International Journal of Innovative Research in Engineering
Volume 3, Issue 3 (May-June 2022), PP: 69-73.
www.theijire.com
ISSN No: 2582-8746

Real Time Wireless Embedded Electronics for Soldier Security using IoT

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How to cite this paper:
Dnyaneshwar Theng[1], Pankaj Tripathi[2] Prasad Pol[3] Dr. S. R. Gulhane[4], "Real Time Wireless Embedded Electronics for SoldierSecurity using IoT", IJIRE-V3I03-69-73.

Abstract: *The Indian army is the land-based branch and it is the largest component of IndianArmy. It will be beneficial for our country's safety if we try to provide them better advanced technology equipment. In this project we have explained how to track the location of the soldier with the help of GPS and also we will be able to monitor health parameters such as pulse rate andbody temperature. The measured parameters will be sent to the control room with the help of GSMmodule to know the condition of the soldier. If the soldier is injured the fluctuations with the heartbeat and the pulse rate will be measured and will inform the military base station and through GPS we can locate the wounded soldiers. From this information we can strategize the future war plan with the actual number of unharmed soldiers and also we can provide the neededmedication for the harmed one with the location provided by the GPS. This consisting of wearablephysiological equipment and transmission modules which are mounted inside the jacket for communication between soldier and base station or between soldier and soldier. Hence, it is possible to implement a low cost mechanism to protect the valuable human life on the battlefield.*

Key Word: *GSM, GPS, Temperature sensor, Heart beat sensor, ATmega328P Microcontroller*

I. 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 asthey 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 increasing the reliability and performance. Some embedded systems are mass-produced, benefiting 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 orenclosure. 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 International Journal of Engineeringand Techniques - Volume 7 Issue 4, July 2021 REAL TIME WIRELESS EMBEDDED ELECTRONICS FOR SOLDIER SECURITY

II. MATERIAL AND METHODS

2.1 Hardware used

2.1.1 Arduino Uno:

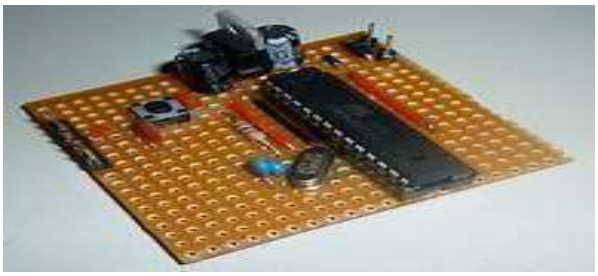

Fig 2. Arduino Equivalent Board

Arduino is an open-source electronics podium based on easy to use hardware and software. Arduino boards are able to interpret inputs light on a sensor, a finger on a push button, or a Twitter message and turn it into an output activating a motor, turning on an LED, publishing somewhat online. Over the years Arduino has beenthe brain of thousands of projects, from on a daily basis objects to compound technical instruments. A universal community of makers students, hobbyists, artists, programmers, and professionals has gathered approximately this open source stage, their offerings have added up to a hard to believe amount of accessibleknowledge that can be of huge help to novices and experts the same.

2.1.2 Temperature Sensor (LM 35):

Fig 3. Temperature Sensor (LM35)

LM35 is a precession Integrated circuit Temperature sensor, whose output voltage varies, based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C. It can easily be interfaced with any Microcontroller that has ADC function or any development platform like Arduino Real Time Wireless Embedded Electronics for Soldier Security

2.1.3 SpO2 Sensor:

Fig 4. Heart Beat & Oxygen Sensor

An alternate name of this sensor is heartbeat sensor or heart rate sensor. The working of this sensor can be done by connecting it from the fingertip or human ear to Arduino board. So that heart rate can be easily calculated. the pulse sensor includes a 24 inches color code cable, ear clip, Velcro Dots-2, transparent stickers-3 etc.

Fig 5. GSM SIM 800L Module

2.1.4 GSM Modem:

A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network. From the view of the mobile phone network, they are essentially identical toan ordinary mobile phone, including the need for a SIM to identify themselves to the network.

2.1.5 GPS Modem:

Fig 6. GPS Receiver

The Global Positioning System (GPS) is a satellite base navigation system that provides location and time information. The system is freely accessible to anyone with a GPS receiver and unobstructed line of sight to atleast four of GPS satellites Real Time Wireless Embedded Electronics for Soldier Security .

