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Soldier Health Care Monitoring and Tracking system using LabVIEW and Zigbee

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Abstract: The paper presents the development of a system of soldier health care. It consists of two unit's viz., "Solider unit" and "Server unit". The wireless technology is used in our project for the communication. We are using a programmable IC, with a RAM memory and ROM which is of Flash type, to control the operations.GPS is interfaced with the Solider Unit which sends the current location of the soldier in the battle field, to the server unit, module. The receiver in the server unit receives the signal and tracks the location. Heart beat sensor and temperature sensor are attached with the soldier unit, to check if the soldier is alive or dead, and sends the information to the server unit. In any emergency situation soldier can contact the server by giving a request through keypad interfaced with the unit. To prevent inactive the body part for examples finger, heart, leg& hand due to heavy snow. Thermoelectric cooling uses the Peltier effect to create a heat flux between the junctions of two different types of materials which is wearied by soldier for worm up. LCD display shows the status. The server unit monitors via Lab VIEW (PC).LCD display shows the status.

Keywords: Health Monitoring, Wireless Sensor Networks, Zigbee, Lab VIEW

I. INTRODUCTION

A. Motivation

Soldier deaths have become extremely common these days at borders and during various rescue operations. The main reasons are due to mismanagement and lack of proper connectivity among soldiers. Many soldier deaths are also caused due to improper monitoring of vitals in extremely low temperature and high altitude zones like the Himalayas. A system that continuously monitors the vitals along with the location can be used. When the vitals go below a certain threshold value the main station can be alerted. In addition to this, each soldier can also be aware of the position of his squad members. The base station computer must also be able to send and receive messages to individual soldiers for strategic planning of missions. Each soldier can be equipped with a biosensor data acquisition unit along with a microcontroller to process the data to and a wireless module to transmit and receive messages from the locality are able to transmit and receive messages from the other devices.

B. Technical Background

A lot of previous work has been done on the area of patient health monitoring. This work focuses on wireless health monitoring and GPS position tracking of soldiers. The paper also talks about the implementation of a software solution using Lab VIEW for a complete soldier management system.

C. Proposed Solution

It consists of two unit's viz., "Solider unit" and "Server unit". The wireless technology (Zigbee) is used in our project for the communication. We are using a programmable IC (PIC16F877A), with a RAM memory 368bytes and ROM 8K which is of Flash type, to control the operations.GPS is interfaced with the Solider Unit (moving unit) which sends the current location of the soldier in the battle field, to the server unit, via zigbee transmitter. The receiver in the server unit receives the signal and tracks the location. Heart beat sensor and temperature sensor are attached with the soldier unit, to check if the soldier is alive or dead, and sends the information to the server unit. In any emergency situation soldier can contact the server by giving a request through keypad interfaced with the unit. To prevent inactive the body part for examples finger, heart, leg& hand due to heavy snow. LCD display shows the status. The server unit monitors via Lab VIEW (PC). The LCD display shows the status of the system.

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II. THE LITERATURE REVIEW

Many efforts were reported by different academicians and researchers to track the location of the soldiers' along with their health condition on the battlefield. Survey on Wearable sensor based system for health monitoring and Prognosis is the system which is designed and developed with wearable biosensors for health monitoring .These system can comprise various types of small physiological sensors, transmission modules and processing capabilities and thus facilitate low-cost wearable unobtrusive solution for continuous all-day and any-place health and activity status monitoring. A Raspberry Pi based approach was proposed in to monitor the body temperature, respiration, movements and heartbeat of the patient. The collected information was then added to the cloud-based websites with the help of IoT.

