Soldier Tracking and Health Indication System Using Arm Processor

Authors
Prof. D.B. Rane, Jagale Swapnil, Gholap Ujwal, Rupwane Ashish
Department of Electronics,
Pravara Rural Engineering College, Loni, A'nagar, Maharashtra

Abstract

In present time world, border security is an important factor in any nation's security. The national security mainly depends on army, navy, air-force. The army soldiers are played the one of the important and vital roles. There are many issues regarding the safety of these soldiers. Whenever any soldier enters the war field it is very vital for the army base station to know the exact location and also the health status of all soldiers. Every year Army Soldiers become lost or injured in war field. In this proposed system gives the ability to track where Soldiers are at any given instant. Search and rescue work become minimized in time and resources. And also, with alert feature Soldiers will be able to communicate their distress with GPS coordinate information to the base station. This project which is a reliable system, energy efficient remote soldier monitoring system. It is able to send health parameters and position parameterof soldier in real time. Using bio-sensors it enables the army station to monitor Soldier's parameters such as body temp, heartbeat rate, respiration rate in real time and wirelessly transmitted to Army base station using GSM.

Keywords- *ARM, GPS, Bio-sensors, Navigation*

INTRODUCTION

Nowadays Defense services are rapidly growing towards new researches with advance technologies. Soldier's health is most important issue because they are the defenders who protect our country from enemies. The proposed system is composed of two parts, which are portable remote soldier unit and the monitoring center at Army Base station. The portable remote soldier unit consists of ARM7 processor with the embedded operating system, GPS and a GSM, respiration sensor, temperature sensor and heart beat rate sensor.

BASIC CONCEPT

The proposed work of this project is to develop a system that can be provided with real-time wireless monitoring systems which are designed and implemented with GPS network and are able to transmit bio-signals and location parameters of soldiers. The aim of this system is to provide a medical monitoring for the soldier at any time and any place and to design a soldier tracking system for provide wireless system for monitoring the parameters of soldier are as – Respiration rate, body temperature and heart beat rate.

A) SYSTEM STRUCTURE

It is composed of two parts as follows:

1) Soldier remote unit: This unit consists of four types of sensors such as body temperature sensor, heart beat sensor respiration sensor and accelerometer sensor. These sensors are used to measure the bio signals from the human body such as heat signal, heart beat and respiration rate. After measurement of these parameters, these analog signals are converted into digital form and

compared with the actual signals. If any variance occurs between the measured signals and the actual signals, then it is considered as an emergency. The ARM7 LPC2138 processor plays an important role in controlling all the system. It has on chipA\D convertor.GSM (SIM900) is used to transmit the signals from the sensors which are controlled by the ARM7 processor.GPS system is used for identify location of the soldier. It isvery helpful for the army base station to rescue the soldier when the emergency signal is received. The ARM7 processor family includes the 16/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 or HVQFN package. The ARM7TDMI core is the most widely used 32-bit embedded RISC microprocessor in industries. Optimum for cost issue and power sensitive applications, the ARM7TDM provides the low power consumption, small in size and higher performance needed in portable, embedded applications [1].In-System Programming or In-Application Programming (ISP/IAP) via on-chip boot loader software. It has Single flash sector or full chip erase in 400 m sec and programming of 256 B in 1 msec. Embedded ICE RT and Embedded Trace interfaces offer real-time debugging with the On-chip Real Monitor software and high-speed tracing of instruction execution. LPC2138 has 8-channel 10-bit ADCs provide a total of up to 16 analog inputs, with conversion times as low as 2.44 m sec per channel.[1].

