Design and Implementation of Soldier Health and Position Tracking System

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ABSTRACT

Nowadays all nations keep its security at high priority. Soldiers being the backbone of any armed force usually lose their lives due to lack of medical help when in emergency, also soldiers who are involved in missions or in special operations get straggled on war fields and lose contact with the authorities. To overcome this concerns we had built this project which, using wireless body area sensor network such as temperature sensor, heartbeat sensor etc. will monitor the health status of the soldier whenever required. Also using GPS we can track the soldier's exact location whenever required. Using oxygen level sensor we can also monitor the environmental condition, so authorities can provide essential aids. The communication is established between the soldiers and authorities via GSM. Any abnormalities in the readings of wireless body area sensor network is considered as a trigger for GSM to establish the connection between the soldier and base unit and send current location and health status to the receiver. 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.

Keywords : Arduino, Wi-Fi (ESP 8266), Load cell, Database System

I. INTRODUCTION

The nation's security is monitored and kept by army, navy and air-force. The important and vital role is of soldiers who sacrifice their life for their country. There are many concerns regarding the safety of the soldier. Soldiers entering the enemy lines often lose their lives due to lack of connectivity, it is very vital for the army base station to known the location as well as health status of all soldiers. India has already lost so many soldiers in war-fields as there was no proper health backup and connectivity between the soldiers on the war-fields and the officials at the army base stations.

There are many concerns regarding the safety of soldiers. So for their security purpose, many instruments are mounted on them to view their health status as well as ammunitions present with them. Bio-sensor systems comprise various types of small physiological sensors, 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. Ranges of physiological sensors monitoring heart rate, core body temperature will improve situational awareness, not only for the host, but also for collocated military

personnel who will exchange information using wireless networks.

II. LITERATURE SURVEY

During, wars and military search operations, soldiers gets injured and sometime becomes losses. To find soldiers and provide health monitoring, army base station and need GPS device for locating soldiers, WBASNs to sense health related parameters of soldiers and a wireless transceiver to transmit the data wirelessly.

In [1] has discussed on recent advantage in growing technology, and on various wearable, portable, light weighted and small sized sensor 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 sensors, Electrocardiogram (ECG) sensor, electr dermal activity (EDA) sensor which can be placed on human body for health monitoring in real time.

In [3] author has 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 consist of various types of small physiological sensors, transmission modules have great processing capabilities and can facilitates the low-Cost wearable solutions for health monitoring. Also as stated by Dinesh Kumar Jaiswar, Sanjana S Repal in their survey, P.S.

Kurhe ,S.S Agrawal had introduced a system that gives ability to track the soldiers at any moment additionally ,the soldiers will be able to communicated with control room using GPS coordinate 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.

III. Architecture of AVR

The AVR microcontrollers are based on the advanced RISC architecture and consist of 32 x 8-bit general purpose working registers. Within one single clock cycle, AVR can take inputs from two general purpose registers and put them to ALU for carrying out the requested operation, and transfer back the result to an arbitrary register. The ALU can perform arithmetic as well as logical operations over the inputs from the register or between the register and a constant. Single register operations like taking a complement can also be executed in ALU. We can see that AVR does not have any register like accumulator as in 8051 family of microcontrollers; the operations can be performed between any of the registers and can be stored in either of them.

AVR follows Harvard Architecture format in which the processor is equipped with separate memories and buses for Program and the Data information. Here while an instruction is being executed, the next instruction is pre-fetched from the program memory.
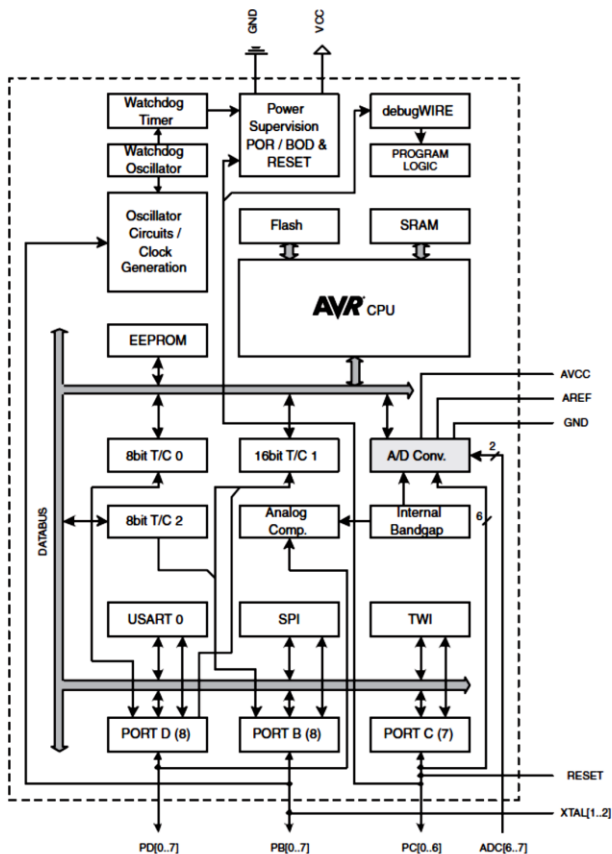
Fig. 1 Architecture of a AVR

