

Implementation of GPS Based Security System for Safe Navigation of Fisherman Autoboat

C.Vinothkumar¹ and B.Arunkumaran²

¹Assistant Professor, Dept. of Electronics and Instrumentation, Sathyabama University, India.

²PG Scholar, Dept. of Power Electronics and Drives, Jeppiaar Engineering College, Anna University, India.

ABSTRACT – The Fisherman Autoboat system uses GPS that stands for global positioning system which finds out the location and position of the boat in ocean. The main aim of this Autoboat system is to identify the zone. By using ultrasonic sensor, iceberg in the sea can be found out while travelling in boat or ship. As well as, to find the prediction of tsunami MEMS is being used. If the fisherman crosses the limitation of border it gives voice message, even though if he try to move forward then automatically motor of the ship/boat will stop. For weather report, temperature and humidity sensor is used.

In the problematic time, from the control room the navy section can trace out the ship/boat which has crossed the border & in danger for the rescue, and also there is one emergency switch available on the boat side that will inform about the route to home. A ZigBee transmitter is used to transmit these data from the transmitter side.

Keywords: GPS, SENSORS, ZIGBEE, MEMS, SAFE NAVIGATION.

I. INTRODUCTION

GPS radio occultation has proved to be a powerful tool for remotely sensing the Earth's neutral atmosphere and ionosphere. Through this project, we propose a novel approach to retrieving marine troposphere profiles based on single ground-based GPS occultation observations. A new retrieval method uses the data from a ground-based receiver while the GPS satellites rise or set at the local horizon in the direction of the ocean [1]. The subsequent experiment was carried out on the coast of the Yellow Sea from August 2010 to July 2011 in this regard a GPS based system determines the location of maritime boundary in the ocean which is not visible to the mariners and they cross it. A GPS receiver is set on earth while the satellite raises high in universe [2]. An ultrasonic sensor is used for detection of iceberg and MEMS is implemented to and crosses the boundary and detect vibration in the ocean. The relevant information is visible on LCD also.

A temperature and humidity sensor is used to report weather. The buzzer beeps when boat approaches the iceberg. A ZigBee transmitter is used to transmit these data from the transmitter side. The ZigBee receiver receives the transmitted parameters and monitored through display unit. In this transmitter is Master and it will be in constant place. While the

receiver enters into particular limit it automatically receives the data from transmitter and displayed.

II. EXISTING SYSTEM

At present, there are few existing systems which help to identify the current position of the boats/ships using GPS system and view them in an electronic map. GPS provides the fastest and most accurate method for mariners to navigate, measure speed, and determine location. This enables increased levels of efficiency for mariners worldwide and accurate position, speed and heading are needed to ensure the vessel reach its destination safely.

In the present system a GPS receiver is available in the boat while the GPS satellite raises high in the universe. The satellite observes the latitude and longitude of the boat's position and calculates for the location. So, the mariners can find out the place where the boat is and also the direction of motion.

The GPS equipped boat has the advantage of moving in the right direction. As the ocean is so much spread that it is almost impossible to find out in which direction one has to navigate. This facility enables to find out the correct way to the destination thereby increasing the level of convenience to the mariners.

II.1 DISADVANTAGES OF EXISTING SYSTEM

1. **Lack of awareness causes accident** -The fishermen are not aware of the maritime boundary and they tend to cross it. This causes the situation of dispute and loss of life. Also, no such system for warning is present when the boat crosses the maritime boundary or when boat approaches any iceberg. So this can lead to accidents.

2. **No alarming and warning system is present for icebergs and tsunami**.-The boat is not well-equipped with any alarming or security system that causes loss of lives. The fishermen are not warned of any iceberg in the ocean, tsunami and crossing of the maritime boundary. This causes improper attention during the navigation process and unknowingly the fishermen had to lose their lives.

3. **No security system is present which causes loss of life**-No security from the rescue team can be obtained as no system for informing the coastal guards is present. The coastal guards have the rights to save the fishermen when they are in danger.

But since they are not known to the emergency situation, they cannot send any help from their side.

III. PROPOSED SYSTEM

The proposed system is used to detect the maritime boundary of the country where the long time dispute between Sri Lanka and India still exists. This mainly happens when fisherman crosses maritime border of neighboring country as he is not aware of the limits in sea.

