

REAL TIME WIRELESS EMBEDDED ELECTRONICS FOR SOLDIER SECURITY

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Abstract:

Soldiers are very essential part of any nation's security system. During wars and search operations soldiers get injured and many of them become lost. As, soldiers health is important because they are the savior of our country who protects us from enemy attacks, terrorist activities and from many suspicious activities which can harm us as well as our nation too. This project gives an ability to track the location and monitor health of the soldiers in real time who become lost and get injured in the battlefield. It helps to minimize the time, search and rescue operation efforts of army control unit. This system enables to army base station to track the location and monitor health of soldiers using GPS module and wireless body area sensor networks (WBASNs), such as temperature sensor, heart beat sensor, etc.. The data coming from sensors and GPS receiver send data by using GSM module. Also, a soldier can ask for help from control room and can communicate with other fellow soldier present within the wireless transmission and reception range.

Keywords:

GSM, GPS, Temperature sensor, Heart beat sensor, Arduinouno microprocessor

INTRODUCTION

An embedded system is a special-purpose computer system designed to perform one or a few dedicated functions, sometimes with real-time computing constraints. It is usually embedded as part of a complete device including hardware and mechanical parts. In contrast, a general-purpose computer, such as a personal computer, can do many different tasks depending on programming. Embedded systems have become very important today as they control many of the common devices we use.

Since the embedded system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product, or

from economies of scale.

Physically embedded systems range from portable devices such as digital watches and MP3 players, to large stationary installations like traffic lights, factory controllers, or the systems controlling nuclear power plants. Complexity varies from low, with a single microcontroller chip, to very high with multiple units, peripherals and networks mounted inside a large chassis or enclosure.

In general, "embedded system" is not an exactly defined term, as many systems have some element of programmability. For example, Handheld computers share some elements with embedded systems — such as the operating systems and microprocessors which power them — but are not truly embedded systems, because they allow different applications to be load and peripherals to be connected.

An embedded system is some combination of computer hardware and software, either fixed in capability or programmable, that is specifically designed for a particular kind of application device. Industrial machines, automobiles, medical equipment, cameras, household appliances, airplanes, vending machines, and toys (as well as the more obvious cellular phone and PDA) are among the myriad possible hosts of an embedded system. Embedded systems that are programmable are provided with a programming interface, and embedded systems programming is a specialized occupation. Certain operating systems or language platforms are tailored for the embedded market, such as Embedded Java and Windows XP Embedded. However, some low-end consumer products use very inexpensive

microprocessors and limited storage, with the application and operating system both part of a single program. The program is written permanently into the system's memory in this case, rather than being loaded into RAM (random access memory), as programs on a personal computer are.

In today's word, the science and technology is growing rapidly with new inventions, innovations and with advance level of their implementations. These immerging advance technologies are firmly adopted by defence services to provide some safety systems to our soldiers. There are many parameters by which defence services can provide safety to the soldiers. In our project, we are trying to provide an embedded wireless system by which the Army base stations can monitor the heart beat count and body temperature of soldiers using wireless body area sensor networks (WBASNs) such as temperature sensor, heart beat sensor, etc. [1]. Base stations can also know the location of soldiers by tacking them through Global positioning system (GPS) and can guide them to any safe area. Also, the soldier can ask for his location from army control unit in case if he feels that he is lost or to plan any new strategies against enemies. In this project, all the processes are in real time because of the use of Arduinouno microcontroller. The sensed data and the tracked location of soldiers will be sendingdata by using GSM module [2]. In military operations, one of the fundamental challenges is that the soldiers are not able to communicate with control room and sometimes not even with the other fellow soldiers. Once a troop or a soldier become lost during fight in battlefield due to some unfavourable environment or adverse fight conditions, then it becomes more difficult to search them and bring back to the army base station. In addition, every defence organization needs to design and develop some advance, small, portable and robust system to provide safety measures to their soldiers. There are many

problems which are faced by soldiers during wars in battlefield, like:

1. Sometimes soldiers want to know their location when they become lost but they are not able to do so.
2. Sometimes soldiers need some help during panic situations but they are not able to ask for help.
3. Sometimes soldiers are not able to get help when they get injured during war.

