SEA WATER SECURITY MANAGEMENT

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Abstract— The island like Sri Lanka, peninsula like India and the coastal countries are separated by their maritime borders. The people livelihood in coastal area of those countries purely depends on fishing occupation in the sea. Crossing the border is being a serious offence. Especially, In Tamilnadu nearly 20,000 boats perform fishing in the Bay of Bengal. Due to carelessness or unknowing the boundary limit, the fisherman used to rude the maritime borders. Once they rude the border, they arrested or killed by the relevant navy and they are being abducted and their boats are being captured by the neighborhood countries coastal guards. In such situation the lives of fishermen continue to be difficult. It is a major threatening issue and leads to loss in the both humans as well as their economic incomes. As far as the fishing activity has not been peaceful since the issue of maritime border crossing. Coastal route is always a choice of intruders. In order to avoid this issue, there is a need for producing significant realization among our fishermen to avoid crossing over into Sri Lanka water boundary. The technology proliferation will be an apt choice for resolving the nautical boundary crossing issue. Global Positioning System (GPS), Global System for Mobile communication (GSM) and Wireless Networks can be the best choice for addressing the maritime border crossing issue. The proposed system is used to devise a low-cost alert system for fisherman that gives an alert when the boat/ship crossed beyond other country's border. It helps the fishermen not to go afar of border. If the fishermen violate the border agreement, an alarm (danger signal) is generated indicating that the fisherman has violated the rule. In addition, a Global System for Mobile communication supported TX interface will send (forward) a message to base station located on the shore indicating that a vessel has crossed the border. Thus, guards in the shore can assist and provide additional help to those fishermen if needed. Keeping in mind about lives of Indian fishermen, this device has been created to help them not to move beyond Indian border.

Keywords— maritime, proliferation, GSM

I. INTRODUCTION

An embedded system is a special purpose computer system, which is completely encapsulated by the device in control. An embedded system has specific requirements and performs predefined tasks, unlike a general-purpose personal computer. An embedded system is a programmed hardware device. A programmable hardware chip is a 'raw material' and it is programmed with particular applications. This is intelligent system to understand in comparison to older systems with full functional hardware or system with general purpose hardware and extremely loaded software.

Embedded systems are a combination of hardware and software which facilities mass production and variety of application. It perhaps additional mechanical or other parts designed to perform a dedicated function. In some case embedded system is part of a large system or product. Embedded system is part of a large system and hardware that has a computing device embedded in it.

There are controllers, processors, arrays or other hardware using dedicated (embedded) logic or programming (code) called firmware are a microkernel. Embedded systems are designed around a microcontroller which integrates memory and peripherals. Embedded systems are usually part of a larger device augmenting its capabilities. This is intelligent system to understand in comparison to older systems with full functional hardware or system with general purpose hardware and externally loaded software. Therefore, an embedded system is a programmed hardware device.

.NEED FOR EMBEDDED SYSTEM

It is an embedded system because microcontroller is 'inside' some other system.

Example: a microcontroller is 'embedded' into TV, etc.

- Avoids lot of electronic components
- Built in rich features
- Reduces cost and space
- Reduces time for maintenance
- Probability of failure is reduced
- Easy interface with computer

COMPONENTS OF EMBEDDED SYSTEM

- Microcontroller
- Microprocessor
- Digital signal controller
- Digital signal processors
- Buses

Navigation and localization using Mobile Ad-hoc Networks (MANETS)

At first the wireless networks are utilized by many applications where the locations of the nodes in the networks need to be tracked based on the calculation of ommunication factors among nodes. Hence many time and secure sensitive applications require the deployment of mobile ad-hoc networks. Mobile Ad-hoc Networks (MANETS) can also used for addressing these issues by algorithms called cooperative localization. The challenges are extended to cooperative localization is that multiple hops nodes cannot be localized using single hop localization algorithms. In sensor network technology, the localization of sensor needs to be tagged with sensor data. Cost and energy depletions are the notable drawbacks of the sensor networks. Presently there are few existing systems using GPS technology to track and identify the current position of the boats/ships. These systems used electronic map that provides an effective method for navigation and localization detection by the naïve users. This also acquires increased levels of safety and efficiency for mariners. The accurate position information becomes even more critical in GPS based monitoring system.

Border Alert System for Boats Using Zigbee

The boaters may sometimes cross their area limit without their knowledge. This causes a lot of problems. They may be caught by the other peoples. This project is developed for the boat users to find out their border in the sea area. The main modules in this project are RF transducer, microcontroller unit and LCD display. The Zigbee transmitter is connected at the border area. It transmits RF signals within the particular limit. The Zigbee receiver with the micro controller unit is connected at the boat. When the boat reaches the particular area, the RF signals are received by the receiver and given to the micro controller unit.

