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Soldier Tracking and Health Monitoring System

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Abstract: The paper reports an Micro-Controller based health monitoring and tracking system for soldiers. The proposed system can be mounted on the soldier's body to track their health status and current location using GPS. These information will be transmitted to the control room through GSM. The proposed system comprises tiny wearable physiological equipment, sensors, transmission modules. Hence, with the use of the proposed equipment, it is possible to implement a low cost mechanism to protect the valuable human life on the battlefield.

I.INTRODUCTION

In today's world enemy warfare is an important factor in any nation's security. National security mainly depends on the army (ground), navy (sea), air-force (air). The important and vital role is played by the army soldiers. There are many concerns regarding the safety of these soldiers. The defence department of a country must be effective for the security of that country. For this the soldiers also must be effective for this we are introducing a "SOLDIER MONITORING SYSTEM". This system will be useful for soldiers, who are involved in special operations or mission.This system enables GPS Tracking of these soldiers and also enables the telemedicine. It is possible by M-Health. The M-Health can be defined as Mobile computing, medical sensors and communication technologies for health care.In a SOLDIER MONITORING SYSTEM, smart sensors are attached to the jacket of soldiers. These are implanted with a personal server for complete mobility. This personal server will provide connectivity to the server at the base station using a wireless connection. A GPS Tracking system is also attached with the jacket, which provides the tracking of the position of each soldier. Here also providing a helmet with video. This may help the control station to know about the situation at the mission field. Each soldier has a GSM enabled phone which enables the communication between both ends. Thereby it is possible to back up a soldier or cover a soldier and make the mission accomplished.

II. OVERVIEW OF THE SYSTEMS

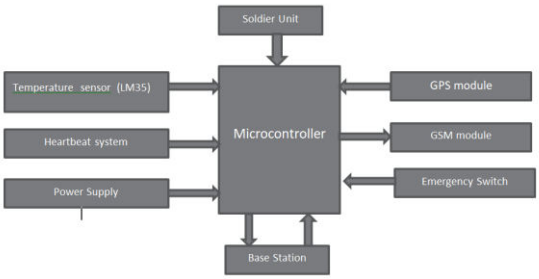


Fig shows the block diagram of the soldier unit which includes following blocks.

Here the Overview of the systems is shown and explained briefly**.**

A. Heart beat sensor.The Heart Beat sensor provides a simple way to study the heart's function.This sensor monitors the flow of blood through the finger.As the heart forces blood through the blood vessels in the finger, the amount of blood in the finger changes with time.The sensor shines a light lobe (small High bright LED) through the finger and measures the light transmitted to the LDR.The signal obtained from the LDR is amplified by the amplifier and will be filtered and provided to the ADC.

B. Temperature sensor: The Temperature can be detected with the help of a temperature sensor LM35,The LM series are precision integrated circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature. Station which when pressed immediately will alert Base station and thus will not wait for heart beats to go out of the normal range.

III. MATHEMATICAL MODELING AND

SYSTEMS DESIGN

Microcontroller: 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 is in automatic responding devices.AT89C51 microcontroller is used as the brain of circuits. The function of this section is to collect the information about the heartbeat of the soldier, atmospheric temperature and location of the soldier in each minute. Then it sends this information to the base unit.

LM35 Sensor: The LM35 is a Precision integrated circuit temperature sensor whose output voltage is linearly proportional to oc. The LM35 thus has an advantage, their linear temperature sensor calibrated in Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient centigrade scaling low cost is assured by trimming calibration at water level. The LM35's Low Output impedance, linear output precise inherent calibration make interfacing to readout. It can be used as a single power supplier or with I supplies. The LM35 series is available packaged in hermetic to 46 transistor packages while the LM 35C, LM35w also available in the plastic To-92 transistor package. The function of LM35 in this project is to monitor the atmospheric temperature.