LITERATURE SURVEY

During, wars and military search operations, soldiers get injured and sometimes become lost. To find soldiers and provide health monitoring, army base stations need GPS device for locating soldiers, WBASNs to sense health related parameters of soldiers and a wireless transceiver to transmit the data wirelessly. Hock Beng Lim, Di Ma, Bang Wang, ZbigniewKalbarczyk, Ravishankar K. Iyer, Kenneth L. Watkin [1] had discussed on recent advances in growing technology, and on various wearable, portable, light weighted and small sized sensors that have been developed for monitoring of the human physiological parameters. The Body Sensor Network (BSN) consists of many biomedical and physiological sensors such as blood pressure sensor, electrocardiogram (ECG) sensor, electro dermal activity (EDA) sensor which can be placed on human body for health monitoring in real time. In this paper, we describe an idea to develop a system for real time health monitoring of soldiers, consisting of interconnected BSNs. We describe the basic prototype of the system and present a blast source localization application. In this paper, we have completed only an initial design of individual sensor nodes and developed a basic prototype of the system to collect the sensed data. In future, we will try to develop an integrated data management system and a web portal which will enable users to have easy access of data.

P.S. Kurhe, S.S. Agrawal [4] had introduced a system that gives ability to track the soldiers at any moment. Additionally, the soldiers will be able to communicate

with control room using GPS coordinate information in their distress. The location tracking has great importance since World War II, when military forces realized its usefulness for navigation, positioning, targeting and fleet management. This system is reliable, energy efficient for remote soldier health monitoring and their location tracking. It is able to send the sensed and processed parameters of soldier in real time. It enables to army control room to monitor health parameters of soldiers like heartbeat, body temperature, etc. using body sensor networks. The parameters of soldiers are measured continuously and wirelessly transmitted using GSM.

In this paper, it is possible to transmit the data which is sensed from remote soldier to the base station's PC by using wireless transmission device like GSM. The accuracy of this system may be affected by some factors such as weather, environmental conditions around the soldier's unit and GPS receiver. The future works in this system may include the optimization of the hardware components, by choosing a suitable and more accurate GPS receiver. By improving the routing algorithm can be make this system more powerful and energy efficient. Upgrading this system is easy which makes it open to an advanced future.

ShrutiNikam, SupriyaPatil, PrajkaPowar, V. S. Bendre [5] had presented an idea for the safety of soldiers. There are many instruments which can be used to view the health status of soldiers as well as ammunitions on them. The Bio sensor which consists of various types of small physiological sensors, transmission modules have great processing capabilities and can facilitates the low-cost wearable solutions for health monitoring

GPS module can be used to log the longitude and the latitude by which directions and location can be traceable easily. RF module can be used for high speed, short-range data transmission, for wireless communications between soldier-to-soldier that will help to provide soldiers health status and location data

to control room. So by using these devices and modules, we are trying to implement the basic health observing system for soldier in low cost with high efficiency and high reliability.

The GPS module tracks the position of soldiers anywhere on the globe and the bio-sensors monitor the vital health parameters of soldiers that provide safety and security to soldiers. By the use of ARM processor and low power hardware peripherals, overall power consumption of system will get reduced. And due to use of small sized modules, the system will be lightweight and can be carried out anywhere.

Prof. PravinWararkar, SawanMahajan, AshuMahajan, Arijit Banerjee, AnchalMadankar, AshishSontakke [6] had proposed an idea of tracking the position of soldier as well as to give the health status of the soldier, which enables the army base station to plan the strategies according to current situation during war. Use of GPS tracking device and RF transceiver module provide the wireless system to monitor the health parameters and location tracking of soldiers. By using this system, the army base station will come to know the position of soldier and the health parameters such as body temperature and blood pressure of soldiers.

