

THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

Satellite and RF Enabled Assistance for Marine Navigation

Lohith K. C.

UG Student, Department of Electronics and Communication Engineering,
Atria Institute of Technology, Bangalore, Karnataka, India

Pramodini S. K.

UG Student, Department of Electronics and Communication Engineering,
Atria Institute of Technology, Bangalore, Karnataka, India

Priyanka S.

UG Student, Department of Electronics and Communication Engineering,
Atria Institute of Technology, Bangalore, Karnataka, India

Rashmi S. T.

UG Student, Department of Electronics and Communication Engineering,
Atria Institute of Technology, Bangalore, Karnataka, India

Pushpa Y.

Assistant Professor, Department of Electronics and Communication Engineering,
Atria Institute of Technology, Bangalore, Karnataka, India

Abstract:

Fishing is one of the main occupation in coastline areas. When fishermen go into the sea for fishing, they cannot distinguish between our country and other country boundary. Hence they cross the boundary and get arrested. This is the main situation existing till date. This paper mainly aims at the safety of fishermen. This system consists of 3 units, boundary unit, ship unit and base station. An android mobile is considered as the base station. Each fisherman is given a RFID tag. Using RFID technology, data about the fishermen entering the sea is send to the base station. The boundary unit keeps on transmitting signals. When the ship reaches the boundary, alert is given to the ship. Any changes in weather condition are noted and a voice alert is given in the ship unit. The fishermen can get help from the base station anytime when they are in danger. If any intruders try to cross the boundary, information reaches both ship and the base station. Audio and visual alerts are given to the fishermen. GPS system and android are used for the communication between the fishermen and base station. Code is developed using embedded C in renesas software. Cube suite is used to dump the code on to the kit.

Keywords: Renesas microcontroller, RF technology, GPS, Android.

1. Introduction

In coastline areas, fishing is the main occupation of people. When fishermen enter the sea, they need a safety system to protect themselves from any danger or to seek help from others. They cannot distinguish between international boundaries. To find a solution to the existing problem, we designed a system which all fishermen can afford. The main features of the system are, conveying information about fishermen, giving boundary alert, weather alert, emergency and conveying information about intruder. This system is set up using RF technology. Each fisherman is given a RFID tag. Using this RFID code, information about the fishermen entering the sea is noted. An android mobile is used as base station. GPS technology is used for communication between the fishermen and the base station. An app is created using java.

2. Methodology

The system consists of 3 units, mainly ship unit, boundary unit and base station. An android mobile is considered as the base station. An app is created using java. Figure 1 shows the ship unit. It consists a renesas microcontroller (RL78) which is used to control the whole system. This microcontroller can support 3 UART's. RFID reader, GSM and mp3 module are connected to the microcontroller using these UART's.

The main features of the system are,

- 1) Conveying information about fishermen.
- 2) Emergency

- 3) Weather alert
- 4) Boundary determination
- 5) Intruder

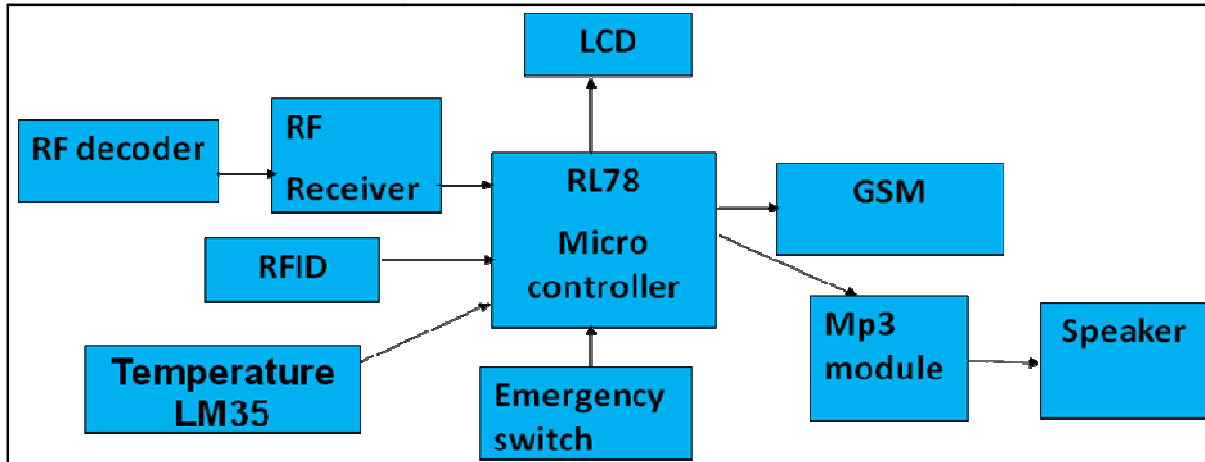


Figure 1: Block diagram of ship unit

2.1. Conveying Information about Fishermen

Each fisherman is given a unique RFID tag. This tag has a unique code. Figure 1 shows the block diagram of ship unit which has a RFID reader. When the fishermen are entering the sea, they punch their RFID tag. The RFID tag is read by the RFID reader by the electromagnetic field developed. The RFID code is displayed on the LCD. Then this information is sent to the base station. At the base station, the app gets opened and a message is displayed.

