

IoT based Border Alert for Fisherman using Zigbee and GPS

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Abstract: Nowadays people living in coastal areas are losing their valuable life unknowingly. This application can be widely used by people in the border to find the appropriate path to reach the destination. Suppose the fisherman crossed the boundary line. The notification will be sent to the board station as well as the fisherman also. The notification will be displayed on the LCD display. The automatic alarm system is going to be provided along with this device which alerts in case of any border crossing. This is, the application can be easily be utilized by all the people in the surroundings.

Keywords: GPS, ZigBee, Arduino UNO, WIFI Module, LCD Display, Buzzer.

1. Introduction

This methodology helps in controlling the fisherman by monitoring their movement from the central control room.

This system is fast and accurate as is the case with most GPS systems and it even determines the speed and the direction in which the boat is heading. GPS is used to track the current location of the ship by finding the longitude and latitude of the current location. By using longitude and latitude values to calculate the threshold values. This value will be displayed on the LCD display also. Suppose the current threshold value greater than the prefixed values of threshold values, then the ship is in danger zone. The buzzer will be ring automatically. The motor speed will be decreased. If not, then it remains the same. By using RF Transmitter and Receiver we can only transmit the frequency and we cannot receive the frequency.

But in Zigbee, we can receive and transmit the radio frequency easily.

GPS and Zigbee protocol are combined to give a safety system which would also serve for security purposes. The additional advantage of the existing border alert systems that are already imparted is that, the interlock of the Zigbee Technology where minute by minute position of the boat can be received to a base station. But, previous systems employed IR radiations which proved to be quite disadvantageous and difficult to use. The paper uses a GPS module, Zigbee, Microcontrollers, and a buzzer system to alert the fisherman. The existing system is an inexpensive maritime border crossing alert system mainly focused on smaller scale fishermen who live just near to the poverty line. This system includes data collection unit, processing unit, controlling unit and

transmission unit and etc., The data collection unit consists of location recognition components like GPS receiver and other components attached to the boat that contains the boat localization by collecting the geological positions. The processing unit holds the latitude and longitude values of the sea in the form of databases that can be used for comparing the present boat position with legal border limits. The controlling unit displays the boat position by using the LCD display and alert to the fisherman through the alarm and turn off the boat motor if the boat crossed the border. The transmission unit sends the position of the boat in the sea to the base station through the Zigbee transceiver.

2. Literature survey

D. Arun Vijay et. al. "Design of Border Alert System for Fisherman Using GPS", March 2014.

India and Sri Lankan Border in this method the author uses the pre-determined values of latitude and longitude points of the maritime border shown in fig 2.1; this is stored in the Microcontroller. When the boat approaches the border, boat's position (latitude and longitude) is measured using GPS and compared with the stored value, if it exceeds then the boats seem to be crossed and an alert message is sent to the fisherman. The advantage is accuracy range is high with the use of GPS. but the drawback is the memory required, saving each point of latitude and longitude is more.

Vignesh M, et. al, "GPS Based Border Alert System for Fisherman with Boat Speedometer", March 2015.

In this method the author foresees the use of GPS tracking system. The boat's position is measured using GPS and the speed of the boat motor is controlled in case of emergency. The alert message is sent to the user (fisherman). The advantage is for the purpose of identification the fisherman is using the GPS72h, equipment used for the navigation in the sea and it provides the fastest and most accurate method for mariner navigate, measure speed, and determines the location and this system enables increased levels of safety and efficiency. The disadvantage here is that border alert is intimated only for the fisherman, but not to the control station.

3. Project framework

The block diagram for the boat monitoring and a border alert

for fisherman using Zigbee and GPS can be given by,

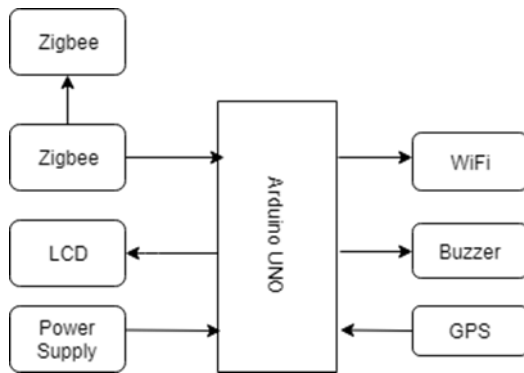


Fig. 1. Block diagram for proposed system (boat side)



Fig. 2. Block diagram for proposed system (base station)

The proposed architectural design consists of a GPS and ZIGBEE. They are interfaced to the 8051 Microcontroller. DC motor is connected to the Microcontroller by using a relay. The GPS tracker in the base station, the location of the boat is monitored through the PC.

4. Implementation setup

A. Components required

- GPS
- ArduinoUNO
- Zigbee
- LCD Display
- Buzzer

1) Arduino UNO

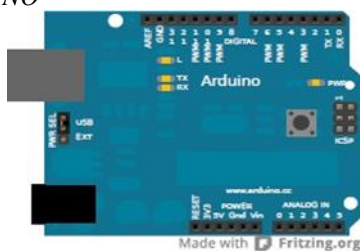


Fig. 3. Arduino UNO

A microcontroller is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/ output peripherals and etc., The important part for us is that a microcontroller contains the processor (which all computers have) and memory, and some input/output pins that you can control on the Arduino. (Often called GPIO - General Purpose Input Output Pins). The hardware consists of a simple open source hardware board designed around an 8-bit Atmel AVR Microcontroller.

