GPS-GSM BASED SOLDIER TRACKING & HEALTH INDICATION SYSTEM

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Abstract— In today's world enemy warfare is an important factor in any nation's security. The national security mainly depends on 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. As soon as any soldier enters the enemy lines it is very vital for the army base station to know the location as well as the health status of all its soldiers.
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 (using bio-sensors) during the war, which enables the army persons to plan the war strategies. Also the soldier can ask for directions to the army base unit in case he feels that he is lost, by using the locations sent by the GPS to the base station, they can guide the soldier to safe area.

Keywords — GPS, GSM, Bio-Sensors

I. INTRODUCTION

The infantry soldier of tomorrow promises to be one of the most technologically advanced modern warfare has ever seen. Around the world, various research programs are currently being conducted, such as the United States' Future Force Warrior (FFW) and the United Kingdom's Future Infantry Soldier Technology (FIST), with the aim of creating fully integrated combat systems.

Alongside vast improvements in protective and weaponry subsystems, another major aspect of this technology will be the ability to provide information superiority at the operational edge of military networks by equipping the dismounted soldier with advanced visual, voice & data communications, helmet mounted visors, capable of displaying maps and real-time video from other squad members, ranges of physiological sensors monitoring heart rate, core body temperature, etc. These devices will improve situational awareness, not only for the host, but also for the posted military personnel who will exchange information using wireless networks. The challenge was to integrate these piecemeal components into a lightweight package that could achieve the desired result without being too bulky & cumbersome or requiring too much power. One of the fundamental challenges in military operations lays that the soldiers are not able to communicate with control room station. In addition, the proper navigation between soldier's organizations plays important role for careful planning & co-ordination. So in this paper we focus on tracking the location of soldier from GPS, which is useful for control room station to know the exact location of soldier & accordingly they will guide them.

II. PROPOSED SYSTEM

Here there are 2 units:

1. Soldier unit
2. Army base unit

- **Soldier Unit**:

This unit is placed on the soldier. It has mainly 3 parts:

1. Biomedical sensors
2. Keypad 4*4
3. GPS + GSM unit

1. Biomedical sensors :

Here to find the health status of soldier we are using a body temp sensor as well as pulse rate sensor. These sensors will measure the body temperature & the pulse rate of soldier which then will be stored in µc memory.This unit is placed on the soldier. Here the electrodes are placed on various parts of soldier. This gives the pulse rate of the soldier. This data is then amplified using the instrumentation amplifier. The µc receives this data and calculates the pulse rate of the soldier for every 30 sec.

2. 4 key keypad :

Here we are giving a 4 keys as a facility to the soldier where he can ask 4 pre-determined questions to the base camp.

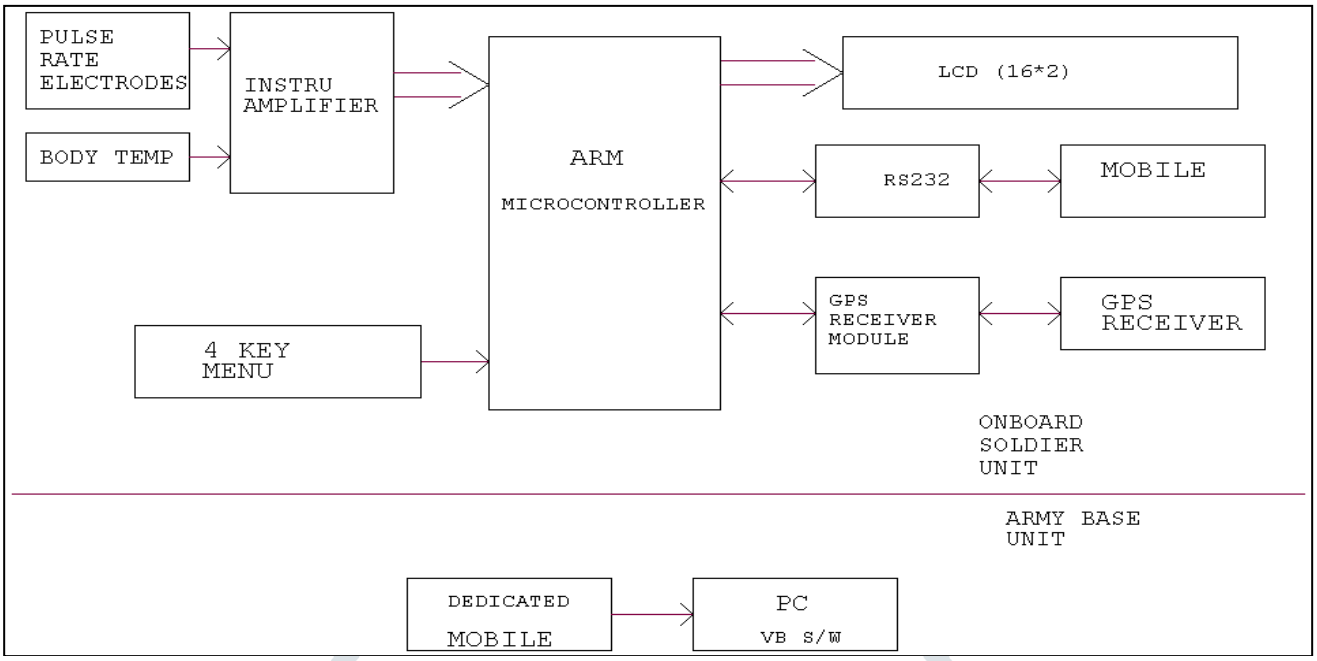
3. GPS+GSM unit :

The GPS is used to log the longitude & the latitude of soldier, which is stored in the µc memory. The GSM unit sends a SMS to the army base camp containing the health parameters and the location of soldier.