III. PROPOSED SOLUTION

The proposed system is divided into multiple subsystems on the soldier end: a biosensor data acquisition unit, a tracking module, a user interface module and a wireless module for transmission and reception of data. The command center is divided into two subsystems: a Lab VIEW based GUI interface for interacting with soldiers and a wireless module. It consists of two unit's viz., "Solider unit" and "Server unit". The wireless technology (Zigbee) is used in our project for the communication. We are using a programmable IC (PIC16F877A), with a RAM memory 368bytes and ROM 8K which is of Flash type, to control the operations.GPS is interfaced with the Solider Unit (moving unit) which sends the current location of the soldier in the battle field, to the server unit, via Zigbee transmitter. The receiver in the server unit receives the signal and tracks the location. Heart beat sensor and temperature sensor are attached with the soldier unit, to check if the soldier is alive or dead, and sends the information to the server unit. In any emergency situation soldier can contact the server by giving a request through keypad interfaced with the unit. To prevent inactive the body part for examples finger, heart, leg& hand due to heavy snow. LCD display shows the status. The server unit monitors via Lab VIEW (PC). The LCD display shows the status of the system.

A. Soldier Side: The soldier unit is which consist of biosensors like Temperature sensors. Heart beat sensors with the tracking system using GPS .An LCD display is also available which are used to display the information being above provided. The keypad is used where information to be sent are transferred. These are being controlled by the PIC microcontroller unit which acts as the base interface in the system. The politer crystals are used to track the temperature.

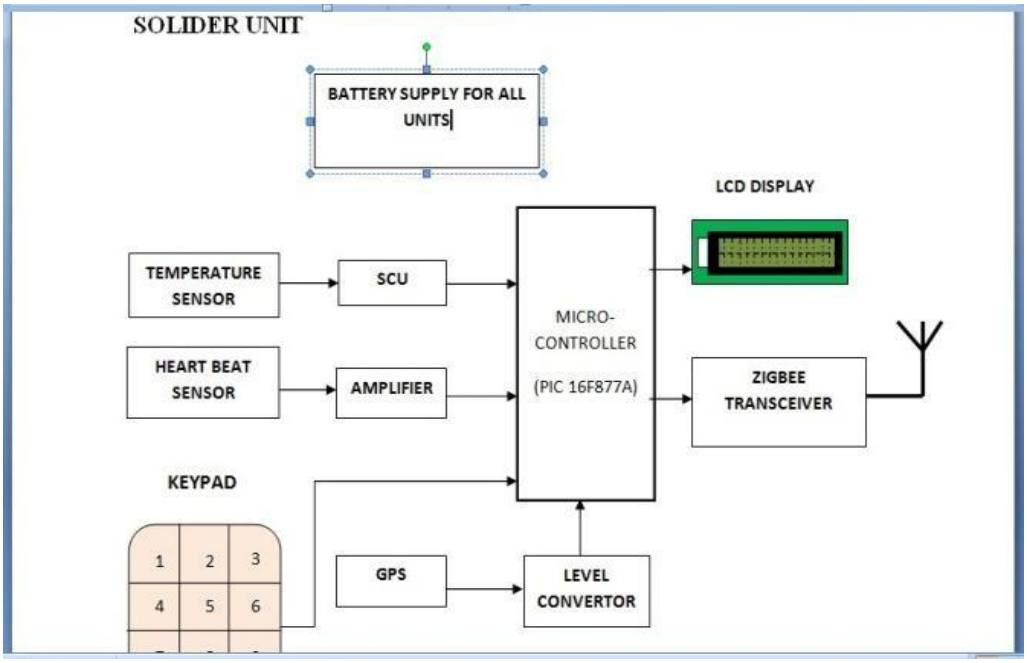

Fig. 1 Soldier side

B. Base Station Side: A LabVIEW based software has been developed for the base station computer. The software will be able to monitor the vitals such heart rate, and monitoring the temperature. Some features such as intruder alert, medic request, backup request, mission status, messaging from the base station and message acknowledgement are integrated into the system. These alerts are indicated by the software when the soldier presses certain buttons.

