

Soldiers Health and Position Tracking System

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Abstract— In the overall world the security of the nation is depends up on the soldier and so the safety of the soldiers is considered as vital role in it. During enemy war or search operation or surgical strike etc. The soldier is in the war field or battlefield sometimes soldier are injured or die. Concerning the soldiers safety there are many instruments to view their health status as well as to communications with the soldiers. In soldiers security, bio-sensors systems gives different types of small physiological sensors, Biomedical sensor , transmission modules and processing capabilities, and can thus facilitate low-cost wearable unobtrusive solutions for health monitoring. GPS used to log the longitude and latitude so that direction can be known easily. These devices are being added to weapons, firearms, and militaries such as the Israeli an Army which are exploring the possibility of embedding GPS devices into soldiers vests and uniforms so that field commanders can track their soldiers movements in real time. GSM module can be used for effective range of high-speed transmission, short-range and soldier-to-soldier wireless communications that will be required to relay information on situational awareness, tactical instructions, and covert surveillance related data during special operations reconnaissance and other missions .So by using these equipments. We are trying to implement the basic lifeguarding system for soldier in low cost and high reliability.

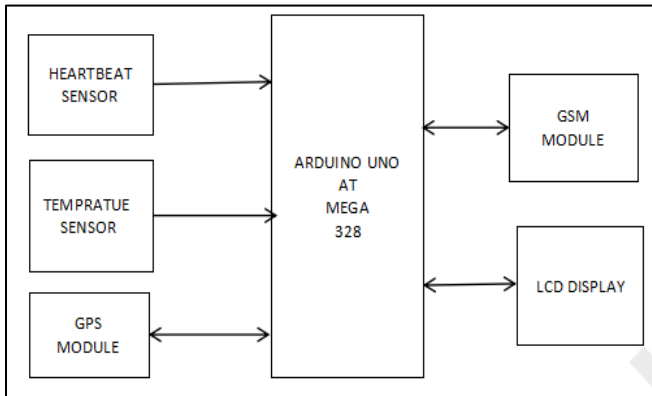
Keywords: Arduino, LCD Display, GSM, GPS, Various Sensors