The proposed system uses a GPS receiver which receives signals from the satellite and gives the current position of the boat. With already known details of the latitude and longitude of the maritime boundary, the microcontroller calculates the current position and stored boundary positions and indicates the fisherman that he has crossed the boundary by an alarm system. It also uses a message transmitter to send message to the base station which monitors the boats in the sea.

This system provides an indication to both fisherman and to coastal guard. Thus the system saves the lives of the fisherman or reduces the damages caused to them by Lankan coast guards.

Additionally, sensors for iceberg detection and tsunami prediction have been included. A report for weather can also be obtained through temperature and humidity sensor. These all features have been made cheap in order to be installed on boats of fishermen for the reason being making the system economical.

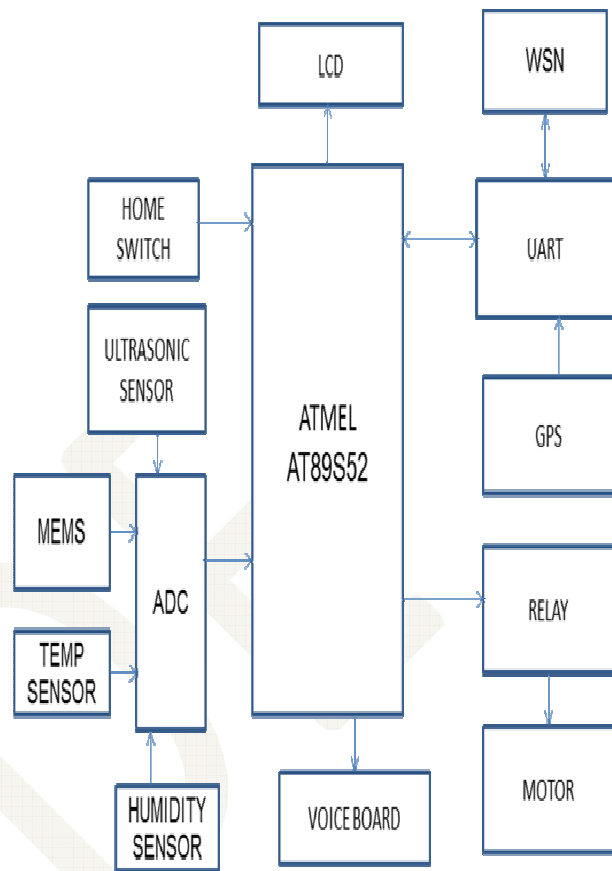


Figure-1: Block Diagram of Transmitter Section.

Figure-1 describes the block diagram of the transmitter section. In transmitter section we have a GPS which detects the location of the maritime boundary.

A sensor such as ultrasonic is used for detection of the iceberg and MEMS for Tsunami. Humidity and temperature sensor is used for weather report. The signals of all the sensors are given to the microcontroller through ADC. With already known set point in microcontroller maritime boundary is detected. If the boat crosses the border a message through voice board is heard and viewed through LCD. The motor gets switched off as it crosses the boundary.

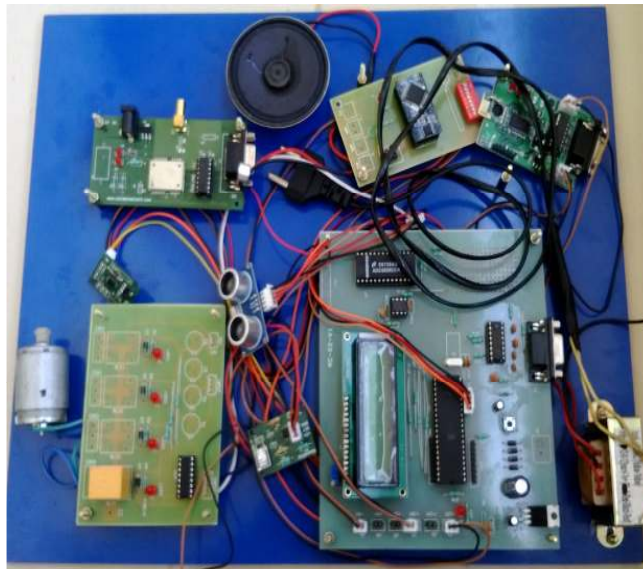


Figure-2: Image of Transmitter Section

Figure-3 has the receiver section's block diagram which is located at the navy section near the sea shore. It has a buzzer which beeps when the border is crossed and displayed through the LCD. The information through WSN is obtained and a microcontroller is used for this.