Heart Beat Sensor: In this project we use a polar heart rate transmitter and RMC01 receiver as a heartbeat sensor. The use of a heartbeat sensor in this project is to measure the heartbeat of a soldier to know about the physical status of the soldier.The Polar heart rate receiver component receiver wirelessly receives the heart rate signal from the Polar transmitter belt. The complete heart rate measurement system consists of three different parts; transmitter, receiver and electronics and/or display device that is outputting the heart rate value.The transmitter, worn around the chest, electrically detects the heartbeat and starts transmitting a pulse corresponding to each heartbeat. The receiver that is installed on end user equipment receives the signal and generates a corresponding digital pulse that is operated on by the end user equipment electronics.

GPS Modem:A GPS modem is used to get the signals and receive the signals from the satellites. The function of GPS modem in this project is used to send the position (Latitude and Longitude) of the soldier from a remote place. The GPS modem will continuously give the data i.e. the latitude and longitude indicating the position of the soldier. The GPS modem gives many parameters as the output, but only the NMEA data coming out is read and sent to the base station at the other end.

GPS Overview: The GPS (Global Positioning System) is a "constellation" of 24 well-spaced satellites that orbit the earth and make it possible for people with ground receivers to pinpoint their geographic location. The location accuracy is anywhere from 100 to 10 meters for most equipment. Accuracy can be pinpointed to within 1 meter with special military-approved equipment. GPS equipment is widely used in science and has now become sufficiently low-cost so that almost anyone can own a GPS receiver. The GPS has three components namely: The space segment: consisting of 24 satellites orbiting the earth at an altitude of 11000 nautical miles.The user segment: consisting of a receiver, which is mounted on the unit whose location has to be determined? The control segment consists of various ground stations controlling the satellites.

The GPS is owned and operated by the U.S Department of Defense but is available for general use around the world. Briefly, here's how it works:

21 GPS satellites and 3 spare satellites are in orbit at 10,600 miles above the earth. The satellites are spaced so that from any point on earth, 4 satellites will be above the horizon.Each satellite contains a computer, an atomic clock and a radio. With an understanding of its own orbit and the clock, it continually broadcasts its changing position and time. (Once a day, each satellite checks its own sense of time and position with a ground station and makes any minor correction).On the ground, any GPS receiver contains a computer that "triangulates" its own position by getting bearings from 3 or 4 satellites. The result is provided in the form of a geographic position- Longitude and latitude, for most of the receivers, within 100 meters.If the receiver is also equipped with a display screen that shows a map, the position can be shown on the map.If the 4th satellite can be received, the receiver/computer can figure out the altitude as well as the geographic position. If you are moving, your receiver may also be able to calculate your speed and direction of travel and give the estimated times of arrival to specified destinations.

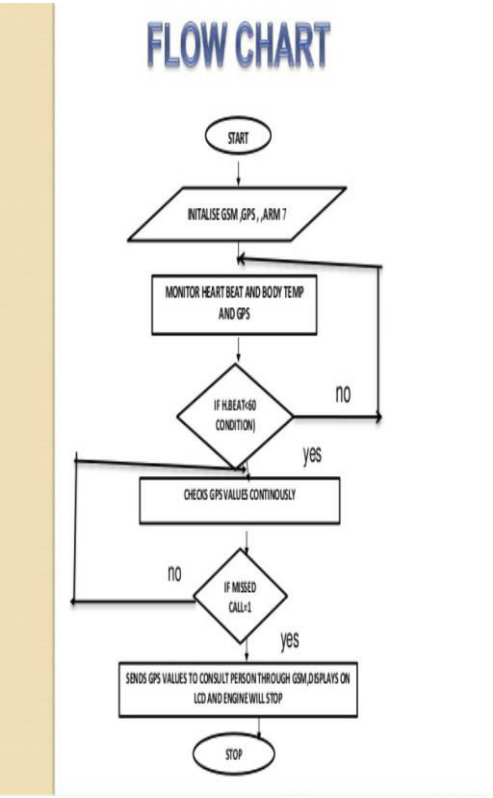
For a GPS receiver to function, it needs to lock onto satellite signals. Each satellite broadcasts two signals at 1.57542GHz and 1.2276GHz, denoted as L1 and L2, respectively. A satellite specific code, known as the course acquisition (C/A) code, is used to discern satellites. Correlation of the transmitted codes against local codes is needed to locate satellites in frequency space. The 1023-bit C/A code modulates the L1 at 1.023MHz, repeating every millisecond. Accumulation of this 1000Hz data is required for a receiver to operate.

