ijournals International Journal of Software & Hardware Research in Engineering
ISSN No: 2347-4890 Volume 2 Issue 1/ January 2014

A REAL-TIME BORDER ALERT SYSTEM FOR BOATS USING WINS

Shibu.J[1]; Gowthami.D[2]

Affiliation: PG Scholar[1]; PG Scholar[2]; PG Scholar[3]

Bannari Amman Institute of Technology

ABSTRACT

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 GPS module, WINS transceiver, microcontroller unit and LCD display. The WINS are distributed in the sea border which is divided into nodes of certain distances. is connected at the border area. Each sensor nodes can communicate each other. The receiver is kept in the boat and which is connected to the microcontroller 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.

Keywords

GPS (Global Positioning System), GSM (Global System for Mobile Communications), Wireless Integrated Network Sensors (WINS), Personal Computer (PC).

1. INTRODUCTION

Wireless Integrated Network Sensors (WINS) combine sensing, signal processing, decision capability, and wireless networking capability in a compact, low power system. On a local, wide-area scale, battlefield situational awareness will provide personnel health monitoring and enhance security and efficiency. Also, on a metropolitan scale, new traffic, security, emergency, and disaster recovery services will be enabled by WINS. Here first it identifies the node where the harmonic signals are produced by the strange objects and the intensity of the signal will be collected .The signal will be sent to the main node. The processing of the regular interval data from the nodes will be analyzed and based on the intensity of the signals and the direction of the detecting nodes gets changing will be observed and the results will be sent to the satellite communication system.

2. SYSTEM ARCHITECTURE

It consists of Client side module which is placed on the boat and Server side module. Boat module consists of microcontroller unit connected to the GPS transceiver [3] and indication unit of LED and buzzer. Costal unit consists of system control unit and GPS transceiver.

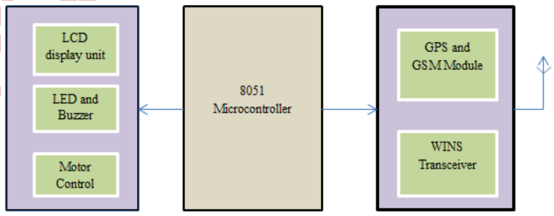

Fig 1: Block Diagram of Boat Module

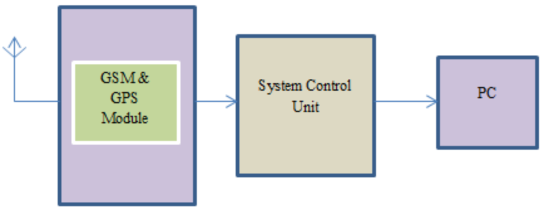

Fig 2: Block Diagram of Costal Unit

3. WINS SYSTEM FOR AREA DETECTION

Conventional wireless networks are supported by complex protocols that are developed for voice and data transmission for handhelds and mobile terminals. These networks are also developed to support communication over long range (up to 1km or more) with link bit rate over 100kbps. In contrast to conventional wireless networks, the WINS network must support large numbers of sensors in a local area with short range and low average bit rate communication (less than 1kbps). The network

ijournals International Journal of Software & Hardware Research in Engineering
ISSN No: 2347-4890 Volume 2 Issue 1/ January 2014

design must consider the requirement to service dense sensor distributions with an emphasis on recovering environment information. Multi hop communication yields large power and scalability advantages for WINS networks. Multi hop communication, therefore, provides an immediate advance in capability for the WINS narrow Bandwidth devices. However, WINS Multi hop Communication networks permit large power reduction and the implementation of dense node distribution.

Wireless Integrated Network Sensors (WINS) now provide a new monitoring and control capability for monitoring the borders of the country. Using this concept we can easily identify a stranger or some terrorists entering the border.

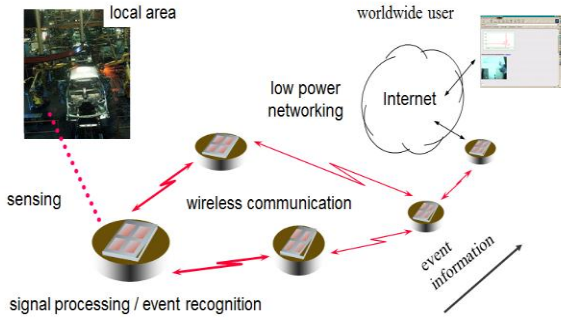

Fig 3: WINS working model

The border area is divided into number of nodes. Each node is in contact with each other and with the main node. The noise produced by the foot-steps of the stranger is collected using the sensor. This sensed signal is then converted into power spectral density and the compared with reference value of our convenience.

WINS provide a new monitoring and control capability for monitoring the Border of the country. WINS require a microwatt of power so it is very cheaper than other security system such as Radar and produce less amount of delay. It produces a less amount delay to detect the target. It is reasonably faster. On global scale wins will permit monitoring of land, water and air resources for environment monitoring.