I. LITERATURE REVIEW

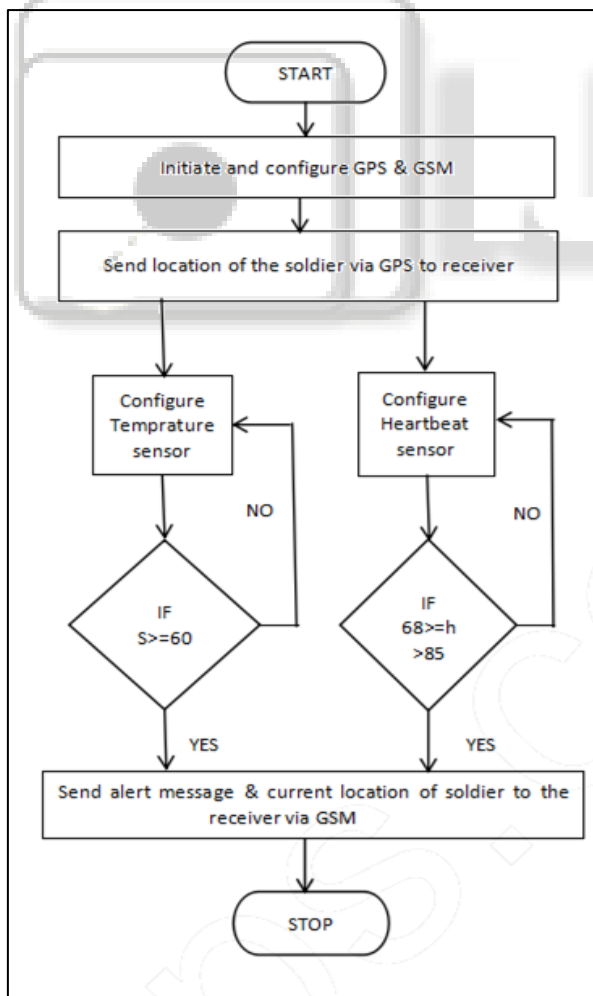
- 1) The researchers like Hock Beng Lim, Di Ma, Bang Wang Zbigniew Kalbarczyk, Ravishankar k. Lyer, Kenneth L. Watkin, [1] had proposed a methodology on Body sensor network and on various cheap, light weighted and small sized sensors. The wireless body area sensor network like temperature sensors and heartbeat sensors, oxygen sensors etc. which can be placed in the human body for health monitoring. In this paper, we describe an ongoing effort to develop a system consisting of interconnected BSNS. For real time health monitoring of soldiers. Body sensor network consisting of such physiological and biomedical sensor placed on a human can be used for real time health monitoring.
- 2) Simon L. Cotton and William G. Scanlon [2] proposed a methodology on the topic Millimeter wave Soldier to soldier communications for covert battlefield operation. This paper had proposed covert communication between soldiers will required the development of a bespoke directive medium access layer .The number of adjustments to a IEEE 802.11 distribution coordination function that will enable directional communication as suggested.
- 3) J.Rantakokko, Joakimrydell, peterstromback [3] proposed a methodology on Accurate and reliable soldier and first responder indoor positioning: Multisensor systems and cooperative localization In this paper, it is proposed that inertial navigation with foot-mounted sensor is suitable as the core system in GPS denied environments ,since it can yield meter -level accuracies for a few minutes. however, there is still a need for additional supporting sensors to keep the accuracy.
- 4) Vincent Pereira, A.Giremus, E.Grive [4] proposed a methodology on Modelling of multipath environment using copulas for particle filtering based GPS navigation. Another class of approaches deals with multipath effects directly at the level of the navigation algorithm which estimates the position from the satellite ranging measurements. They have the advantage of leaving the receiver architecture unchanged.
- 5) M.V.N.R. Pavan Kumar¹, Ghadge Rasika Vijay [5] proposed a methodology on Health Monitoring and Tracking of Soldier Using GPS. This system can be used in critical conditions. The most significance in this is implementation of M-Health. By implementing this system we can improve the security of our country this also help to improve the safety of the soldier. This system also helps to provide real time video information. Using this system we can reduce casualties of war.
- 6) Shruti Nikam, Supriya Patil, Prajka Power, V.S. Bendre [6] had presented idea for the save to soldiers. There are lot of instruments which can be used like health related status of soldier and communications on them. Transmission modules have great processing capabilities and can facilitates the low-Cost wearable solutions for health monitoring.
- 7) P.S.Kurhe, S.S Agrawal [7] had introduced a idea or system that gives ability to track the soldiers and the soldiers will be able to communicated with base station using GPS.
- 8) Shubhangi Gupta, Shivani Kulshrestha, Divya Singh, Ashish Kumar, Er.Hitendra Singh [8] had present idea on GPS and GSM Based Soldier Health Monitoring and Tracking System. The basic lifeguarding system for soldiers Using GPS we can tracks position of soldier anywhere on globe and also the health parameters which provide security and safety for soldier in low cost and high reliability as well as Effective Communication in which 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 And Less complex circuit and less power consumption.
- 9) The location tracking has great importance since in World War II it's only reserved for Soldiers to track the location, then after when arm forces realized its

usefulness for navigation, positioning, targeting etc. This system is portable, light weighted, reliable, energy efficient for soldier health monitoring and their location tracking. It is able to send the all information of soldier including health parameters of soldiers liket beat rate , body temperature, etc. and exact location of soldier in real time using GPS all information send to army base station using GSM.

II. BLOCK DIAGRAM



III. FLOWCHART:



IV. PROJECT WORK

One of the most important tasks in military processes is that the Soldier, not able to interconnect with control room administrator. In addition, every organization wants to apply for certain work when they communicate over the n/w owned and worked with other organizations. Therefore, without cautious planning and coordination, one group cannot interconnect with the other groups. Present a problem faced by the soldiers are; Soldier wants to identify the location. They will not get assistance during terror situation and soldiers are not trackable Soldier unit is placed on the soldier.

Soldier Health and Position Tracking System allows military to track the current location GPS position of soldier and also checks the health status including body temperature and heartbeats of the soldier. The system is very helpful for getting health status information of soldier and providing them instant help. The proposed system not only performs the task of health monitoring but also does the tracking of soldiers using GPS. Designing of this system using GPS and GSM gives a wireless system for tracking the location of the soldier and observing the heart beat rate and body temperature of the soldier. The temperature sensor is used to measure the temperature of the body as well as heart beat sensor is used to measure the heartbeat rate of the soldier. This unit has four parts, namely biomedical sensor, keypad, GSM, and GPS.