IV. COMPONENTS USED IN SOLDIER HEALTH AND POSITION TRACKING SYSTEM

This section presents the design and implementation of various components involved in soldier health and position tracking system.

A. MICROCONTROLLER ATMEGA 328:

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..
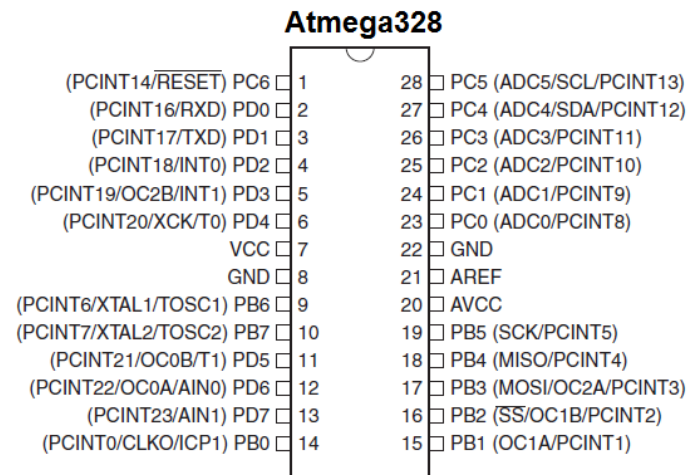

Fig. 2 ATmega 328 controller pinout.

B. GSM MODULE

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 consume 1.5mA(sleep mode).

Fig. 3 GSM Module

C. GPS MODULE

Neo 6 M GPS is a USRT 6 M module. It will be used to track the position of the soldier. It gets connected to at-most 32 satellite and will give the exact longitude and latitude readings. In this way it will track the exact position. While originally a military project, GPS is considered a dual-use technology, meaning it has significant military and civilian applications. It operates in the range -40 degree Celsius to 85 degree Celsius and at 2.7V-5V. Also it has a tracking and navigation sensitivity of -161 dBm devices like keyboards, mice, joysticks, etc. Also they are used on DB9 cable assemblies for data connectivity.

D. SIM900

The SIM900 is a complete Quad-band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry-standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption. With a tiny configuration of 24mm x 24mm x 3 mm, SIM900 can fit almost all the space requirements in your M2M application, especially for slim and compact demand of design.

SIM900 is designed with a very powerful single-chip processor integratingAMR926EJ-S core. Quad - band GSM/GPRS module with a size of 24mmx24mmx3mm. SMT type suit for customer application. An embedded Powerful TCP/IP protocol stack.

