

REAL TIME WIRELESS EMBEDDED ELECTRONICS FOR SOLIDER SECURITY

DANDEMPALLY MOUNIKA, Dr. P. SUMITHABHASHINI, Dr. P. RAJA PRAKASHA RAO

M. Tech Scholar Department of Electronics and Communication Engineering

Professor Department of Electronics and Communication Engineering

HOD & Associate Professor, Electronics and Communication Engineering

ABSTRACT

Security of data in army stations is very important issue. In early systems, at the time of information transmission between two army stations, it can be hacked by terrorists, spies and enemies. Communication plays vital role in day to day life. There are two types of communication such as wired and wireless. Basically wireless communication is mostly preferred over wired. But sometimes we need a secured wireless communication in case of industries, companies etc. Data security is very important especially from defense point of view. There are various techniques for transmission of data securely. In military area secure communication is required. The messages send or received should not be hacked. For this controller base wireless communication system is used for secure message transmission. In this we used half duplex encrypted system so messages in this system cannot be hacked. For security special trans-receiver is used namely SIM800C which

uses special AT commands for providing security. The messages can be sending from any module and there is the choice that the message is either broadcast or can send to specific module

Keywords: *ESP32 CAM, Arduino, Internet of Things (iot), MAX30100 sensor, GPS Module, DHT11 sensor*

INTRODUCTION

Everyone in this world wants to be safe and secure. When it comes to the safety and security of Multinational companies, Military, Army, the situation becomes more complicated. Even a common man puts his maximum efforts to protect his data. The popular methods to protect the data in a secure way is to encrypt the data while sending and receiving, decrypt the data to retrieve the original message. Before transmitting the data, the data will be converted into an unreadable form and will be sent. At receiver side the opposite operation of encryption is carried out to recover back

the original message. Thus the data will be protected in every way by following the encryption and decryption standard formats. Wireless makes this project more flexible. Some of the software's are needed to be installed into the system before using them and hardwired connections. The hardware connections and cabling can be completely eliminated in this project. In the Military area secure communication is required. The information shared between them is very confidential. The message send or receive should not be hacked. For the secure communication system a controller based wireless communication system is used for secure message and data transmission and reception. There are two types of communication-Half duplex and full duplex. This project is based on secure/Encrypted half duplex system. The messages in this system cannot be hacked. In communication systems transmission of data from one place to another place is important our project is encoding and decoding techniques for data transmission. These use the PIC microcontroller at both sides and make it feasible to send the data from one place to another place. It is beneficial and cost effective as far as the application importance is considered.

RELATED STUDY

Stealthiest can be described as a disposition to be sly and to do things surreptitiously. This paper presents a new architecture for flexible and secure networking in battlefields that enables stealthy and covert communication in the presence of node mobility. Our architecture is based on the combination of optical (fiber) and wireless links. Our objective is to be able to carry on undeterred communication without the as mobility and flexibility, along with directional antennas for communication. From security point of view, we also assume presence of red zones, which are the ones controlled by the adversary or where the adversary can trace wireless activities.

EXISTING SYSTEM

Many other jackets existing in the market can provide both cooling and hot service with the jacket. The different climatic conditions such as very cold and very hot temperatures could be dangerous to health. Since in very cold temperatures, the most serious concern is the risk of hypothermia or dangerous overcooling of the body. Hence, we have developed a smart army jacket as an important resource for the army soldiers as soldiers play a very

important role to protect our country in extreme cold conditions. The smart army jacket is proposed in such a way that it could monitor the health, internal temperature as well as emergency notification in the form of short message service for the soldier.

PROPOSED SYSTEM

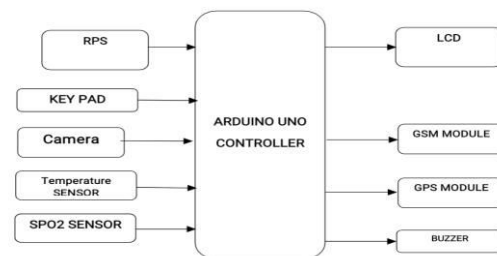
To design a soldier tracking systems using wireless system for monitoring the parameters of soldier are as Body temperature & Temperature. Biomedical sensors: Here to find the health status of soldier we are using a body temp sensor to measure body temperature as well as pulse rate sensor. These parameters are then signal conditioned and will be stored in the memory. One of the fundamental challenges in military operations lays in that the Soldier not able to communicate with control room administrator. In addition, each organization needs to enforce certain administrative and operational work when they interact over the network owned and operated by other organizations. Thus, without careful planning and coordination, one troop cannot communicate with the troops or leverage the communication infrastructure operated by the country troops in the same region. The purpose of this investigation was to test the

components of the Soldier Tracking and Performance Measurement System against the statement of requirements as found in the Request for Proposal. Secondary aims of this investigation included gathering data that will allow potential users of the system to understand its capabilities and limitations, as well as allow efficient planning of both time and resources necessary to ensure efficient and productive use of the system for training the soldier.