The health monitoring and tracking system can be implemented by using RF module and GPS tracking system. By using GPS device, we will able to give proper location of soldier and also can monitor the health parameters by temperature sensor and heart beat sensor. Thus, we can help the soldiers in panic condition from army control room by communicating with them during war.

Rubina.A.Shaikh [10] had investigated for the care of critically ill patients. Considering in India, everyday many people get affected by heart attack, and many of them become more serious, because they did not get proper and timely help of doctors. This paper is based on monitoring the health of remote patients, when

they get discharged from hospital. I have tried to design and develop an energy efficient and reliable health monitoring system which is able to send the parameters of patients in real time because of the use of ARM 7 microprocessor. This system enables the doctors to monitor health parameters like body temperature, heartbeat and ECG of patients from their clinic or hospital. The health parameters of patient are measured continuously and transmitted wirelessly through ZigBee transceiver.

In this project, we will be able to transmit and display the health data which is sensed from remote patients, on the doctor's PC, using ZigBee module as a wireless transmission device. Additionally, if doctor will not present in clinic or hospital, then too, they will be able to receive SMS on their mobile phone, in case of any health parameter increases beyond the normal range using GSM technology. But, to get the more accurate and correct ECG readings, the leads of the ECG sensor should be stuck properly on the body of patient, fails to do so; ECG readings will not be accurate.

EXISTING SYSTEM

In this Existing system the soldier Health and Position Tracking System allows military to track the current GPS position of soldier and also checks the health status including body temperature and heartbeats of soldier. The System also consists extra feature with the help of that soldier can ask for help manually or send a distress signal to military if he is in need. The GPS modem sends the latitude and longitude position with link pattern with the help of that military can track the current position of the soldier. The system is very helpful for getting health status information of soldier and providing those instant help for that they are using Zigbee module on LPC1768 ARM Microcontroller.

Disadvantages:

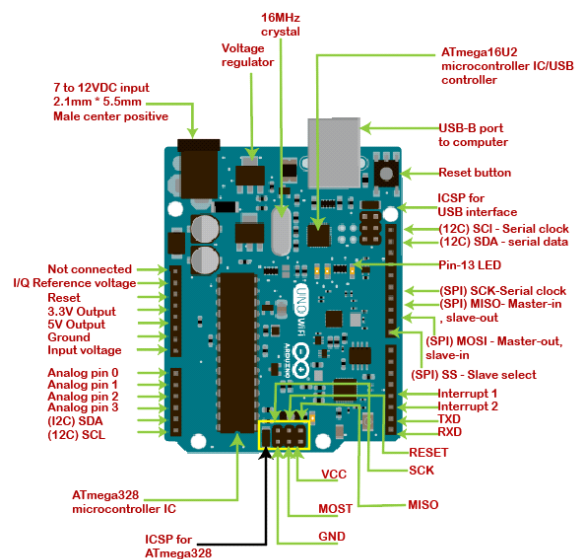
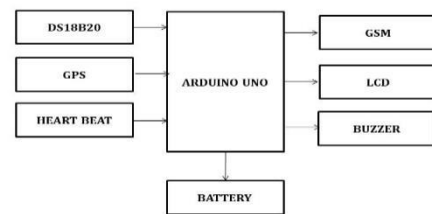
- Using ARM is very high cost
- Zigbee module range is very low.