4. GLOBAL POSITIONING SYSTEM [GPS]

The Global Positioning System (GPS) is a space-based satellite navigation system that provides location and time information in all weather or climate conditions, anywhere in or near the Earth surface by the help of an unobstructed line of sight to four or more GPS satellites. This system also provides critical information’s to military, civil as well as commercial users around the whole world. Also it is maintained by the United States government and it allows anyone to access freely with a single GPS receiver.

4.1 GPS Network

The title (Cambria, 24 pt bold with color (Red=0, Green=35, Blue=100), authors' names (Cambria 16-point, bold) and affiliations (Cambria 12-point) run across the full width of the page – one column wide. We also recommend e-mail address (Cambria 12-point, italic). See the top of this page for three addresses. If only one address is needed, center all address text. For two addresses, use two centered tabs, and so on. For three authors, you may have to improvise.

A GPS receiver can calculates its position by precisely timing the signals sent by GPS satellites rotates around the Earth. The messages that are continuously transmitted by the satellite will includes,

i. The time the message was transmitted
ii. Satellite position at time of message transmission

The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite. Each of these distances and satellites' locations defines a sphere. Also the receiver is kept on the surface of each of the spheres when the distances and the satellites' locations are correct. Those distances and satellites' locations are often used to compute the location of the receiver using the navigation equations. This location is then displayed using a moving map display or latitude and longitude; elevation or altitude information may be included, based on height above the geoid (e.g. EGM96).

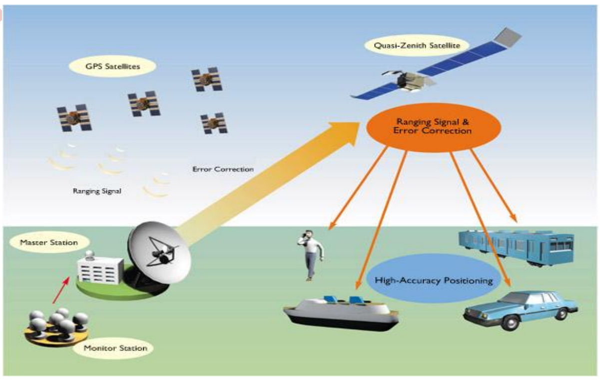

Fig 4: GPS network working model

GPS measurements yield only a position, and it cannot yield speed or direction. Also most of the GPS units can automatically derive velocity and direction of movement from two or more position measurements. The main drawback of this principle is that the changes in speed or direction can only be computed with a delay, and this will reduce the accuracy in derived direction when the distance travelled between two position measurements drops below or near the random error of position measurement.

To alleviate this effect, modern navigation systems use additional sensors like a compass or an inertial navigation system to complement GPS. In typical GPS operation, to get accurate results four or more satellites must be visible. Also the four sphere surfaces typically do not intersect each other. So

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when the navigation equations are solved to find an intersection, this solution will give the position of the receiver along with the difference between the time kept by the receiver's on-board clock thereby eliminating the need for a very large, more expensive, and power hungry clock.

The most accurately computed time is used only for display or not at all in many GPS applications that will use only the location. Also a number of applications for GPS do make use of this cheap and highly accurate timing. These operations include time transfer, traffic signal timing as well as synchronization of cell phone BS.

Although for normal operations four satellites are required, fewer needed to apply in special cases. A receiver can determine its position using only three satellites, If one variable is already known. Some GPS receivers may use additional clues such as reusing the last known altitude, dead reckoning as well as inertial navigation, to provide a (possibly degraded) position when fewer than four satellites are visible.

4.2 Parts of GPS

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The Space Segment: This segment consists of 24 satellites, produced by Rockwell International, that are launched into space by the help of rockets, from the regions Cape Canaveral, Florida. They are much similar the size of a car, and its weight is about 19,000lbs. Each and every satellite is in orbit above the earth at an altitude of 11,000 nautical miles (12,660 miles), and also it takes 12 hours to orbit one time. Moreover there exist 6 orbital planes each having 4 satellites. These orbits are tilted 55° to the equator of the earth. So that there is coverage of the Polar Regions.

These satellites continuously orient themselves to ensure that their solar panels stay directed towards the sun, and also their antennas directed towards the earth. Each and every satellite carries 4 atomic clocks.

The Control Segment: This part consists of 5 worldwide unmanned base stations (BS) that monitor the satellites to track the exact position of them in space, and also to make sure that they are working correctly. These BS's constantly monitor the orbits of the satellites and use very precise radar to check or verify the altitude, position and speed. Also the satellite uses these updates in the signals that they send to GPS receivers.

The User Segment: This part consists of user receivers which are hand-held devices or, it may be placed in a vehicle. Each and every GPS receivers have an almanac programmed into their computer that tells them the location of each satellite is at any given moment.

