

Secured Maritime Alert System Based on RSSI Technology

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Abstract - One of the essential traits of remote systems is confinement. Separation between hubs can be evaluated with the assistance of received signal strength indicator (RSSI). Utilizing these parameters and with assistance of different position deciding algorithms, for example, Trilateration localization and area discovery is conceivable. The innovation multiplication of RSSI is utilized to give confinement-based situating, careful area, and time subtleties in every single climatic condition, even anyplace whenever. In spite of the fact that it involves two units to be specific Transmitter and collector units is utilized for time, touchy following, confinement, and a lot greater security application. The marine security frameworks and gadgets turned into an upsetting apparatus for vessel oceanic fringe issues. The proposed framework coins minimal effort ready framework for sea issues. It is a ceaseless observing plan that tracks, cautions and controls the exercises of vessel from the control unit situated in the shore.

Index Terms - RSSI, Border Alert, Fisherman, Boat Speedometer.

INTRODUCTION

Localization and safe evacuation of passengers in large ships during emergency is a growing and important need recently in the maritime industry. Through the Lynceus2Market project [1], it is aimed to develop an overboard localization system that can determine the position of passengers in case they fell overboard the ship into the sea. Through active reflector tags, which will be integrated within the passenger's life jackets, passengers' positions can be determined by an unmanned aerial vehicle (UAV) equipped with global positioning system (GPS) surveying the area around the ship.

$$\text{RSSI} = P_r = P_t \times (\lambda 4\pi d)$$

Fig 1: Microprocessor board bottom view with RSSI



The active reflector tags will use 24 GHz switched injection locked oscillator (SILO) for high resolution localization, and it will also incorporate 868 MHz Zigbee transceivers for long distance communications, which is up to 8 km in an outdoor line of sight scenario with an output transmit power of 14 dBm. The 868 MHz Zigbee will also provide RSSI which can be used to implement a less-accurate localization system for far away passengers which are not in the range of the SILO radar. The advantage of RSSI localization is that it is nearly implemented in all receivers, so it does not require dedicated hardware. Despite its low accuracy as it can suffer greatly from multipath interferences and noise, it will still have fair accuracy if it is deployed outdoors where no strong multipath interference is present. The automated detection and classification of maritime traffic is a challenging problem and is of great importance to many organizations. For marine protected areas (MPAs), an automated boat detection system could alert authorities of vessel traffic. However, in some MPAs commercial snorkeling and diving boats are authorized while fishing vessels are not. For this reason, a classification system is needed to discriminate these different types of boats. The need for similar systems arises in the monitoring of harbor traffic for national security. There are many different methods for boat detection, examples including radar,

electro-optic (EO) and infrared (IR) cameras, and both active and passive sonar. Active sonar and radar provide little additional information beyond detection. Radar and optical methods are limited by line of sight for detection, and optical systems can be obscured by rain, fog, or may require daylight. Active sonar can be used for detection of quiet targets, but the high level of reverberation in shallow water environments.

RELATED WORK

Song chai et.al., An indoor positioning algorithm using RSSI is a Radio-Frequency term which is chiefly utilized for separation estimation between transmitter and receiver. It is most famous system for indoor and outside condition to improve exactness. It is generally reasonable for WSN because of minimal effort, low force utilization, straightforward equipment, and so forth. RSSI accomplishes high precision in short separation. [6] Luis Almedia et.al, RSSI based relative localisation for mobile robots” In this work, we develop an anchor less relative localisation algorithm aimed to be used in multi robot themes. The localisation is performed based on the received signal strength indicator readings collected from the messages exchanged between nodes. they use the RSSI as a rough estimate of inverse of distance between any pair of communication nodes.[5] M.Malamjne et.al., Using RSSI value for distance estimation in wireless networks based on ZIGBEE In today’s modern wireless ZIGBEE based modules , there are two well-known values for link quality estimation: RSSI and LQI. In respect to wireless channel models, received power Should be a function of distance. From this aspect, it is believed that RSSI can be used for evaluating distance between two nodes. The experiment described in this page indicates that RSSI is a better wireless sensor indicator.[1] Anibal et.al., On-line RSSI-Range model learning for target localisation and tracking” The interactions of RSSI with the environment are very difficult to be modelled, including sufficient errors in RSSI range models and highly disturbing target localisation and tracking methods. Some techniques adopt a training-based approach in which they often learn the RSSI range characteristics of the environment in a good training phase.[3] Sadiq basha et.al., RSSI based implementation of smart Toll Gate automation” this project presents a new prototype that aims to design,

