

Nautical Boundary Recognition And Forewarning System Using IoT

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Abstract- This paper describes about the Nautical boundary recognition and Forewarning system for fishermen using GPS and Engine control unit. Fishermen's livelihoods are so insecure that if they cross the country's border accidentally, it is treated as a serious offence. The fundamental cause of this problem is that marine borders between countries are difficult to identify. Hence the proposed system is designed and utilized to encourage the fishermen to explore inside our sea nation border using GPS and Bluetooth module HC-05. The location of the boat is received by the GPS receiver continuously and the inputs are sent to the microcontroller unit which compares the present latitude and longitudinal values with the stored predefined value. Then from the result of the comparison, this engine system is operated accordingly to switch on/ off automatically whether that they are about to reach the nautical border or in limits.. Then the Bluetooth module transfers the data from the microcontroller unit to the cloud storage through web server remote monitor using IOT and simultaneously sends the message to the coastal guard office. The Bluetooth module HC-05 used in this proposed framework provides high-speed data transmission and requires low power consumption which also includes a low-cost maritime boundary crossing warning system for fishermen.

Keywords- Internet of Things (IoT), GPS, Bluetooth Module, Microcontroller (W78E052DDG-142SA)

I. INTRODUCTION

The Island like Sri Lanka, peninsula like India and the coastal countries are separated by their maritime borders. The people livelihood in the coastal area of those countries purely depends on fishing occupation in the sea. Due to unknowing boundary limit, the fishermen used to rude the maritime borders and they get arrested or killed by the relevant navy and they are being abducted and their boats are being captured by the neighborhood countries coastal guards. To avoid this issue, there is need for producing significant realization among our fishermen to avoid boundary crossing. GPS, GSM, and Wireless Networks can be the best choice for addressing the maritime border crossing issue. The proposed

system is used to device a low-cost alert system for fishermen that gives an alert when the boat/ship crossed beyond other country's border. In addition, a Global System for Mobile Communication supported TX interface will send or forward a message to base station located on the shore indicating that a boat has crossed the border and the boat/ship will be controlled by the base station. Thus, guards in the shore can assist and provide additional help to those fishermen if needed. This device has been created to help them not to move beyond Indian border for to save their lives.

In existing system Arduino Uno's ATmega328 is used, and its system connected with GPS, GSM, and a Buzzer. Arduino has open-source hardware and software. The receiver end of Arduino Uno is connected with GPS and the transmitter end is connected with GSM of Arduino Uno. By using embedded C, a predefined location is set and if this is crossed, an SMS alert will be sent to a predefined number.

This communicates using the unique STK400 procedure.

Section II: To describe the Objective of the project, Section III: Literature survey of the project, Section IV: Methodology of the project, Section V: Advantages of the project., Section VI: Verification and Results, Section VII: Conclusion and Future Scope and Section VIII:References.

II. OBJECTIVE

This project aims at providing an attainable resolution to the various hardships visaged by the fishermen as a result of there is stop from any kind of communication. During this project a conveyable device is going to be created, that uses Wireless Transmission for real-time location detection and uses of wireless communication. The device additionally options a little show LCD digital display alphanumeric display and a button that acts as a utile communication switch. Every of the fishing boats is given this transportable device. Victimization of the wireless transceivers on every one of the units, all the boats will type a network inside themselves. Once this network is established, then the subsequent applications can become attainable.

- i. Prevention of fishermen from crossing into international areas.
- ii. Using the network, a warning can be provided to the fishermen from a coastal station / from coast guard vessels.
- iii. If there is any accident or emergency situation on a boat, the information will be broadcasted on the AD Hoc network, thus enabling rescue operations.