And the GPS receivers detect, decode as well as process the signals that are received from the satellites. In general the receiver is used together with the computer software to provide the output information to the user in the form of map. Even though the user does not communicate with the satellite, there can be multiple users at one time

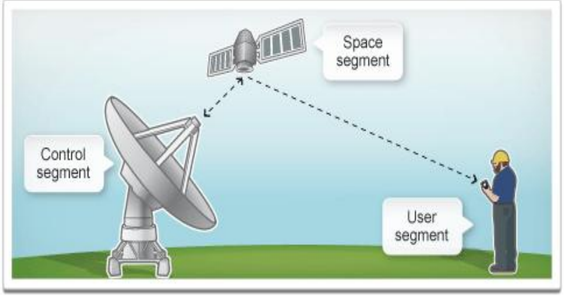

Fig 5: Parts of GPS

5. SYSTEM IMPLEMENTATION

This circuit consists of a microcontroller unit; it may be of any one of these AT89C52, Atmega 8, Atmega 328 controllers. Whenever the boat crosses the border, the intimation will be provided by the indication module of LCD, LED and buzzer. If the limit exceeds means the warning will be sending and if no response means, the system control unit will makes the boat control to the server side module. The display unit is of a sixteen cross two LCD (Liquid Crystal Display) module. All the controllers must have flash memory in order to store the reference ignition code.

6. RESULT AND DISCUSSION

Present paper is designed using 8051 microcontroller. It is proposed to design an embedded system which is used for automotive security. In this paper AT89C52 microcontroller is used for interfacing to various hardware peripherals. For doing so an AT89C52 microcontroller [8] is interfaced serially to a GPS Transceiver. The mobile number is stored in an EEPROM. The main hardware interfaces to microcontroller are LCD display, GPS Transceiver. The design uses RS-232 protocol for serial communication between the microcontroller and the modem. Also a serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels.

The simulation is carried out by using PROTEUS design tool. The current design is an embedded system platform, which asks for an ignition code.

The result shows that, it will work well for all kinds of marine applications and it responds immediately to the user's commands.

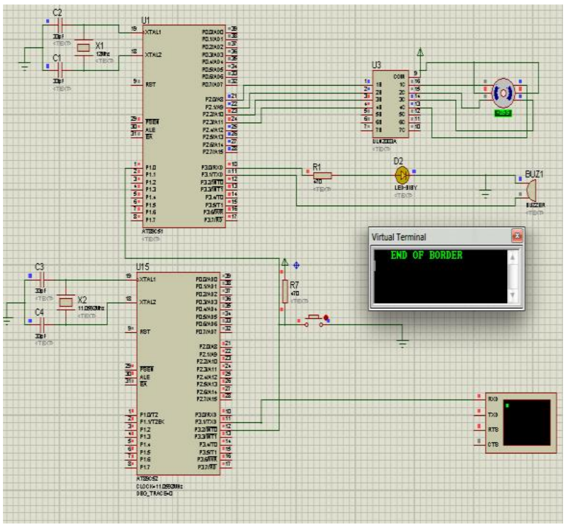

Fig 6: Simulation result of Border Alert System

7. CONCLUSION AND FUTURE WORK

From the proposed system, Border Alert System for Boats Using Wireless Sensor Networks, its results and discussions proved that this system works well, and can be put forward to practical applications. The main feature of this paper is when someone crosses the border line; the client module shows indication of warning message. If no response from the client, then it controls the boat from the server side module by using system control unit.

8. ACKNOWLEDGMENTS

Our thanks to Asst.Prof.Mr.R.Ramkumar, who have contributed towards development of the project.

9. REFERENCES

[1] Andre Weimerskirch, Marko Wolf, and Thomas Wollinger, "State of the Art: Embedding security in vehicles", Journal on Embedded Systems Volume 2007, Article ID 74706.

[2] Jun Luo, Jean-Pierre Hubaux School of Computer and Communication Sciences EPFL, "A Survey of Inter-Vehicle Communication",CH-1015 Lausanne, Switzerland.

[3] AppaRao.T, Baburao Kodavati, Dr.Narayana.Y.K, Raju.V.K.,"GSM and GPS based vehicle location tracking system". Internal Journal of Engineering Research and Applications VOL. Issue 3,pp. 616-625. 15, JULY 2011.

[4] Ericsson L.M, Telefonakie bolaget, "A Method of locating mobile station in a mobile telephone system," International Patent PCT/SE93/00 203.

[5] http://www.modemspy.com/serialcommunications.html

[6] FranciscoGonzalez-Castano.J, Fernando Isasi de Vicente, Javier Vales-Alonso, Jose Pousada-Carballo.M and Manuel Fernandez-Iglesias.J "Real-Time Interception Systems for the GSM Protocol," IEEE transactions on vehicular technology, vol 51 no.5, September 2002.

[7] Ahmed.M, Ajaz.S, Asim.M, Ozair.M, Siddiqui.M, Mushtaq.Z, "Autonomous Vehicle Monitoring and Tracking System" SCONEST 2005.pp.1 3, 2005.8].