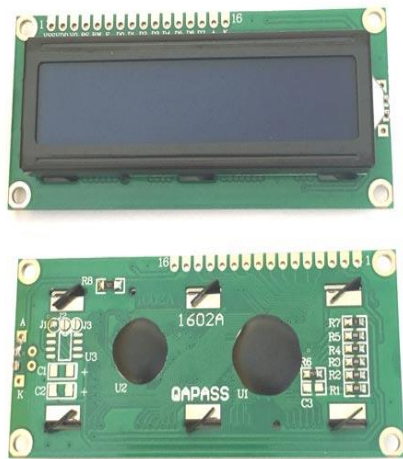
PROPOSED SYSTEM

In This Proposed System the soldier Health and Position Tracking System allows military to track the current GPS position of soldier and also checks the health status including body temperature and

heartbeats of soldier. The System also consists extra feature with the help of that soldier can ask for help manually or send a distress signal to military if he is in need. The GPS modem sends the latitude and longitude position with link pattern with the help of that military can track the current position of the soldier. The system is very helpful for getting health status information of soldier and providing them instant help and here we are using Arduinouno microcontroller and GSM module for Sending message on Health condition and the location of the Soldier to the military.

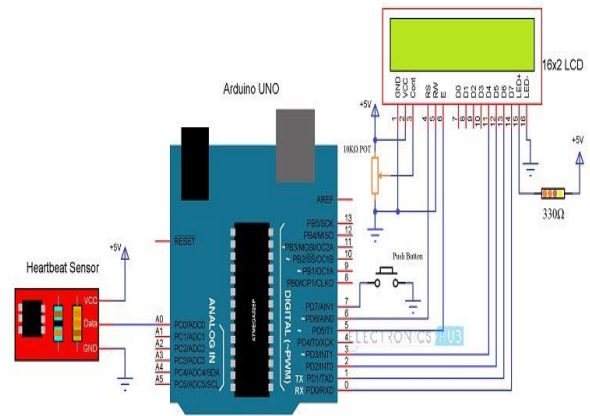
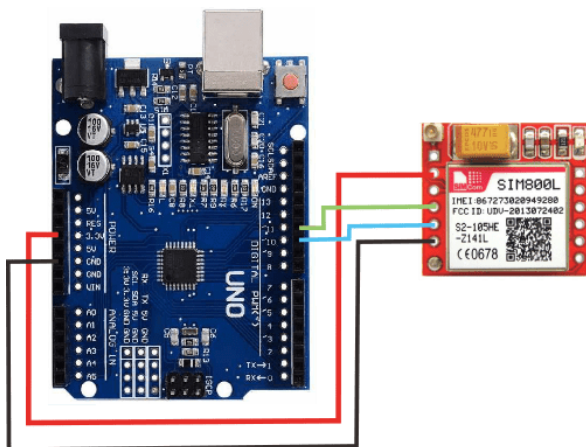
Block diagram:





Pinout (bottom side - right):

- NET - antenna
- VCC - supply voltage
- RESET - reset
- RXD - serial communication
- TXD - serial communication
- GND – ground



- Arduino UNO x 1 [Buy Here]
- 16 x 2 LCD Display x 1 [Buy Here]
- 10KΩ Potentiometer
- 330Ω Resistor (Optional – for LCD backlight)
- Push Button
- Heartbeat Sensor Module with Probe (finger based)
- Mini Breadboard
- Connecting Wires

RESULT

- ▶ System counting heartbeat and measuring body temperature correctly.
- ▶ When ever beat count increase or decrease to certain level or body temperature increases or decreases below certain level system will alert everyone by alert sound and sends exact location of soldier with the help of GSM and GPS module in the form of sms .
- ▶ System also sends the exact location of the soldier when he or she press the panic mode switch.

CONCLUSION

- ▶ From above proposed system, we can conclude that we are able to send data which is sensed from remote soldier to army control room using GSM.
- ▶ The system is completely integrated and can track the location of soldier at anytime from anywhere on the earth using GPS receiver. This system helps to monitor health parameters of soldier using heart beat sensor to measure heart beats and temperature sensor to measure body temperature of soldier.
- ▶ This system helps the soldier to get help from army base station and/or from another fellow soldier in panic situation. This system provides the location information and health parameters of soldier in real time to the army control room.
- ▶ This system is very useful to military forces during war as it can be used in battlefield without any network restriction. Thus, this system provides security and safety to our soldiers.

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