- **Company Unit :**

Upon receiving the SMS , the VB s/w sorts the soldier's location based on the GPS co-ordinates. Also the health status is displayed, in this way the army official's can keep a track of all their soldiers.

III. BLOCK DIAGRAM



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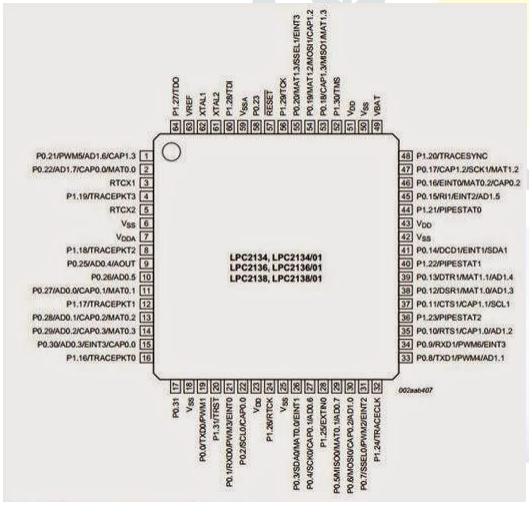
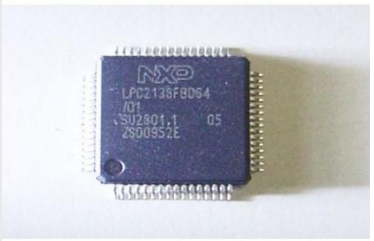
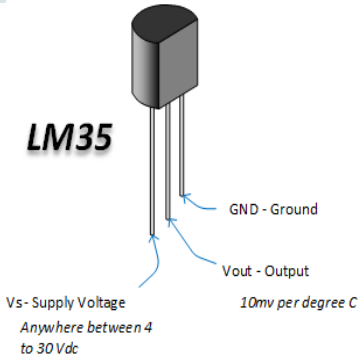
IV. MODULES DESCRIPTION

1) Microcontroller LPC2138 :

The LPC2131/32/34/36/38 microcontrollers are based on a 16/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine the microcontroller with 32 kB, 64 kB, 128 kB, 256 kB and 512 kB of embedded high-speed flash memory. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, these microcontrollers are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. With a wide range of serial communications interfaces and on-chip SRAM options of 8 KB, 16 KB, and 32 KB, they are very well suited for communication gateways and protocol converters, soft modems, voice recognition and low-end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit 8-channel ADC(s), 10-bit DAC, PWM channels and 47 GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers particularly suitable for industrial control and medical systems.







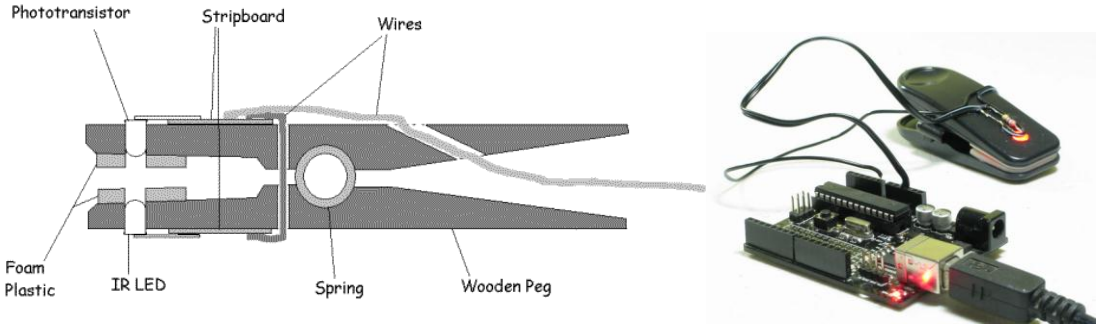
2) Temperature Sensor (LM35)

Temperature sensor is used to sense the temperature. We have used a Temperature sensor called LM35. This temperature sensor can sense the temperature of the atmosphere around it or the temperature of any machine to which it is connected or even can give the temperature of the human body in case if used. So, irrespective of the application to which it is used, it gives the reading of the temperature. The LM35 series are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

Temperature sensor is an analog sensor and gives the output into form of analog signal. This signal is feed to ADC which will convert it into digital form. Once converted into analog form, the microcontroller can process the digital temperature signal as per the application.

