Computer Modeling, ISSN: 2249-1155, Volume 2, No. 3, May 2012, DOI: 10.5121/ijctcm.2012.2303, pp: (27-33).
- [14] P. Rohitha, P. Ranjeet Kumar, Prof. N. Adinarayana, Prof. T. Venkat Narayana Rao, "Wireless Networking through LORA Technology", International Journal of Advanced Research in Computer Science and Software Engineering, ISSN: 2277-128X, Volume 2, Issue 7, July 2012, pp: (49-54).
- [15] NXP Semiconductors, UM10139, LPC 214X User Manual, Rev. 4, 23 April 2012, pp: (1-354).
- [16] Texas Instruments Inc., LM 35 Datasheet, SNIS159E-August 1999-Revised January 2015, pp: (1-31).