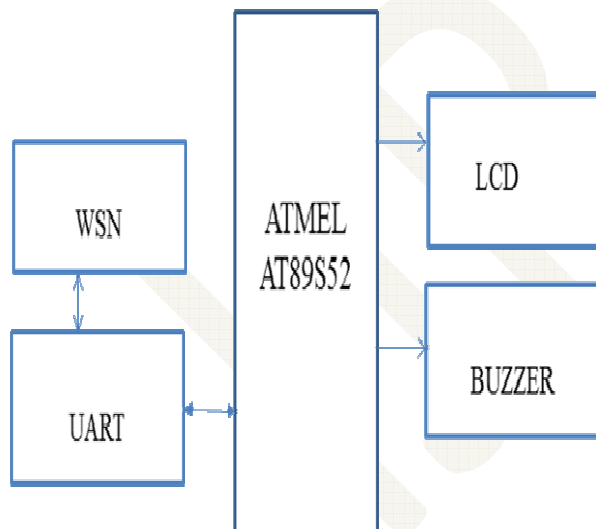


Figure 3: Block Diagram of Receiver Section

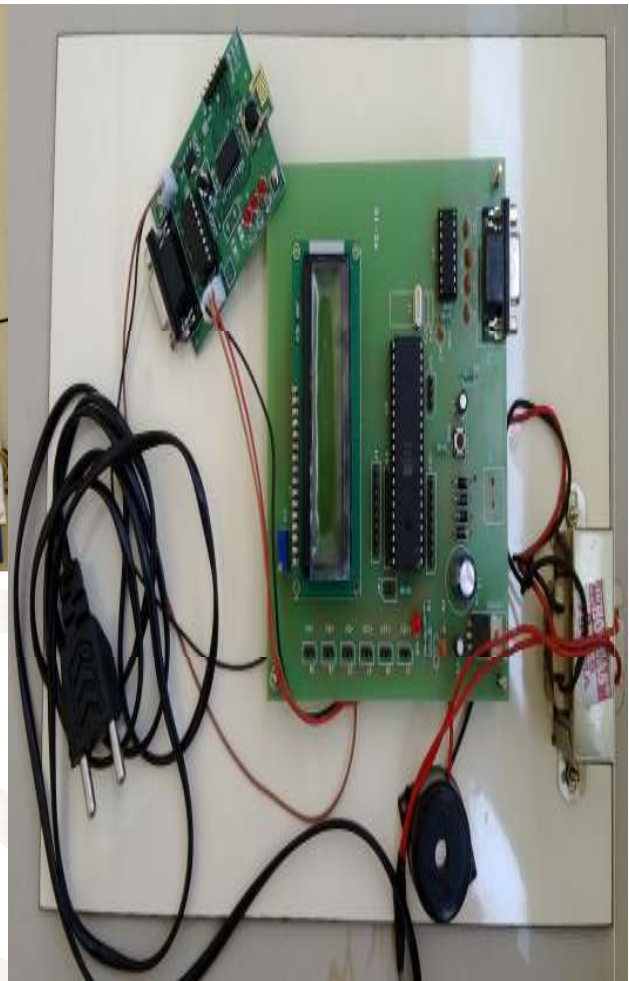


Figure 4: Image of Receiver Section

III.1 ADVANTAGES OF PROPOSED SYSTEM

1. Used to monitor and detect whether the ship is crossing its border.
2. Prevent unnecessary problems with other states during navigation through sea due to border crossing.
3. High Security and alarming system.
Senses icebergs and tsunامي.
4. Detects weather report

III.2 HARDWARES USED

- Microcontroller
- Ultra sonic sensor
- Humidity sensor
- Temperature sensor
- MEMS
- ADC
- Switch
- Relay & motor

- UART
- GPS
- WSN
- Voice board

III.3 SOFTWARE IMPLEMENTED

- Keil compiler
- Embedded C

III.4 SOFTWARE DESCRIPTION OF THE PROPOSED SYSTEM

The main purpose of using the microcontroller in our Autoboat system is because high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

The programs of the microcontroller have been written in Embedded C language and were compiled using KEIL, a compiler used for microcontroller programming. The communication between PC and the microcontroller was established MAX 232 standard and those programs were also done in C language.