2) *Army base unit:* Upon receiving the SMS, the visual basic (VB) software sorts the solder's location based on the GPS coordinates and also soldier's health status is displayed. In this way the army officials can keep a track of all their soldiers.
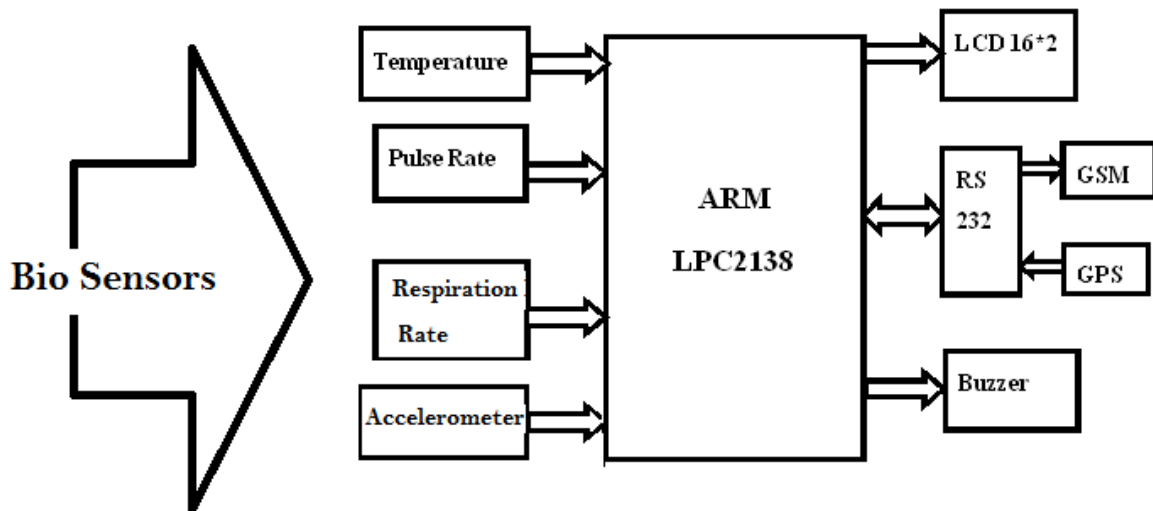
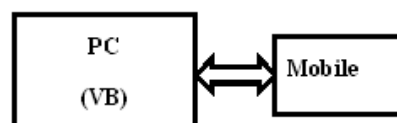## B) BLOCK DIAGRAM DETAILS

Fig: Soldier remote unit

Fig: Army based unit

In first fig, block diagram of overall system is shown. It describes how the system is implemented the real time application. Here there are two units under hardware design part:

1) Soldier remote unit: This unit is with the soldier. It has mainly 2parts: Bio sensors and GPS + GSM unit.

2) Army unit: This unit consists of PC with VB software and GSM module.