The control room can acquire the details about the position and orientation of soldier from GPS. The base station can access the current status of the soldier using GPS. The proposed system is divided into two unit i.e. Soldier unit and control room unit. Here in the system architecture diagram of the soldier is enabled with the GPS it means that the body temperature sensor, heart beat sensor These sensors will help to sense physical parameters & informs to Base Station through GSM modem. the above technologies the tracking of soldier and navigation between soldier to soldier such as knowing their speed, distance, height as well as health status of them during the war, which enables the army personnel to plan the war strategies. Base station gets location of soldier from GPS. The base station can access the current status of the soldier which is displayed on the LCD with the help of GSM and hence appropriate actions can be taken. In our project we have come up with an idea of tracking the soldier as well as to give the health status of the soldier during the war, which enables the army personnel to plan the Strategies. By using the location sent by the GPS modem, the base station can understand the position of soldier.

The hardware requirements for the system are as follows

A. Pulse Sensor:

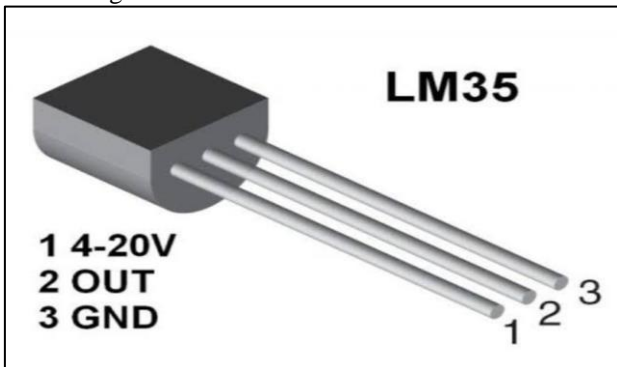
The sensor used in this project is pulse sensor-SEN-11574. Heart rate data can be really useful for determining the health status of a person. The pulse sensor amped is a plug and play heart rate sensor for arduino. It essentially combines a simple optical heart rate sensor with amplification and noise cancellation circuitry making it fast and easy to get reliable pulse readings. It sips power with just 4 mA current draw at 5V. To use it simply clip the pulse sensor to earlobe or fingertip. The use of heart beat sensor in this project is to measure the heart beat of soldier to know about the physical

status of the soldier. The Polar heart rate receiver wirelessly receives the heart rate signal from Polar transmitter belt. The complete heart rate measurement system consists of two parts; transmitter, receiver. The transmitter, worn around the chest electrically detects the heart beat and starts transmitting a pulse corresponding to each heart beat. The receiver unit that is placed over the jacket of the soldier receives the signal and generates a corresponding digital pulse that is connected to the PIC micro controller. The normal human heart rate ranges from 60–100 bpm. When the heart rate is not regular the controller sends the heart rate along with information (i.e. whether the heart beat is normal or abnormal) to the server of the base station.



B. Temperature Sensor

Type T (copper constantan) thermocouples are suited for measurements in the range 200 to 350 degree Celsius. Often used as a differential measurement, since only copper wire touches the probes. This series are precision integrated circuit temperature devices with an output voltage linearly proportional to the centigrade temperature. The LM35 device has an advantage over linear temperature sensor calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient centigrade scaling. To find the health status of soldier base station should know the body temperature and pulse rate of the soldier. So we are using LM35 body biosensor as it is a low cost temperature sensor and it does not require signal conditioning.



The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. As the temperature increase above the specified value the GSM module will immediately alert the Base

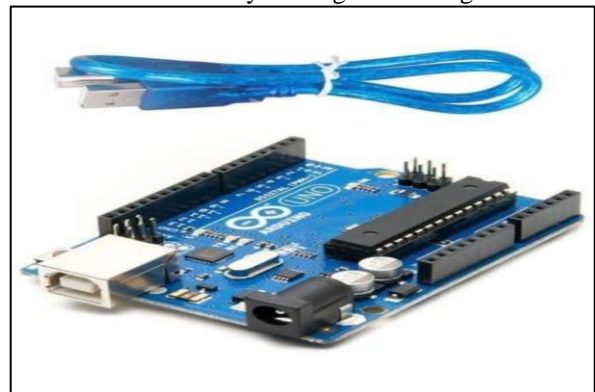
station and thus will not wait for heart beats to go out of the normal range. Human body temperature varies within a narrow range of values. Body temperature can be measured from different parts of the body, but for this project, temperature will be measured from the ear as it is one of the most accurate types of body temperature measurement. LM35 has been chosen as the temperature sensor for this project. Temperature measurements taken in the ear are accurate and relate closely to true core body temperature. Hyperthermia at or above about 40 °C (104 °F) is a life-threatening medical emergency that requires immediate treatment. Hypothermia is less than 35°C (95.0°F) gives symptoms as Intense shivering and bluish/grayness of the skin also requires treatment. If temperature sensor meets this condition the PIC micro controller sends the message to the base unit and displays on the PC.