Fig. 4. SIM900

E. HEART BEAT SENSOR

A Heart Rate Monitor is a personal monitoring device which allows a subject to measure his or her heart rate in real time or record his or her heart rate for later study. The heart's beating rate can be shown in the form of LED Pulses on a LED display or in a number on LCD display. It is largely used by performers of various types of physical exercise. Modern heart rate monitors usually comprise two elements: a chest strap transmitter and a wrist receiver or mobile phone. In early plastic straps water or liquid was required to get good performance. Later units have used conductive smart fabric with built-in microprocessors which analyze the ECG signal to determine heart rate. These again analyze average heart rate over exercise period, time in a specific heart rate zone, calories burned, breathing rate, built-in speed and distance, and detailed logging that can be downloaded to a computer.
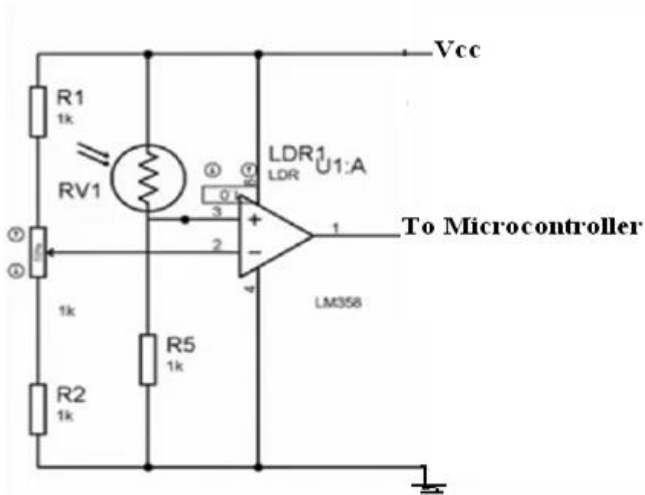
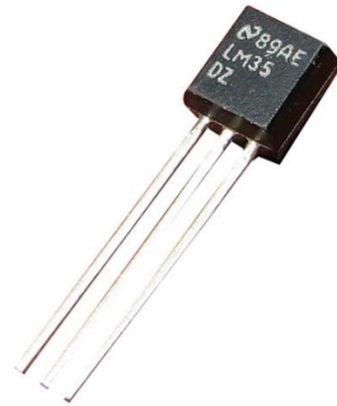**Fig. 5.** Heart Beat Sensor Circuit Diagram.

F. TEMPERATURE SENSOR

The LM35 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.

Fig. 6. Temperature sensor LM35

G. BLOCK DIAGRAM
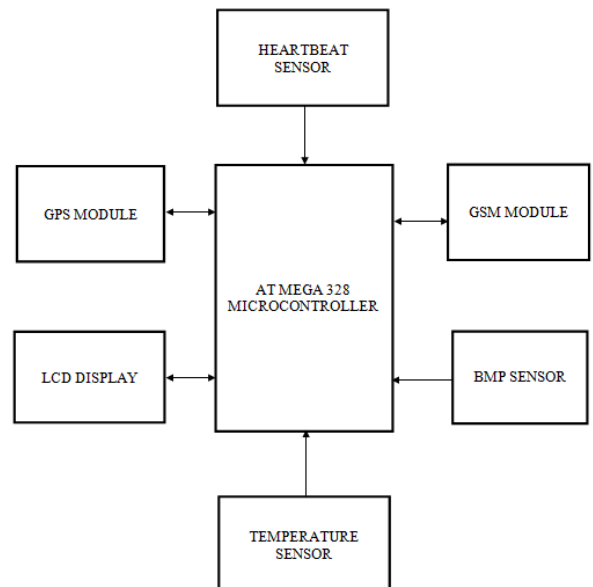
V. CONCLUSIONS

From the above implementation we have concluded that the communication hurdles between the soldiers and authorities at the base unit is overcome using GSM, the precise location and health parameters are known using GPS and wireless body area sensor network respectively and with the GSM modem all information is send to the base station so that field commander will take necessary action.

VI. REFERENCES

[1]. Sweta Shelar, Nikhil Patil, Manish Jain, Sayali Chaudhari, Smita Hande (8th March, 2015).” Soldier Tracking and Health Monitoring Systems”. Proceedings of 21st IRF International Conference, Pune India. ISBN: 978-93-82702-75-7 pages: 82-87.

[2]. Dineshwar Jaiswar, Sanjana S. Repal (2015, July).”Real Time Tracking and Health Monitoring of Soldier using ZigBee Technology”. International Journal of Innovative Research in Science, Engineering and Technology: a Survey. Vol 4, Issue 7 pages 5560-5574.

[3]. Shruti Nikam, Supriya Patil, Prajakta Powar, V.S.Bendre.”GPS Based Soldier Tracking and Health Indication System”. International Journal of Advanched Research in Electrical, Electronics and Instrumentation Engineering, Pune, Maharashtra, India. Vol 2, Issue 3.

[4]. Pangavne S. M. , Choudhary Sohanlal & Pathak Bhavik (2015).”Real Time Soldier Tracking System”. IOSR Journal of Electronics and Communication Engineering (IOSR-JECE), Nashik, Maharashtra: pp. 21-24.

[5]. M.V.N.R. Pavan Kumar1,Ghadge Rasika Vijay2 ,PatilVidya Adhikrao3,Bobade Sonali Vijaykumar4 Department of Electronics and Telecommunication Engineering 1,2,3,4, LNBCIET, Satara-415020 1,2,3,4Health Monitoring and Tracking of Soldier Using GPS

Cite this article as :