develop and implement RSSI based smart toll gate automation which is used to achieve an improved form of toll gate billing system. The existing system provides the customer with a smart card which provides the details about the person. few of the existing projects based on RFID Tag, which consume more power because radar and tags required power. Active tags expensive because of their complexity.[9] At earlier the wireless sensor networks are utilized by many application and systems where their location of their nodes in the network is to be tracked. So many security systems and sensitive applications are used. The systems like MANET which is used for addressing the issues uses an algorithm called cooperative localization which has multiple hops and nodes cannot be localized by a single hop localization algorithms. To help Gujarati Fishermen to alert when they cross the border and alert in their regional language this application also works in GPS enable mobile device and specific GPS instrument. The concept is to safeguard the uneducated fisher men crossing the border and guides them to go in a right path and save their life. It a helps in locating the Fishing boat using GPS system. This information is transmitted using wireless mode to the control system. Then by detecting the latitude and longitudinal location of the Fishing boat, the control system detects the present area of the Fishing boat and send command signal to the Fishing boat using wireless mode to guide the vehicle if the boat is out from the border. The GPS system is the technology which helps us in identifying the Fishing boat either inside or outside the border. The ZIGBEE technology also helps us to communicate from both the ends. The technology using is Global Positioning system (GPS) to track and identify the position of boats and ships by means of satellite communication. These systems use the electronic maps that provides for the navigation and localization methods by the user. Since this system locates through GPS [5], there are many drawbacks which are position information becomes even more critical in GPS, Complexity, Turn-by-turn directions are not available on every type of GPS device, No accuracy, no longer lifetime.

PROPOSED METHODOLOGY

The proposed work is allowed low cost maritime security system which is mainly focused on the small

scale fisherman who live just near to the poverty line. This security alert system comprises with Transmitting unit which consist of all information and connect with alert system and wireless sensors and the Processing unit which estimate exact position of the vessel by using the localization algorithm and Receive unit monitors the whole process of transmitter and control through PC. The Proposed system's detailed work is discussed by following sections. Fig.1 represents the block diagram of our project. The block diagram shown below gives the basic architecture of the transmitter unit consisting of microcontroller, LCD, vibration sensor, relay switch, motor and RSSI transceiver.

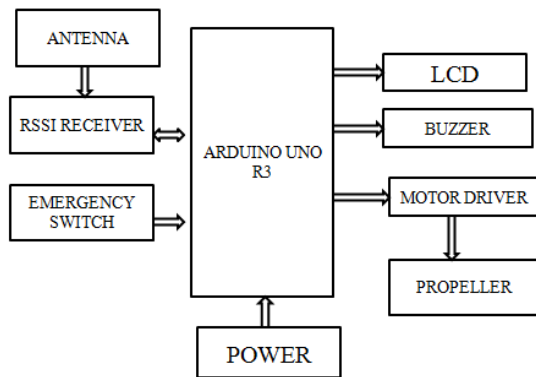


Fig 1: Boat Unit

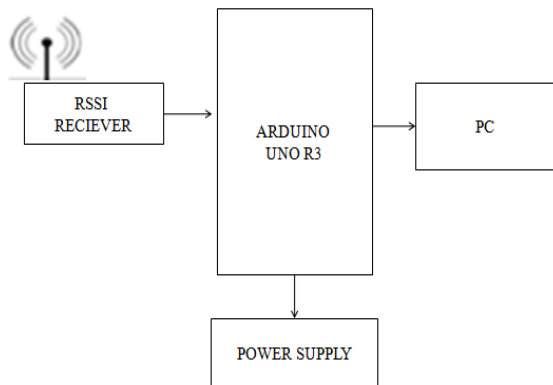


Fig 2: Monitoring Unit

This system is used to detect the locations and boundaries of three stages in seashores with help of RSSI and also intimate to coastal guard. The 2 level borders B1, B2 area details are stored in the controlling unit. If a vessel crosses B1, the controlling unit will provide an alert. If a vessel crosses B2, motor of the boat will be stop. fig 2 and fig 3 shows the transmitter block and the receiver block this is used to transmit the

information from the coastal guard room and the vessel at the sea.

Hardware Requirements

- Arduino Uno R3
- Rssi Tranceiver
- Switch
- Motor Driver
- Keypad
- Propellernmechanism
- Buzzer
- Power Supply Unit
- 16*2 Lcd

Software Requirement

- ARDUINO IDE
- Embedded C

HARDWARE IMPLEMENTATION

Arduino UNO

The Arduino UNO is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 Digital pins, 6 Analog pins, and programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under Common Creative Attribution Share-Alike 2.5 license and is available on the arduino website. Layout and production files for some versions of the hardware are also available. "UNO" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The UNO board and version 1.0 of arduino Software (IDE) were the reference versions of arduino, now evolved to newer releases. The UNO board is the first in a series of USB arduino boards, and the reference model for the arduino platform. The ATmega328P on the arduino UNO comes preprogrammed with a boot loader that allows uploading new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The UNO also

differs from all preceding boards in that it does not use the FTDI USB-to serial driver chip. Instead, it uses the Atmega16U (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.