C. Power supply:

The most important section in every electronic circuit is the power supply. For the proper working of all components an unaltered power supply is needed. The supply must be capable of providing the necessary power for each component. At the same time the protection from over voltage must be there. The basic step in the designing of any system is to design the power supply required for that system. The designing of power supply requires the total current that the system sinks from the supply and the voltage rating required for the different components. In this project work following power supplies is used: 1. 5V constant power supply for GPS, GSM Module and LCD section. 2. Constant voltage regulator LM7805. 3. Variable voltage regulator LM317 for ARM microcontroller LM317.

D. Arduino Board

Microcontrollers are one of the major components in any embedded system. A microcontroller is a small computer on a single integrated circuit containing a processor core, memory and programmable input/output peripherals. Microcontrollers work according to the program written inside its program memory. The major use of these single chip computers are in automatic responding devices. The function of this section is to collect the information about heartbeat of the soldier, atmospheric temperature and location of the soldier in each minute. Then it sends this information to the base unit. The ATmega328 is a single-chip microcontroller created by ATmega in the mega AVR family.

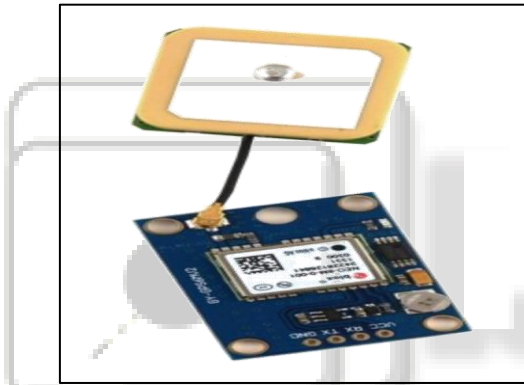


The Atmel 8-bit RISC based microcontroller combines 32kB ISP flash memory with read-while-write

capabilities, 1KB EEPROM, 2kB SRAM, 23 general purpose I/P lines, 32 general purpose working registers, three flexible timer/counter with compare modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, 6-channel 10-bit A/D converter programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. The device achieves throughput approaching 1 MIPS per MHz.

E. GPS Modem

The Global Positioning System (GPS) is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. It uses a third generation POT (Patch Antenna on Top) GPS module. This POT GPS receiver providing a solution that high position and speed accuracy performances as well as high sensitivity and tracking capabilities in urban conditions & provides standard NMEA0183 strings in "raw" mode for any microcontroller. The module provides current time, date, latitude, longitude of the soldier to the microcontroller.



This is a standalone GPS Module and requires no external components except power supply decoupling capacitors. It is built with internal RTC Back up battery. It can be directly connected to Microcontroller's USART. The module is having option for connecting external active antenna if necessary.

F. GSM Modem

GSM, which stands for Global System for Mobile communications, reigns 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. GSM module is a breakout board and minimum system of SIM900 Quad-band/SIM900A Dual-band GSM/GPRS module. It can communicate with controllers via AT commands (GSM 07.07, 07.05 and SIMCOM enhanced AT Commands). This module supports software power on and reset. It has a quad-band 850/900/1800/1900 MHz and a dual-band 900/1900 MHz. It has control via AT commands, a very low power consumption of 1.5mA (sleep mode). 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. A GSM modem can be a dedicated modem device with a serial or USB

connection, or it may be a mobile phone that provides GSM modem capabilities. Most of the GSM cellular modems come with an integrated SIM card holder. AT or attention commands are used to interface GSM modem with PIC microcontroller. In this project uses the GSM modem at base station to communicate with soldier.



V. DRAWBACK

Basically GSM is a range oriented and it will be working properly when there is strong network connection for communication. As it is used in war fields there may be chances of signals and network connection problems. As GSM is used to send the all information of soldier to the base station hence a successful operation of this system is highly depend on proper working of GSM module.

VI. FUTURE SCOPE

one of the main drawback of this system is GSM as it is need a strong range of network connection ,this will be overcome in future using Satellite Communication system for sending the data by using Satellite.for more improvement in this system we will be used some sensors like oxygen sensor for measure related to the environmental conditions.

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