2.2. Emergency

The ship unit consists of an emergency switch. When the fishermen are in danger and need some help from the base station, the emergency switch is pressed. A message is displayed on the LCD as emergency. The message is sent to base station. At the base station, the app gets opened. E1 is displayed, which shows emergency. Also a voice alert is given.

2.3. Weather Alert

A temperature sensor is used to note the changes. When temperature crosses certain limit, a message is displayed on LCD. A voice alert is given at the ship. So the fishermen can come out of the sea.



Figure 2: Block diagram of Boundary unit

2.4. Boundary Determination

Figure 2 shows the boundary unit which consists of a transmitter. This transmitter continuously transmits signals. When the ship reaches the boundary, the receiver receives the signal and sends it to the microcontroller. A message is displayed on the LCD as boundary. A voice alert is given at the ship.

2.5. Intruder

When any intruders try to cross the boundary, the RFID reads the RFID's nearby and sends it to the microcontroller. If the RFID does not belong to our fishermen, message is displayed on LCD as not valid. The information if sent to base station. At the base station, the app gets opened and a voice alert is given. Then a warning button is pressed at the base station and a voice output is given at the ship unit. This way both the fishermen and the base station can be notified about the intruder. And measures can be taken by both to protect fishermen from intruders.



Figure 3: Base station

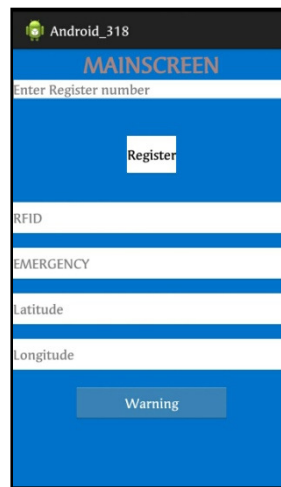


Figure 4: Android app

2.6. Base Station

An android mobile is considered as the base station. An app is created using java. Figure 4 shows how the android app looks like. Firstly, the mobile number of the sim card used in the ship unit has to be registered in the app. The first box shows the information about the RFID. It is displayed as R0 if the RFID belongs to the fishermen. If it belongs to the intruder, then it is displayed as R1. The second box is used to show the emergency condition. When emergency switch is pressed, it is displayed as E1. In all other conditions it will be E0. The third and fourth boxes will display the latitude and longitude each time when a message is received. The warning button is pressed only when an intruder crosses the boundary.

3. Conclusion

All the 5 objectives are fulfilled. The communication system is set up between fishermen and the base station using the GSM technology. The RFID technology is used to convey information about fishermen. The system will be very helpful for the safety of fishermen. As the system can be implemented in the ship, all fishermen can afford it. It will be a solution to the existing problems. The fishermen will be able to seek help whenever required. They will be able to communicate with base station. The boundary information also will be given. Hence the fishermen have less chances of crossing borders and getting arrested.

4. Future Scope

In future, this system can be taken to the product level. To make this project as user friendly and durable, we need to make it compact and cost effective. Going further, most of the units can be embedded along with the controller on a single board with change in technology, thereby reducing the size of the system. As renesas microcontroller can support only 3 UART's, GPS system is not included in the system. In future, the GPS can be included in the system and the location can be noted.

5. References

- i. K. Suresh Kumar, K. Sharath Kumar, "Design of low cost maritime boundary identification device using GPS system", International Journal of Engineering Science and Technology, Vol. 2(9), 2010.
- ii. Glenford A. McFarlane and Joseph Skobla, "GPS Based Marine Communicator, Department of Physics; the University of the West Indies", 2010 IEEE Aerospace Conference Proceedings.
- iii. Design of Data Acquisition and Record System Based on Zigbee and GPS - Huali Chen & Zhifan Feng - Pacific-Asia Workshop on Computational Intelligence and Industrial Application, 2008. PACIIA '08.
- iv. The System of GPS Navigation Based on ARM Processor - Wang Bo & Jia-Xu Dong - International Forum on Information Technology and Applications (IFITA), 2010.
- v. K.Prabakaran et al. - A Noval Approach of Geo fencing and Geo tagging System Based Sea Border Identification Using Embedded System - International Conference on Current Trends in Engineering and Technology, July 2013.
- vi. Abdul Qayyum, Moona Mazher "Autonomous Navigated Global Positioning System Based Surveillance Unmanned Aerial Vehicle", ITEE Journal" Vol.I, Issue 1.
- vii. Angel, G. ; Brindha, A. "Real-time monitoring of GPS-tracking multifunctional vehicle path control and data acquisition based on Zigbee multi-hop mesh network" International Conference on Recent Advancements in Electrical, Electronics and Control Engineering (ICONRAEeCE), 2011, pp.398 –400.
- viii. Watthanawisuth, N.; Tongrod, N.; Kerdcharoen T.; Tuantranont, A. "Real-time monitoring of GP Stracking tractor based on Zig Bee multi-hop mesh network" International Conference on Electrical Engineering/Electronics Computer Telecommunications and Information Technology (ECTI-CON),2010, pp. 580 –583.