Project Flow Chart:-
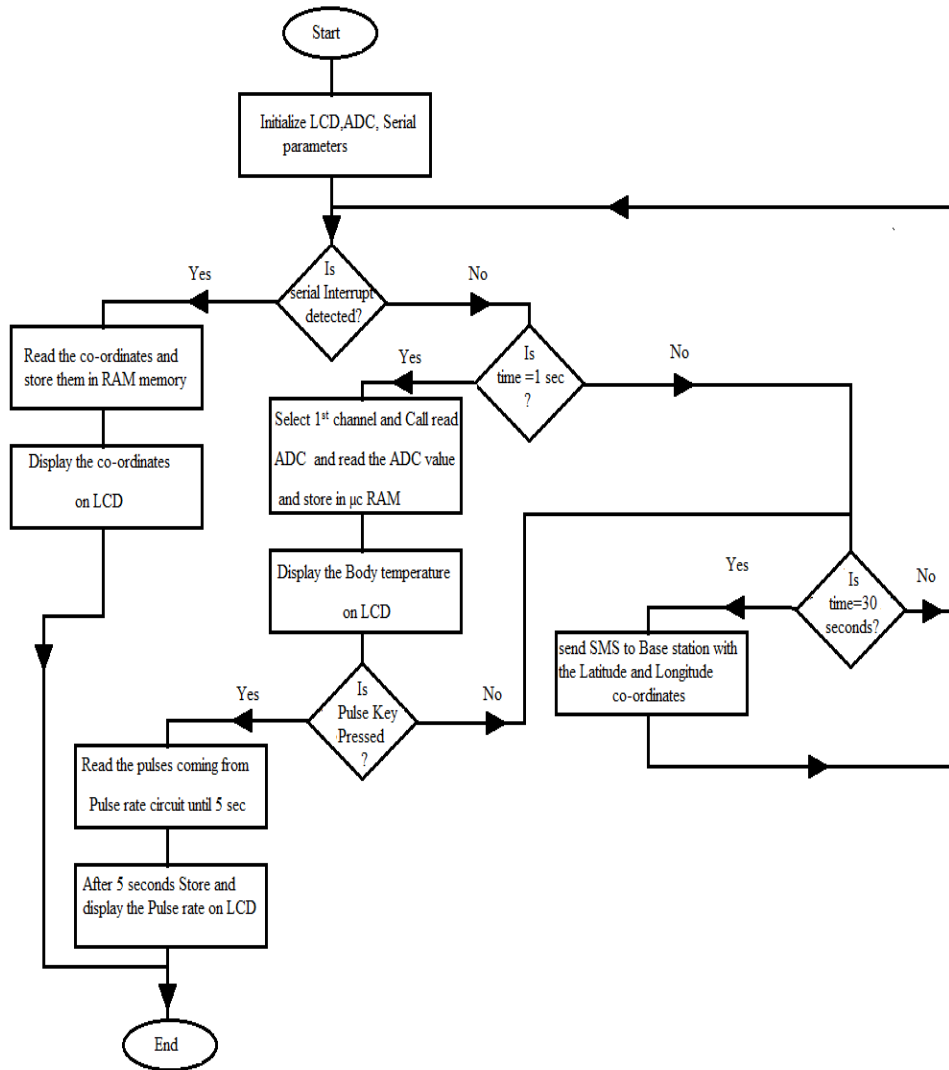
Modules Description:

1) ARM (LPC2138)

The microprocessor that has been used for this project is a 32 bit ARM7, CPU with real-Time emulation and embedded trace support that combines the microcontroller with 512 Kb of embedded high speed Flash memory. It has two 8 channel ADC, single 10 bit DAC, two 32 bit timer/counter ,multiple serial interfaces including two UART, two fast I2C, Capture, compare and PWM module.

2) GPS MODEM:

The GPS smart receiver features the 16 channels .Ultra low power GPS architecture. This complete enabled GPS receiver provides high position, velocity and time accuracy performances as well as high sensitivity and tracking capabilities.

Benefits-

Ultra low power consumption

Easy and fast to install

Superior urban canyon performance

Low cost with high performance

3) GSM MODEM

GSM (Global System for Mobile communication) is a digital mobile telephony syste

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 uses the mobile service provider and send sms to the respective authorities as per programmed. This technology enable 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.
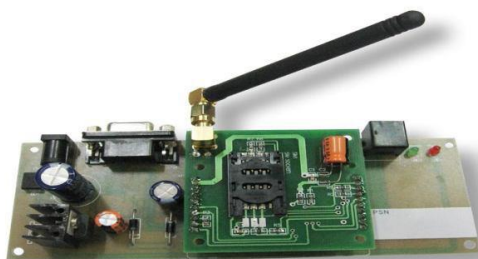
4) Biosensor

Temperature Sensor:

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.
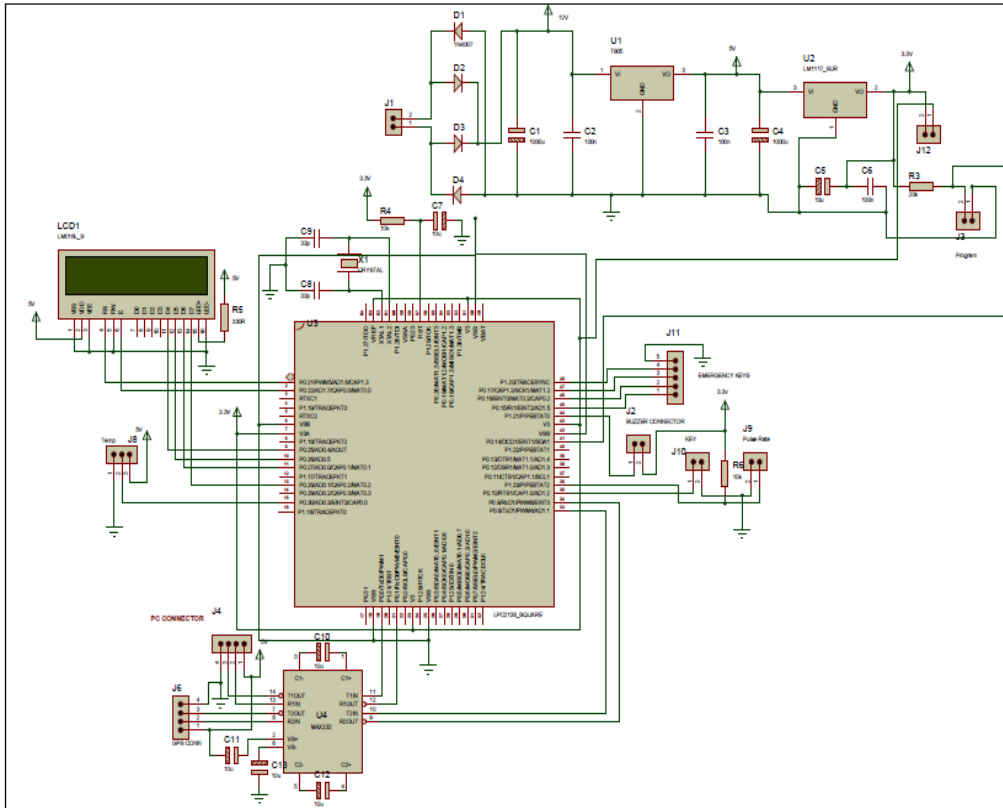

Pulse Rate Sensor:

The pulse rate sensor is basically used to keep track on the pulse rate of the person. In programming the maximum and the minimum st point are provided for the pulse rate. If the pulse rate goes below or above the set point then the alert will be immediately issued by the microcontroller.

SIMULATION RESULTS:

Above fig. shows interfacing of LCD with ARM processor. To perform this we have written code in keil software and proteus is used for simulation results.

CONCLUSIONS

Following conclusion can be retrieved from above implementation are:

Security and safety for soldiers: GPS tracks position of soldier anywhere on globe and also health system monitors soldier's vital health parameters Which provides security and safety for soldiers.

Continuous 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.

Less complex circuit and power consumption. Use of ARM processor and low power requiring peripherals reduce overall power usage of system. Modules used are smaller in size and also lightweight so that they can be carried around.

So in this way concept of tracking and navigation system is very useful for soldiers when they are on military field war. And also for base station so that they can get real-time view of soldier's on field displayed on PC.

BIBLIOGRAPHY

1. Matthew J. Zieniewicz, Douglas C. Johnson, Douglas C. Wong, and John D. Flat "The Evolution of Army Wearable Computers" Research,Development and engineering center, US Armu communication October–December 2002.
2. Wayne Soehren & WesHawkinson "Prototype Personal Navigation Navigation system",IEEE A&E system magazine April- 2008.
3. Simon L. Cotton and William G. Scanlon "Millimeter - wave Soldier –to- soldier communications for covert battlefield operation" Defence science and Tecnlogy laboratory, IEEE communication Magzin October 2009.

4. AlexandrousPlantelopoulous and Nikolaos ,G. Bourbakis "A Survey on Wearable sensor based system for health monitoring and prognosis" IEEE Transaction on system,Man and Cybernetics ,Vol.40,No.1, January 2010.

5. A udereyGiremus,Jean-yves Tourneret, Seniormember,IEEE&ArnaudDoucetA "fixed-Lag particle filter for the joint Detection" Compensation of interference effects in GPS Navigation—December-2011.

6. Hock Beng Lim "A Soldier Health Monitoring System for Military