3) Pulse rate Sensor (LED+LDR)

The pulse rate sensor interfaced within the system will keep on monitoring the pulses . For this we are using LED and LDR sensor to catch the minute variations in the blood flow. The o/p of the sensor is in µv. For these reasons we have an signal conditioning circuit. The O/P of pulse rate is in 0v to 5v. The µC senses these pulses and displays it on LCD.

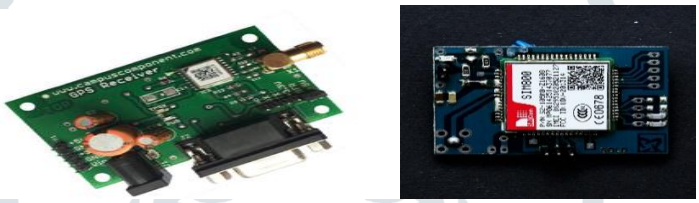


4) GPS

The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides location and time information in all weather, anywhere on or near the Earth, where there is an unobstructed line of sight to four or more GPS satellites. It is maintained by the United States government and is freely accessible by anyone with a GPS receiver which can operate in the free band.

The GPS program provides critical capabilities to military, civil and commercial users around the world. It is an engine of economic growth and jobs, and has generated billions of dollars of economic activity. It maintains future war fighter advantage over opponents and is one of the four core military capabilities. In addition, GPS is the backbone for modernizing the global air traffic system.

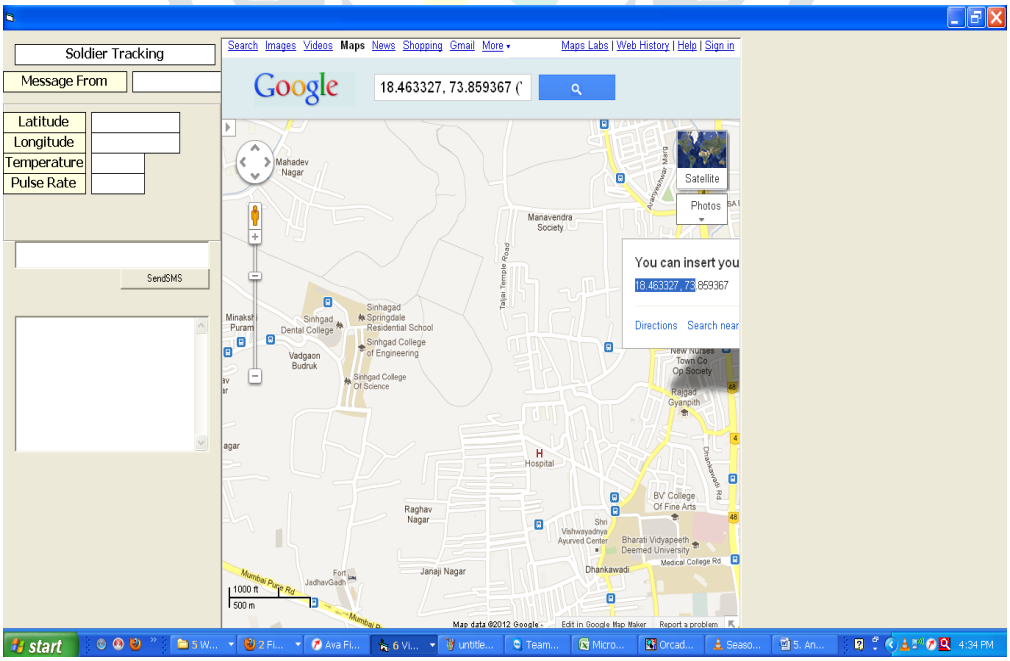
The GPS project was developed in 1973 to overcome the limitations of previous navigation systems, integrating ideas from several predecessors, including a number of classified engineering design studies from the 1960s. GPS was created and realized by the U.S. Department of Defense (DoD**)** and was originally run with 24 satellites. It became fully operational in 1994.



5) GSM

GSM (Global System for Mobile communication) is a digital mobile telephony system. With the help of GSM module interfaced, we can send short text messages to the required authorities as per the application. GSM module is provided by sim which uses the mobile service provider and send SMS to the respective authorities as per programmed. This technology enables the system, a wireless system with no specified range limits. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

V. SIMULATION RESULTS



- The UI has been developed on Microsoft Visual Basic 6.0
- Various parameters have been bundled into the appropriate columns.
- The message from the GSM transmitter is available on the box as 'SendSMS'.
- Various preset commands of the 4*4 keypad is also shown in the box.
- Also the location is visible at the Google maps.

VI. APPLICATIONS

1. Vehicle watching and following system.
2. Fuel watching and following system.
3. Digital Heart Rate monitor.
4. Patient Watching/supervising System.
5. Bio-control of robotics & applications

VII. ADVANTAGES

- Security & Safety of soldiers is enhanced.
- Continuous communication is possible.
- Less complex circuit & power consumption.
- Have adequate scope for future developments due to the use of powerful processor.

VIII. ACKNOWLEDGMENT

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