Block Diagram and Circuit Diagram

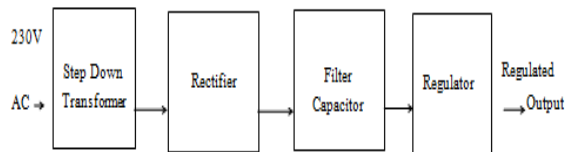
In this chapter Block diagram of diagram real time wireless embedded electronics for soldier security system is explained. The various parts of the power supply unit for the system is explained in this chapter.

Block Diagram Overview



Power supply

All digital circuits require regulated power supply. In this article we are going to learn how to get a regulated positive supply from the mains supply



Heart Beat Sensor

This heart beat sensor is designed to give digital output of heart beat when a finger is placed inside it. When the heart detector is working, the top-most LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

WORKING

The sensor consists of a super bright red LED and light detector. The LED needs to be super bright as the light must pass through finger and detected at other end. Now, when the heart pumps a pulse of blood through the blood vessels, the finger becomes slightly

more opaque and so less light reached the detector. With each heart pulse the detector signal varies. This variation is converted to electrical pulse. This signal is amplified and triggered through an amplifier which outputs +5V logic level signal. The output signal is also indicated on top by a LED which blinks on each heartbeat. Following figure shows signal of heart beat and sensor signal output graph.



LM358 sensor

The LM158 (Low Power Dual Operational Amplifiers) series consists of two independent, high gain; internally frequency compensated operational amplifiers which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. Application areas include transducer amplifiers, dc gain blocks and all the conventional op amp

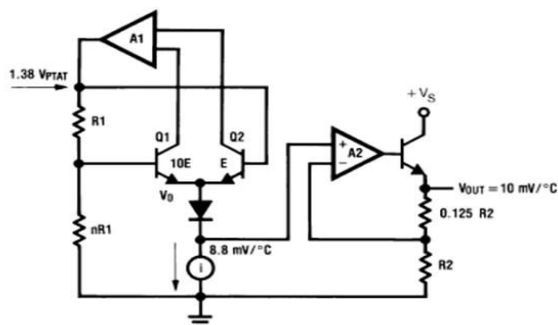
circuits which now can be more easily implemented in single power supply systems.

TEMPERATURE SENSOR:

The Temperature Sensor LM35 sensor series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

LM35 Sensor Specification:

The LM35 series are precision integrated-circuit LM35 temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 sensor thus has an advantage over linear temperature sensors calibrated in ° Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 sensor does not require any external calibration or trimming to provide typical accuracies of $\pm 1/4^\circ\text{C}$ at room temperature and $\pm 3/4^\circ\text{C}$ over a full -55 to $+150^\circ\text{C}$ temperature range.



Temperature Recorder using LM35

Here is how you can make an LM35 a temperature recorder by using the 12F675 PIC microcontroller as the controller and data store. It generates serial output so that you can view the results on a PC and it also calculates the temperature reading in Fahrenheit sending both to the serial port at half second intervals.

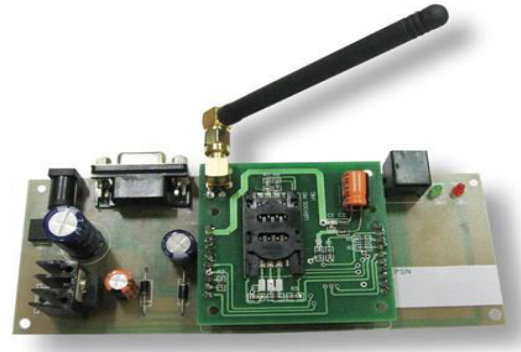
BUZZER

Basically, the sound source of a piezoelectric sound component is a piezoelectric diaphragm. A piezoelectric diaphragm consists of a piezoelectric ceramic plate which has electrodes on both sides and a metal plate (brass or stainless steel, etc.). A piezoelectric ceramic plate is attached to a metal plate with adhesives. Applying D.C. voltage between electrodes of a piezoelectric diaphragm causes mechanical distortion due to the piezoelectric effect. For a misshaped piezoelectric element, the distortion of the piezoelectric element expands in a radial direction. And the piezoelectric diaphragm bends toward the direction. The metal plate bonded to the piezoelectric element does not expand. Conversely, when the piezoelectric element shrinks, the piezoelectric diaphragm bends in the direction. Thus, when AC voltage is applied across electrodes



GSM MODULE Global System for Mobile Communication (GSM)

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.