2.1.6 LCD Display:

*Fig 7. 16*2 LCD Display*

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits

2.1.7 DC to DC Buck Boost Converter

Fig 8. DC to DC Buck converter

DC-DC Buck Converter Step Down Module LM2596 Power Supply is a step-down(buck) switching regulator, capable of driving a 3-A load with excellent line and load regulation. These devices are available in fixed outputvoltages of 3.3 V, 5 V, 12 V, and an adjustable output version. The LM2596 series operates at a switching frequency of 150kHz, thus allowing smaller sized filter components than what would be required with lower frequency switching regulators.

III. PROCEDURE METHODOLOGY

Monitoring to soldiers. So, in order to implement this project, we will use the GPS receiver to track the location ofthe soldiers through satellite. LM 35 which is a temperature sensor senses the body temperature of the soldiers. AnIC LM358 will be use to sense the heartbeat of the solders. We will use ATmega328P microcontroller which is embedded with ATmega328P Microcontroller to process all the received data through sensors and GPS receiver inreal time. Thing speak IoT will be use for wireless transmitting and receiving of data. The data received from GPSmodem is a RS-232 level data, therefore, we have to use IC MAX232, which convert the RS-232 voltage level datato 5V TTL/CMOS level. An alphanumeric LCD display is used to display the data sensed from BSNs and coming from GPS modem. To implement this hardware design, we will require software like Arduino IDE to write programusing language embedded c in Arduino Uno microcontroller for LM 35 temperature sensor, IC SpO2 heart beat sensor, GPS modem and Thingspeak IoT, we will use Keil µVision4 software, which is an Integrated Development Environment (IDE) for ATmega328P. To design the circuit, we will require EasyEDA i.e. software which easy to understand and user friendly. It is the latest and advance software for schematic electrical circuit designing and PCBlayout with schematic capture editor, PCB layout editor. provides easy understanding of the string data. This data isreceived wirelessly using Zigbee from the Soldier's side. Data consists of location, Body Temperature and Heart rate information which will be continuously logged.

IV.WORKING OF MODULE

In This Proposed System the soldier Health and Position Tracking System allows military to track the currentGPS 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 senda 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 Arduino uno microcontroller and GSM module for Sending message on Health condition and the location of the Soldier to the military. Our aim is to track the location of soldiers in the battle field, military search operations and to provide real time health monitoring of soldier.

V. RESULTS

5.1 Simulation Results

System counting heartbeat and measuring body temperature correctly. Whenever beat count increase or decreaseto certain level or body temperature increases or decreases below certain level system will alert everyone by alertsound and sends exact location of soldier with the help of GSM and GPS module in the form of SMS. System alsosends the exact location of the solder when he or she press the panic mode switch

5.2 Hardware Results

5.2.1 Oxygen Level of Soldier

5.2.2 Heart Beat of Soldier

Latitude of soldier location

Longitude of soldier location

VI.APPLICATION

1. This system mainly designed for the soldier for saving their life by taking precaution in advance by monitoring their healthand tracking location.
2. Mainly this will be more helpful for the Army soldiers. For hill climbers.
3. The project can be used in all the Border security Forces.
4. It can be used in the military camps.
5. It can be used in the war fields
6. It can be used in the Govt. related secured rooms and lockers.

VII. 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 anywhereon the earth using GPS receiver.

[1] This system helps to monitor health parameters of soldier using heart beat sensor to measure heart beats and temperaturesensor to measure body temperature of soldier.

[2] This system helps the soldier to get help from army base station and/or from another fellow soldier in panic situation. Thissystem provides the location information and health parameters of soldier in real time to the army control room.

[3] Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldiervital health parameters Which provides security and safety for soldiers. Continuous Communication is Possible Soldiers cancommunicate anywhere using RF, DSSS, FH-SS which can help soldier to communicate among their Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldier vital health parameters Which provides security and safety for soldiers. Continuous Communication is Possible Soldiers can communicate anywhereusing RF, DSSS FHSS which can help soldier to communicate among them.

VIII. ACKNOWLEDGEMENT

Our endeavor stands incomplete without dedicating our gratitude to everyone who has contributed a lot towards successful completion of our work. First of all, we offer thanks to our parents for their blessings. We are indebted to God Almighty for blessing us with his grace and taking our endeavor to a successful culmination. We specially acknowledge Dr. Abhay A Pawar, Principal, Prof. N.A Dawande, Head of the Department, Project Guide Dr. S.R. Gulhane, Associate Professor, and Project Coordinator Dr. Moresh Mukhedkar, Associate Professor, ECE for theirtechnical support and guidance given and steering us to successful completion of this work

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