Once the GPS receiver makes the calculation, it can tell the latitude, the longitude and the altitude of its current position. This doesn't tell much to the average user. So in order to make use of the GPS receiver more user-friendly many receivers send this data to a program which displays a map and can show the position on it. Geographical Information System (GIS) is a computer-based software capable of handling maps and various details given on the map. Data generated by the GPS use spatial data referenced to the earth. In other words this data is the coordinates of its own position expressed in latitude and longitude. This data needs to be positioned on a map of the area for any useful analysis. GPS is being used in science to provide data that has never been available before in the quantity and degree of accuracy that the GPS makes possible. GPS receivers are becoming consumer products. In addition to their outdoor use, receivers can be used in cars to relate the driver's location with traffic and weather information.

GPS Module: CPIT GPS module SA3618/SA3618P (patch on top) is a high sensitivity ULTRA LOW power consumption cost efficient, compact size; plug & play GPS module board designed for a broad spectrum of OEM system applications. The GPS module receiver will track up to 16 satellites at a time while providing fast time-to-first fix and 1Hz navigation updates. Its superior capability meets the sensitivity & accuracy requirements of car navigation as well as other location-based applications, such as AVL systems. Handheld navigator, PDA, pocket PC, or any battery-operated navigation system. The module communicates with the application system via RS232 (TTL level) with NMEA0183 protocol.

Main Features: Built-in high performance NMEX chipset.Average Cold Start in 60 seconds.Ultra-Low power consumption. (SA3618 27mA typ @ 3.3V),16 channels All-in-View tracking.On chip 4Mb flash memory.TTL level serial port for GPS receiver command message Interface.Compact Board Size

IV. FLOW CHART:



V. RESULT

We have achieved the heart beat pulses shown in fig and also the heart beat counter and temperature measurement using LM35 sensor shown in figure.

VI.CONCLUSION

From the above designed project, it can be concluded that we are able to transmit the data which is sensed from remote soldiers to the army base station by using wireless transmission technology GSM. It is completely integrated so that it is possible to track anytime from anywhere. It has real-time capability. The accuracy of the system is affected by some factors such as weather, environment around the mobile soldier unit, GPS receiver. The future works include optimizing the hardware system, choosing a suitable GPS receiver. Improving the routing algorithm can be improved by neural networks. This system has many advantages such as large capability, wide areas range, low operation costs, effective, strong expandability and easy to use. Upgrading this setup is very easy which makes it open to future requirements which also makes it more efficient.

References

[1] M.V.N.R. P.Kumar, G.R.Vijay, P.V.Adhikrao and B.S.Vijaykumar," Health Monitoring and Tracking of Soldier Using GPS", International Journal of Research in Advent Technology, Vol.2, No.4, April 2014 E-ISSN: 2321-9637, page no.291-29.
[2]S.Nikam, S.Pati , P.Powar and V.S.Bendre, "Gps based soldier tracking and indication system", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering Vol. 2, Issue 3, March 2013,page no.1082-1088.
[3]R.Archana,S.Indira,"Soldier monitoring and Health Indication System",international Journal of Science and Research (IJSR) ISSN (Online): 2319-7064.
[4]Hock Beinge Limn "A Soldier Health Monitoring System for Military Applications" 2010 International Conference on Body Sensor Networks Vol.2, No.4, April 2010 E- ISSN: 2321-9637
[5] Google.com, Wikipedia