Fig -2: Arduino Board

LCD

Liquid Crystal Display (LCD) is used to display the output to the user in the form of GUI (Graphic User Interface) and a mono chromatic display. LCD used in this project is JHD162A series. There are 16 pins in all. They are numbered from left to right 1 to 16 (if you are reading from the backside). Generating custom characters on LCD is not very hard. It requires the knowledge about custom generated random-access memory (CG-RAM) of LCD and the LCD chip controller. Most LCDs contain Hitachi HD4478 controller. CG-RAM is the main component in making custom characters. It stores the custom characters once declared in the code. CG-RAM size is 64 byte providing the option of creating eight characters at a time. Each character is eight byte in size.

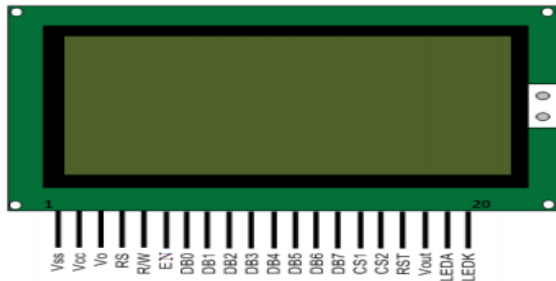


Fig 3: LCD

RSSI (RECEIVED SIGNAL STRENGTH INDICATION)

RSSI is a Radio-Frequency term which is basically utilized for separation estimation amongst transmitter and collector. It is most prevalent method for indoor and outside condition for enhance exactness. It is most appropriate for WSN because of minimal effort, low

power utilization, basic equipment, and so on. RSSI accomplishes high exactness in short separation.

UART

An all-inclusive off beat recipient/transmitter is a kind of "non concurrent beneficiary/transmitter", a bit of PC equipment that deciphers information amongst parallel and serial structures. UARTs are regularly utilized as a part of conjunction with other correspondence benchmarks, for example, EIA RS-232. A UART is generally an individual (or some portion of an) incorporated circuit utilized for serial interchanges over a PC or fringe gadget serial port. UARTs are currently regularly incorporated into microcontrollers. A double UART or DUART joins two UARTs into a solitary chip. Numerous present-day ICs now accompany a UART that can likewise convey synchronously; these gadgets are called USARTs. The Universal Asynchronous Receiver/Transmitter (UART) controller is the key segment of the serial correspondences subsystem of a PC. The UART takes bytes of information and transmits the individual bits in a successive manner. At the goal, a moment UART recollects the bits into finish bytes. Serial transmission of advanced data (bits) through a solitary wire or other medium is considerably more savvy than parallel transmission through different wires. A UART is utilized to change over the transmitted data between its consecutive and parallel shape at each end of the connection. Each UART contains a move enlist which is the basic strategy for change amongst serial and parallel structures.

DC MOTOR

An immediate current engine is a shunt-twisted engine in which the field windings and the armature might be associated in parallel over a consistent voltage supply. Each DC engine has six essential parts - pivot, rotor, armature, stator, commutator, field magnet(s), and brushes. In most regular DC engines, the outer attractive field is delivered by high-quality perpetual magnets. The stator is the stationary piece of the engine, this incorporates the engine packaging, and in addition at least two lasting magnet post pieces. The rotor (together with the hub and joined commutator) pivot regarding the stator. The rotor comprises of windings (for the most part on a center), the windings being electrically associated with the commutator.

ENGINE CONTROL UNIT

The ECU comprises of an AT mega 238, subjective Get to memory (RAM), read just memory (ROM), and an info/yard interface. This unit is used to stop engine when it is achieves the confined region. On the off chance that it is more proximate the limited region, the engine speed lessened by using beat width regulation. The Electronic Control Unit (ECU) can control essentially every operation in a motor together with blast frameworks. In electronic control unit work at electronic fuel injector with a solenoid valve to control the fuel supply in the motor When the alert is caused it is fundamental to prevent the motor from advancing the fuel injector is fitted with a solenoid valve which is an electromagnetically controlled mechanical valve. At the point when the GPS position coordinates the put away limited esteem, the aftereffect of the esteem provides for the fuel injector. So, this thusly decreased the fuel supply which stops the motor from pushing ahead.