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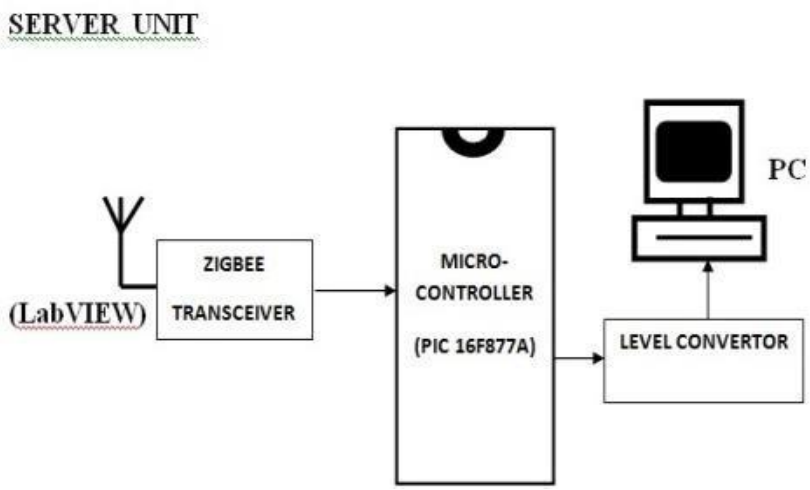

Fig. 2 Base Station side

IV. IMPLEMENTATION

A. Hardware Implementation

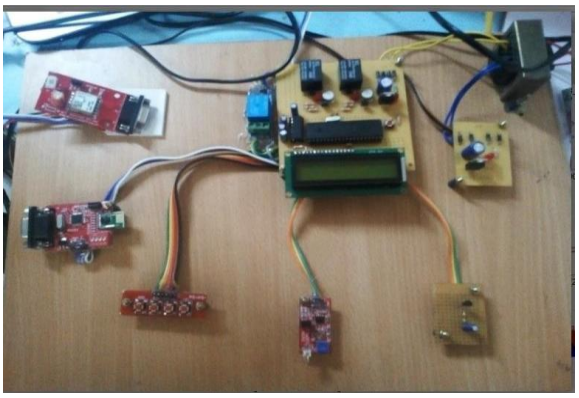

Fig. 3 Hardware Components

Heart beat sensor: Here we are using IR sensor for detecting the HEART BEAT. IR has less noise and ambient light than at normal optical wavelengths. The light is produced only when current passes through in the forward direction and block current in the reverse direction. Plethysmograph is an infrared photoelectric sensor used to record changes in pulsatile blood flow from the finger. The Plethysmograph operates by recording changes in blood volume as the arterial pulse expands and contracts the microvasculature.

Temperature Sensor: The surface body temperature is measured using TI's LM34 which is a high precision integrated circuit temperature sensor, whose output voltage varies linearly with Fahrenheit temperature. Its output is given to microcontroller's ADC.

GPS Module: The GPS module was acquired from Rhydo Labs. It provides standard NMEA0183 strings. It provides current time, date, latitude, longitude, and speed and travel direction However, only the latitude and longitude information were extracted from the strings.

Keypad and 16X2 LCD: A 4X4 matrix keypad are used which are used for transmitting data from the soldiers unit in any critical situations and 16X2 LCD is used for providing an interface with the device. This helps in receiving the datas.

B. Software Implementation LabVIEW

For the base station, the end device is interfaced to the computer serially. Laboratory Virtual Instrument Engineering Workbench (LabVIEW) is a system-design platform and development environment for a visual programming language from National Instruments. The graphical language is named "G"; not to be confused with G-code. Originally released

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for the Apple Macintosh in 1986, LabVIEW is commonly used for data acquisition, instrument control, and industrial automation on a variety of operating systems (OSs), including Microsoft Windows, various versions of Unix, Linux, and macOS. The latest version of LabVIEW is 2016, released in August 2016.

V. RESULTS

Based on the study of the existing system of soldiers protections we can say that the existing system are not much efficient for protecting the soldiers. Real time monitoring of health combined with the tracking system are not imposed. Thus, our proposed system is which soldier health care monitoring and tracking system where we monitor their health care and track the soldier in real time. In this system instead of GSM, GPS systems are used which are more efficient and accurate and easy to use and detect the areas.