The micro controller analyses the signal and calculates the distance and sends corresponding message to the LCD display. If it crosses the limit, the micro controller operates the warning buzzer and it switches off the running motor of the boat. Thus, the boat may be automatically off and the boater may easily understand the situation. This information is conveyed to the coastal authorities using GSM and they will track the boat using GPS system. The micro controller program is written in embedded c language and the microcontroller used is AT89C51.

LIMITATIONS IN EXISTING SYSTEM

The main drawback of the existing system is using the Zigbee and RF technologies. These can be used for a smaller area in the sea. This system can be used only to identify the border crossing not to save the boat and fishermen.

THE PROPOSED SYSTEM

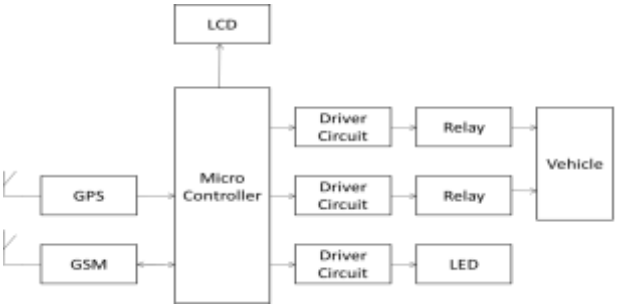
The proposed system uses a GPS receiver which receives signal from the satellite and gives the current position of the boat. The proposed system is used to detect the border of the country through the specified longitude and latitude of the position. The border can be predefined and this can be stored in microcontroller memory. The current value is compared with predefined values and if these values are same, immediately the microcontroller gives instruction to the driver circuit to reverse the boat/ship automatically. It also uses a message

transmitter (GSM) to send message to the base station which monitors the boats in the sea. The system provides an indication to both fisherman and to coastal guard. Thus, it saves the lives of the fisherman and alerts the base station to provide help.

MODIFICATION IN THE EXISTING SYSTEM

Existing system is used only for surveillance purpose. Using the GPS system one can able to monitor the entire area and able to control the boat. In existing system, the border crossing get detect and raise alarm. But in the proposed system, the message sending and reversing the boat is added so that the controller can able to control the boat automatically. This system uses GPS is more accurate compare to the other systems.

BLOCK DIAGRAM OF SYSTEM



BLOCK DIAGRAM DESCRIPTION

GPS

The GPS unit receives the location of the boat continuously from the satellite. This GPS unit can be interfaced with Microcontroller by using MAX232.

GSM

The GSM Modem in the block diagram explains the mobile phone. This paves the sending of message (SMS). The GSM modem is interfaced with Microcontroller by using MAX232. When the boat crosses the border, the GSM is used to send the SMS to the base station.

MICROCONTROLLER

The ATmega164PA/324PA/644PA/1284P is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega164PA/324PA/644PA/1284P achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption and processing speed.

EVOLUTION OF MICROCONTROROLLER:

Markets for microcontrollers can run into millions of units per application. At these volumes of the microcontrollers is a commodity items and must be optimized so that cost is at a minimum. .Semiconductor manufacturers have produced a mind-numbing array of designs that would seem to meet almost any need. Some of the chips listed in this section are no longer regular production, most are current, and a few are best termed as "smoke ware": the dreams of an aggressive marketing department.

LCD

The LCD unit is used to display the current location and direction of the boat.

LED

The basic LED circuit is an electrical circuit used to power a light-emitting diode (LED). It consists of up to four components connected in series: a voltage source, a current limiting resistor, a LED, and optionally a switch to open and close the circuit.

MOTOR DRIVER

The motor in the vehicle is interfaced with Microcontroller by using the relay. The LPC298 is used to control the direction of the boat. This driver can be used to move the vehicle in forward, reverse, right and left direction.

A GSM modem is a specialized type of modem which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone.

When a GSM modem is connected to a computer, this allows the computer to use the GSM modem to communicate over the mobile network. While these GSM modems are most frequently used to provide mobile internet connectivity, many of them can also be used for sending and receiving SMS and MMS messages

A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it can be a mobile phone that provides GSM modem capabilities.

For the purpose of this document, the term GSM modem is used as a generic term to refer to an modem that supports one or more of the protocols in the GSM evolutionary family, including the 2.5G technologies GPRS and EDGE, as well as the 3G technologies WCDMA, UMTS, HSDPA and HSUPA.

A GSM modem exposes an interface that allows applications such as Now SMS to send and receive messages over the modem interface. The mobile operator charges for this message sending and receiving as if it was performed directly on a mobile phone. To perform these tasks, a GSM modem must support an "extended AT command set" for sending/receiving SMS messages, as defined in the ETSI GSM 07.05 and 3GPP TS 27.005 specifications.