III. LITERATURE SURVEY

D. Jim Isaac - the paper titled as “Advanced border alert system using GPS and with intelligent Engine control unit “In our system using GPS and GSM, where GPS is used to find the location of the boat. If the boat nearer to the boundary primarily it warns the fishermen with the alarm and emits the location of the boat to the nearest coast office via GSM communication. When it further nears the maritime boundary, an interferer is sent to the Engine Control Unit which controls the speed of the engine with the help of the electronic fuel injector. and its low cost maritime. By this method, we can alert the fishermen and also monitor them thereby avoiding banned activities such as smuggling, intruders, etc.

Naveen Kumar.M -the paper titled as “border alert and smart tracking system with alarm uses DGPS and GSM and this system uses DGPS to track the location of the boat and to activate an alarm which consists of a Piezo-buzzer, when the border is move toward or crossed. Also, in addition, the DGPS information is sent to control office, and also the information is sent to the family at regular time intervals that are in expectation about their family member's safety.

S. Kiruthika - the paper titled as” A Wireless mode of protected defence mechanism to mariners using GSM technology. “In our system using only GPS to receive the information from the satellite and stored. border locations to detect whether the boat has crossed the border or not. If so, the mariner is alerted, and the message is transmitted to nearby coast office through RF signals at VHF (30-300MHz) range which covers wide area.

IV. METHODOLOGY

The proposed system is based on NUVOTON-142SA instead of using an Arduino Uno’s ATmega328 microcontroller. This project puts forward an approach of suspecting the boarder and alerting the fisherman. Complete location is split up into safe zone and danger zone. This system incorporates GPS receiver, LCD display, LED, and Bluetooth module. The location of the boat is received by the GPS receiver continuously and the inputs are sent to the

NUVOTON which compares the current location with the boundary location already stored. The NUVOTON then makes use of the LCD display and LED to act as an indicator for the zone in which the boat is situated. The motor move to reaches the restricted zone automatically engine gets off by means of relay and send through the message to the coastal guard.

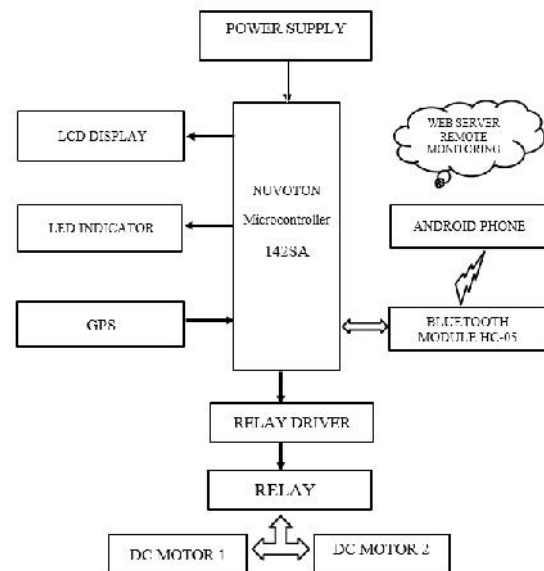


Fig:1. Block Diagram of the Transmitter



Fig:2. Block Diagram of the Receiver

NUVOTON Microcontroller: NUVOTON W78E052DDG-142SA is a successive microcontroller unit that is fully compatible with the widely popular 8052 despite having an 8051 core. It is an 8-bit architecture-based microcontroller unit that has 8 kilobytes of Flash. It has 256 bytes of RAM, 4 8-bit bi-directional I/O ports, specified as P0, P1, P2, P3, and 4-bit I/O port P4. Three 16-bit timer/counters, a hardware watchdog timer, and a serial port make this microcontroller easy to integrate with multiple applications. The specialty of this microcontroller unit is the optional 12T or 6T mode. The W78E052DDG 8-bit microcontroller is an 8051 based CMOS microcontroller unit that has limited peripheral support having a vast range of GPIOs and a single full-duplex UART. This controller has a 3pcs 16bits Timer/Counter. A full duplex single UART is very good to make communication with PC-based applications.