MODEM SPECIFICATIONS:

The SIM300 is a complete Tri-band GSM solution in a compact plug-in module.

Featuring an industry-standard interface, the SIM300 delivers

GSM/GPRS900/1800/1900Mhz performance for voice, SMS, data and Fax in a small form factor and with low power consumption. The leading features of SIM300 make it deal with virtually unlimited applications, such as WLL applications (Fixed Cellular Terminal), M2M application, handheld devices and much more.

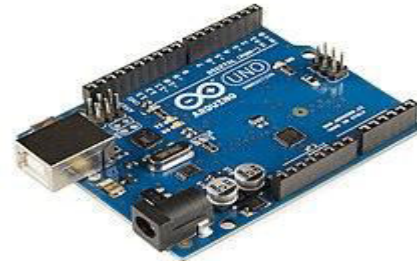
1. Tri-band GSM/GPRS module with a size of 40x33x2.85
2. Customized MMI and keypad/LCD support
3. An embedded powerful TCP/IP protocol stack
4. Based upon mature and field proven platform, backed up by our support

service, from definition to design and production.

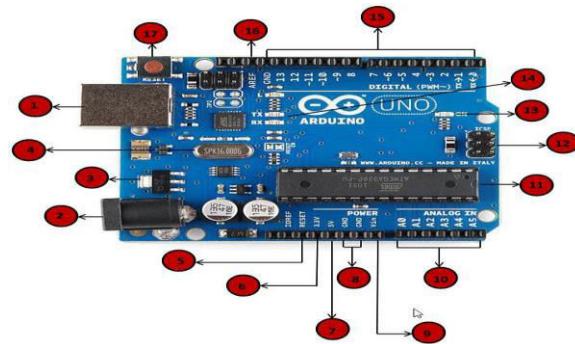
ARDUINO CONTROLLER

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control both physically and digitally. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In

addition to using traditional compiler tool chains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.



PIN EXPLANATION



SOFTWARE EXPLANATION

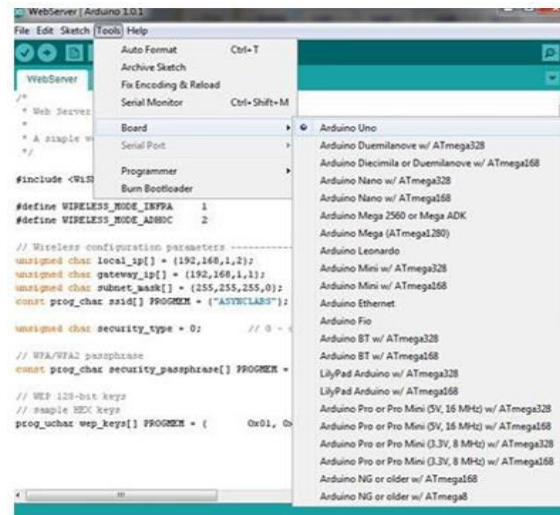
A double sided board is more expensive to produce professionally, more difficult to etch on a DIY board, but makes the layout of components a lot smaller and easier. It should be noted that if a trace is running on the top layer, check with the components to make sure you can get to its pins with a soldering iron. Large capacitors, relays, and similar parts which don't have axial leads can NOT

have traces on top unless boards are plated professionally.

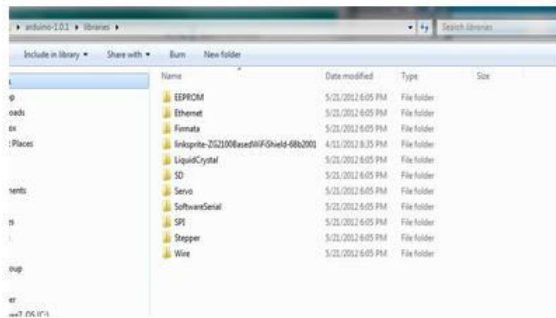
AURDINO COMPILING



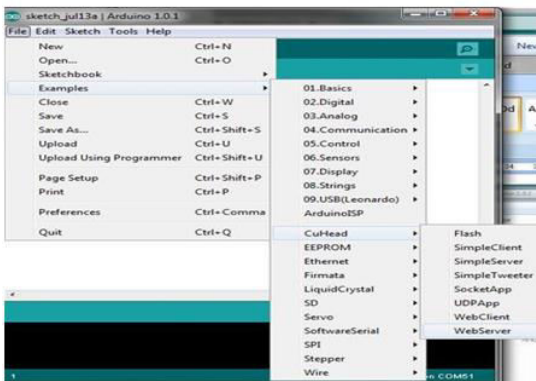
Select the target board as “Arduino Uno”:



Launch Arduino by double click “Arduino” below



One example



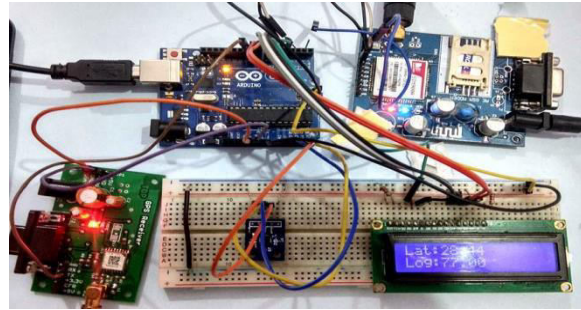
A robust accurate positioning system with seamless indoor and outdoor coverage is highly tool for increasing safety in emergency response and military operation. GPS-based positioning methods mainly used to field rescue. The position and orientation of the rescuer and the trapped is acquired using GPS chip. Using the GPS data of both the units the relative distance, height and orientation between them are calculated from the geometric relationships based on a series of formulas in Geographic Information Science (GIS). Using this technology, we are doing the navigation between two soldier .the data will be send wirelessly by RF Transceiver. This device can do accurate coordination via wireless communication, helping soldier for situational awareness. GPS module have serial interface. Receiver information are

broadcast via this interface in a special data format. This format standardized by the National Marine Electronics Association (NMEA).

PHYSIOLOGICAL SIGNALS AND BIOSENSORS

With recent advances in technology, various wearable sensors have been developed for the monitoring of human physiological parameters. The various sensing technologies are available, which can be integrated as a part of health monitoring system, along with their corresponding measured physiological signal. The measurement of these vital bio signal and their subsequent processing for feature extraction, lead to collection of real time gathered parameter which can give an overall estimation of health condition at any real time. There are a number of medical parameters of soldier that can be monitored, like ECG, EEG, Brain Mapping, etc. But these require complex circuitry and advanced medical facilities and hence they cannot be carried around by the soldier. The entire system would become bulky for the soldier.

Hardware kit image



Output results with location



CONCLUSION

From the above implementation we came to the following conclusion: Security and safety for soldiers: Using GPS we can tracks position of soldier anywhere on globe and also the health parameters which provide security and safety for soldiers. Effective Communication is Possible: Soldiers can communicate anywhere using RF, DS-SS, FH-SS which can help soldier to communicate among their squad members whenever in need and emergency. Less complex circuit and less power consumption

Since ARM processor require less power to operate so power consumption is less. Also the modules used are small in size, so complexity is also reduced.

Future Scope

We are finding the shortest path based on the distance of nearby hospitals but there may be chance that the traffic will be more in that path. So we need to come up with some algorithm which gets the nearby hospitals with minimal distance and traffic. We may add some modules which will also let the system know about the traffic details and then find out which node will take less time to reach from the accident spot. Another thing which we may add is 'first aid kit' for emergency medical treatment at the scene itself. We can also add some modules which will measure the injuries level or some additional information like blood group, heart beats, current glucose level which may be send to the hospitals in advance before the victims reaches the hospitals hence improvise the performance of the proposed system.

REFERENCES

[1] R. Ganiga, Rohit Maurya, Archana Nanade,"Accident detection system using Piezo Disk Sensor", International Journal of science, Engineering and Technology

Research(IJSETR) volume6,Issue3,March 2017,ISSN 2278-7798.

[2].Hemjit Sawant, Jindong Tan, Qingyan Yang Qizhi Wang," Using Bluetooth and Sensor networks for intelligent transport systems", In proceeding of Intelligent Transport System; 2004

[3].Helia Mamdouhi, Sabira Khatun, Javed Zarrin," Bluetooth Wireless monitoring, Manging and Control for inter vehicle in vehicular adhoc networks", Journal of computer Science, Science Publication; 2009

[4].Jules White, Brian Dougherty, Adam Albright, Douglas C," Using Smartphone to Detect Car Accidents and Provide Situational awareness to emergency responders chirs Thompson", Mobile Wireless Middleware, Operating system and Application;2010

[5].Khyati Shah, Vile Parle, Swati Bairagi,Vile Parle "Accident Detection and Conveyor System using GSM and GPS Module" International journal of Computer Applications (0975-8887) .

[6].Pooja Shindalkar, Aasiya Fatema Shaikh, Chaitanya Mate, "Arduino Based Vehicle Accident Detection System", International journal of Innovative Research in Computer and Communication Engineering (An