RELAY

A hand-off is an electrically worked switch. Where many transfers are habituated to an electromagnet to mechanically work a switch, yet other working standards are withal used, for example, strong state transfers. Relays are used where it is mandatory to control a circuit by a low-control flag where a few circuits must be controlled by one flag. The primary transfers were used in long separation broadcast circuits as enhancers they emphasized the flag radiating from one circuit and re-transmitted it on another circuit.

RESULTS AND DISCUSSION

The result of this model is when the boat is nearing the border it will alert the fishermen by sending the message. Here the figure 8 shows that checking whether the boat is crossing the border. Figure 9 shows that the alert is shown when the boat is nearing the border. Even after sending the message the boat is either not turning the direction or stopping the boat the boat will gets turned off automatically. The advantages are fast response, easy to use, rescuing fisherman’s life, improved security. The disadvantage is if there is any clone or floods in the ocean/sea, cannot be able to inform the fisherman by prior.so it is not able to rescue the fisherman life in that situation.

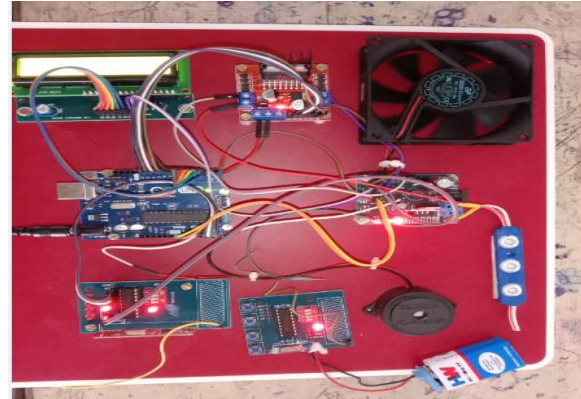


Fig 4: Experimental Setup

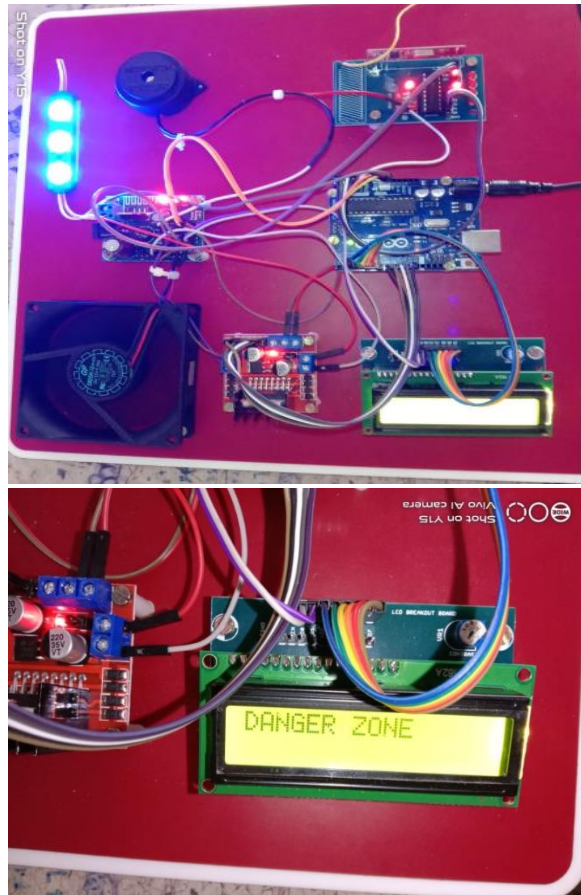


Fig 5. Output

CONCLUSION

The proposed paper of the Border ready and sharp following with alert using RSSI has ended up being a low venture. The venture furthermore goes for giving placidity at the fringes and decreases the pressures between the two nations. The proposed framework's engineering is solid most noteworthy favorable position of the RSSI framework is the office of the

creation to work in any climate conditions and in any signifies. The framework conceived will moreover incorporate a waterproof that the circuit is not inclined to any harm. The framework gives high accuracy and high exactness estimations of the Scope and Longitude. This model demonstrates to challenge the as of now subsisting model which just uses a DGPS contraption to track the fringe and make the watercraft move rearwards. This is not utilizable as, amidst the oceans, despite the fact that there are no waves, the sea streams can hoodwink the watercraft and prompt to investigation. The framework proposed will not just alarm the anglers however also conveys the data to the control station and moreover advises the relatives through the RSSI framework. On the off chance that the vessel is muddled because of harsh states of the ocean (or) purposeful intersection of the outskirt is done.

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