GSM modems can be a quick and efficient way to get started with SMS, because a special subscription to an SMS service provider is not required. In most parts of the world, GSM modems are a cost effective solution for receiving SMS messages, because the sender is paying for the message delivery.

OVERVIEW

The ATmega162 is a low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega162 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption and processing speed.

The AVR core combines a rich instruction set with 32 general purpose working registers. All the 32 registers are directly connected to the Arithmetic Logic Unit (ALU), allowing two independent registers to be accessed in one single instruction executed in one clock cycle. The resulting architecture is more code efficient while achieving throughputs up to ten times faster than conventional CISC microcontrollers.

The ATmega162 provides the following features: 16Kmicrocontroller where the number of I/O locations bytes of In-System Programmable Flash with Read-While-Writesupersedes the 64 I/O locations reserved in the AVR capabilities, 512 bytes EEPROM, 1K bytes SRAM, an externalinstruction set. To ensure back-ward compatibility with memory interface, 35 general purpose I/O lines, 32 generalthe ATmega161, all I/O locations present in ATmega161 purpose working registers, a JTAG interface for Boundary-scan, On-chip Debugging support and programming, four flexible Timer/Counters with compare modes, internal and external interrupts, two serial programmable USARTs, a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM,

Timer/Counters, SPI port, and interrupt system to continue functioning. The Power-down mode saves the register contents but freezes the Oscillator, disabling all other chip functions until the next interrupt or Hardware Reset. In Power-save mode, the Asynchronous Timer continues to run, allowing the user to maintain a timer base while the rest of the device is sleeping. In Standby mode, the crystal/resonator Oscillator is running while the rest of the device is sleeping.

This allows very fast start-up combined with low-power consumption. In Extended Standby mode, both the main Oscillator and the Asynchronous Timer continue to run. The device is manufactured using Atmel's high density non-volatile memory technology. The On-chip ISP Flash allows the program memory to be reprogrammed In-System through an SPI serial interface, by a conventional non-volatile memory programmer, or by an On-chip Boot Program running on the AVR core. The Boot Program can use any interface to download the Application Program in the Application Flash memory. Software in the Boot Flash section will continue to run while the Application Flash section is updated, providing true Read-While-Write operation. By combining an 8-bit RISC CPU with In-System Self-Programmable Flash on a monolithic chip, the Atmel ATmega162 is a powerful microcontroller that provides a highly flexible and cost effective solution to many embedded control applications.

The ATmega162 AVR is supported with a full suite of program and system development tools including: C compilers, macro assemblers, program debugger/simulators, In-Circuit Emulators, and evaluation kits.

The ATmega162 is a highly complex

have the same locations in ATmega162. Some additional I/O locations are added in an Extended I/O space starting from 0x60 to 0xFF, (i.e., in the ATmega162 internal RAM space). These locations can be reached by using LD/LDS/LDD and ST/STS/STD instructions only, not by using IN and OUT instructions. The relocation of the internal RAM space may still be a problem for ATmega161 users. Also, the increased number of Interrupt Vectors might be a problem if the code uses absolute addresses. To solve these problems, an ATmega161 compatibility mode can be selected by programming the fuse M161C. In this mode, none of the functions in the Extended I/O space are in use, so the internal RAM is located as in ATmega161. Also, the Extended Interrupt Vectors are removed. The ATmega162 is 100% pin compatible with ATmega161, and can

replace the ATmega161 on current Printed Circuit Boards. However, the location of Fuse bits and the electrical characteristics differs between the two devices.

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. Rather than having a melting point, they have a temperature range within which the molecules are almost as mobile as they would be in a liquid, but are grouped together in an ordered form similar to a crystal.

An LCD consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates are coated with transparent electrodes which define the character, symbols or patterns to be displayed polymeric layers are present in between the electrodes and the liquid crystal, which makes the liquid crystal molecules to maintain a defined orientation angle.

CONCLUSION

The progress in Science & Technology is a non-stop process. Everyday new things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

The proposed system based on Atmega microcontroller is found to be more compact, user friendly and less complex, which can be readily used in order to perform. Though it is designed keeping in mind about the need for industry, its use can be extended for other purposes such as commercial & research applications. This project “MARITIME SECURITY SYSTEM USING GPS” is fully software controlled with less hardware circuit. The feature makes this system the base for future systems.

FUTURE SCOPE

In this project we can store upto 5 GPS values in microcontroller memory.

In future we can add external memory to store more number of GPS values.

In future we can add mobile display with google map instead of LCD display.

The satellite image can be added to this project to find fishes inside the border.

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