III.5 ALGORITHM OF PROPOSED PROCESS

- STEP 1 : START
- STEP 2: Initialize data.
- STEP 3: Temperature sensor and humidity sensor give values.
- STEP 4: If ultrasonic sensor and MEMS does not detects signal.
- STEP 5: No connection to ADC.
- STEP 6: If ultrasonic sensor and MEMS detects signal.
- STEP 7 : Control goes to ADC
- STEP 8: ADC control goes to microcontroller.
- STEP 9: GPS transmits the location to microcontroller in form of signals for calculation of boundary.
- STEP 10: Microcontroller transmits signal 0, 1 to o/p devices (LCD, voiceboard,monitor section) as per limitation being crossed or not.
- STEP 11: Microcontroller sends command to motor to stop, change direction, and find weather information.
- STEP 12: Receiver section sends control.
- STEP 13 : STOP

IV.RESULTS AND DISCUSSION

Through this system we have been able to locate the maritime boundary for the fishermen and a proper warning system in order to prevent their lives while they cross the Indo-Srilankan maritime boundary unknowingly. Also there is a

system where the motor automatically gets off if the fishermen cross the border.

Furthermore we have also been able to create an alarming system for an iceberg or tsunami in the ocean. The same can be viewed in the LCD display also.

The weather report and detection helps the mariner to find the condition of weather and decide if it is suitable for them to go in the ocean for navigation or not.

Table 1: Parameters and their mode of output

For iceberg alert	LCD glows and voice message
For tsunami alert	Display on LCD
For weather report	Temperature and humidity values display on LCD
For navigation direction	Movements in X,Y and Z direction
Crossing of maritime boundary	Buzzer beeps and display on LCD

V.SUMMARY AND CONCLUSION

This system implements GPS and Embedded system together to create a security system. The fisherman, while navigating crosses the maritime boundary, unknowingly as they are unable to visualize it in the ocean which causes loss to its life. Through this project a GPS based security system is provided to the fisherman so that they can find out when they are in danger.

In this system, a GPS receiver is being set up on the earth and through satellite all the information regarding crossing of the maritime boundary can be obtained by the mariners and coastal guards .In case of any danger the rescue team will be sent to them. A variety of sensors are used for detection of other parameters. An iceberg can be detected through ultrasonic sensor, Tsunami through MEMS and for weather report temperature and humidity sensor is being implemented.

This system is an implication of security system for safe navigation of mariner's auto boat. It is a helpful step in saving lives of fisherman and a useful contribution to the society.

VI. FUTURE WORK

This system done using GPS is a helpful system in creating an automatic alert system to save mariner's life that

are unable to find the marine boundary in the ocean by their own and also unable to predict any iceberg or tsunami. Additionally, it helps in finding weather conditions

In future, technological improvements can be done to get the alert signals on smart phones to reduce complexity of components and cost. The smart phones are now available at a very cheap rate and are used by almost everyone in the society without taking in account of the economical status. So it is an imagination to use smart phones for the alert and warning in place of the complex hardwares which will reduce complexity and thereby enhancing ease of operation.

REFERENCES

- [1] B.Parkinson and J.Spilker, *GPS Global Positioning System Theory and Applications*. Danvers, MA: AIAA, 1996.
- [2] D.H. Macqueen, G. W. Laguna, N. A. Bertoldo, R. A. Fertig and S. L. Hunter, "Development of a real-time radiological area monitoring network for emergency response at Lawrence Livermore National Laboratory," *IEEE Sensors J* , vol. 5, Apr. 2005, no. 4, pg-565–573.
- [3] E.Kaplan, *Understanding GPS Principles and Applications*. Norwood, MA: Artech House, 1996.
- [4] M.Kayton and W. R. Fried, *Avionics Navigation Systems*, New York: Wiley, 2nd edition, 1997.
- [5] P.Hwang and R. Brown, *Introduction to Random Signals and Applied Kalman Filtering*, New York: Wiley-Interscience, 2nd edition, 1992.