Fig:3. NUVOTON Microcontroller

BLUETOOTH MODULE HC-05:The Bluetooth module HC-05 is a MASTER/SLAVE module. By default, the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The Slave modules cannot initiate a connection to another Bluetooth device but can accept connections. Master module can initiate a connection to other device. The user can use it a simply for a serial port replacement to establish a connection between MCU and GPS, PC to your embedded project, etc.



Fig:4. Bluetooth Module HC-05

VOLTAGE REGULATOR: A voltage regulator is an electronic circuit that provides a stable DC voltage independent of the load current, temperature, and AC line voltage variations. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components.

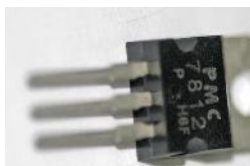


Fig:5. Voltage Regulator

LED INDICATOR: LED Stands for "Light-Emitting Diode." An LED is an electronic device that emits light when an electrical current is passed through it. LEDs are commonly used for indicator lights (such as power on/off lights) on electronic devices. These lights are also commonly used in electronics and automotive industries, and for signage, along with many other uses.



Fig:6. LED Indicator

POWER SUPPLY: Linear regulated power supply having 5V output which will be useful for driving the other components in the circuit like microcontroller. A module should not be inserted or removed from a live circuit. The ground terminal of the power supply must be isolated properly so that no voltage is induced in it. The module should be isolated from the other circuits, so that stray voltages are not induced, which could cause a flickering display.

LCD DISPLAY: A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made from a matrix of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the color of the backlight, and a character negative LCD will have a black background with the letters being of the same color as the backlight. Optical filters are added to white on blue LCDs to give them their characteristic appearance.



Fig:7. LCD Display

DC MOTOR: A DC motor is used to convert the direct flow of electrical energy into mechanical energy which is electrical motors. The most notable sports depend upon the forces conveyed by appealing fields. Since they could be powered by existing direct-current lighting power transport systems, DC motors were the most common type of motor used. DC motors

use electromagnetic induction to convert electricity into motion, while AC motors do the opposite. A permanent magnet and an armature (a spinning coil of wire) are used in the motor.



Fig:8. DC Motor

ANDROID PHONE: An Android cell phone is a cell phone running the Android OS. A typical Android cell phone is a smart phone with touch screen interface, multiple connectivity options, internet browsing capabilities.

RELAY: A type of relay that can handle the high power required to directly control an electric motor or other loads is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called "protective relays".



Fig:9. Relay Driver

V. VERIFICATION AND RESULTS



Fig:10. Hardware Prototype of the system



Fig:11. Message from transmitter Side

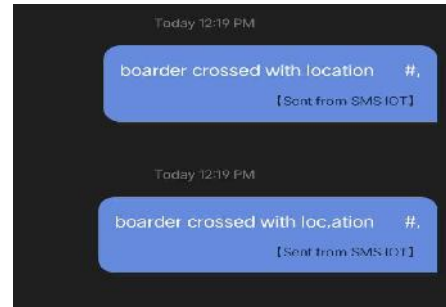


Fig:12. Message received in Receiver Side

VI. ADVANTAGES

- Low cost when contrasted with existing framework.
- It provides high-speed data transmission.
- Accommodate a wider frequency range with low power consumption.
- Helpful for Wreckage recovery.

VII. CONCLUSION AND FUTURE SCOPE

The risk of crossing the border unknowingly by the fishermen can be reduced by implementing the proposed system. This kit is cost efficient which helps saving the lives of innocent fishermen and piracy of boats can also be stopped. This system helps the user to circumnavigate in sea and can alert the coastal guards if they need help. In future following features can be added to the project and enhanced by keeping kits in all boats and by knowing the locations of all the boats we can use kits to assist the traffic. The obstacles which can damage the bottom of the ship can be avoided by using IR sensor and solar panels can be implemented in the vessels. The energy trapped from the solar panel can be used to drive the boat.

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