The UNO board is the first series of USB Arduino boards and the reference model for the Arduino platform. An important aspect of the Arduino is the standard way that connectors are exposed to allow the CPU to be connected to a variety of interchangeable.

2) Zigbee

Zigbee innovation is a remote sensor innovation that guarantees remote checking and controlling to stack parameters. A portion of the qualities like minimal effort, low power, low information rate, simple establishment, low support, different topologies, and so on. Zigbee is used in applications that require only a low data rate, long battery life, and secure networking.



Fig. 4. Zigbee

This paper exhibits a definite investigation of ZigBee remote standard, IEEE 802.15.4 determination, ZigBee gadget writes, the convention stack design and its applications. The technology defined by the ZigBee specification is intended to be simpler and less expensive than other WPANs, such as Bluetooth or Wi-Fi. The gadget transmits the information from the sender to the recipient and with the assistance of Microcontroller under remote transmission.

3) GPS

A Global Positioning System (GPS) gets the global coordinates without any help from the user as it is independent of internet reception.

GPS satellites broadcast signals and each GPS receiver uses these signals to calculate the dimension of location (latitude, longitude, altitude) and the current time. To get significantly higher accuracy with different recipients utilize Differential GPS requires an extra beneficiary settled in a known area close-by. The values obtained from the GPS can be stored and retrieved anytime, the GPS can even broadcast live stream with more accurate coordinates. The real-time GPS module represents the antenna acts like a receiver that increases the distance and strengthened the signals from the satellite.

4) LCD display



Fig. 5. LCD display

An LCD display is used for displaying the latitude and longitude position of the boat.

The LCD display is connected to the Microcontroller. Every pin is connected to an LCD display. A message is sent through commands via Serial Communication.

5) Wi-Fi module

The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any Arduino access to your Wi-Fi network. This module is low cost standalone wireless transceiver that can be used for end-point IOT developments and it can work both as an Access point (create hotspot) and as a station (connect to Wi-Fi), hence it can easily fetch data and upload it to the internet making Internet of Things as easy as possible. It has a powerful on-board processing and storage capability that allows it to be integrated with the sensors and other application specific devices through its GPIOs.

5. Experimental result

The Data will be gotten from the ZIGBEE and separate the estimation of the scope and longitude to the distinctive areas of the database table in the arrangement of an enormous number of clients. The information shared is put away on the server for at regular intervals for the lossless transmission line.

In the event that the watercraft crosses the outskirts, the server sends an alarm to the Microcontroller and furthermore communicate something specific to the area crossed to the recorded individuals from the predetermined anglers. The border alert system for the fisherman is used to detect the boundary location and warn the fisherman in dangerous situations.

It not only finds the GPS value and also compares with the stored value in the Microcontroller, and makes a decision as to whether the fisherman is in the warning range or not.

6. Proposed system

In our project, we used a DC motor interface with

Microcontroller through the motor driver L293D. Microcontroller displays the latitude and longitude on the LCD display. The ZIGBEE technology also helps us to communicate from both the ends, i.e., the base station and Fishing boat. Hence, with both types of improved technologies, it can be saved human life from the danger zone.

7. Conclusion

In this manner, the Tamil anglers can recognize and abstain from intersection the neighboring domain and furthermore, we can without much of a stretch discover fisherman on the off chance that they appear to be lost in the sea knowing their exact coordinates. The framework gives high exactness and high accuracy estimations of the Latitude and Longitude. This model demonstrates to challenge the officially existing model which just uses a Zigbee for remote transmission with high precision and speedier reaction.

References

- [1] K. Sureshkumaret, "Design of low-cost maritime boundary identification device using GPS system", *International Journey of Engineering Science and Technology* Vol.2(9), 2010, pp. 4665-4672.
- [2] Ahmed. M, Ajaz. S, Asim. M, Ozair. M, Siddiqui. M, Mushtaq. Z, "Autonomous Vehile Monitoring and Tracking System" *SCONEST* 2005. pp.1-3, 2005.
- [3] J. C. Reynolds, R. P. Denaro and R. M. Kalafus, "GPS-based vessel position monitoring and display system," in *IEEE Aerospace and Electronic Systems Magazine*, vol. 5, no. 7, pp. 16-22, July 1990.
- [4] A. Michalski and J. Czajewski, "The accuracy of the global positioning systems," in *IEEE Instrumentation & Measurement Magazine*, vol. 7, no. 1, pp. 56-60, March 2004.
- [5] M. Diaz, "Integrating GPS receivers into consumer mobile electronics," in *IEEE MultiMedia*, vol. 6, no. 4, pp. 88-90, Oct.-Dec. 1999.
- [6] R. Dinesh Kumar, M. Shubin Aldo, and J. Charles Finny Joseph "Alert System for Fishermen Crossing Border using Android" *International Conference on Electrical, Electronics and Optimization Techniques* 2016.
- [7] R. G. Bhavani and F. Samuel, "GPS based system for detection and control of maritime boundary intruding boats," *2016 IEEE 59th International Midwest Symposium on Circuits and Systems (MWSCAS)*, Abu Dhabi, 2016, pp. 1-4.