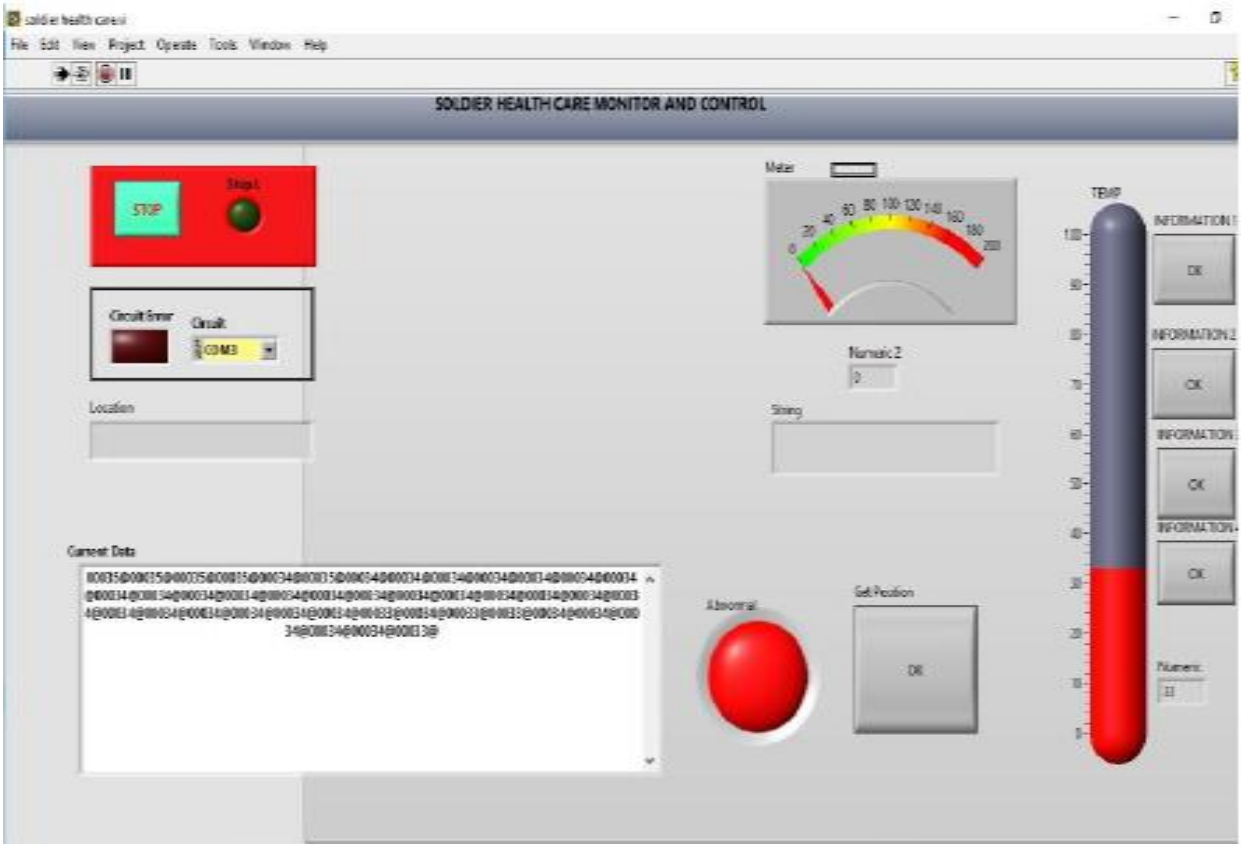

Fig. 4 Software Results

The LabVIEW program was able to continuously monitor the health of the soldier as well as transmit and receive messages wirelessly. The sent messages can be viewed by the user on the LCD. A specified button for alert has been set and when the user presses that button, an alert dialog box is displayed in the LabVIEW interface.

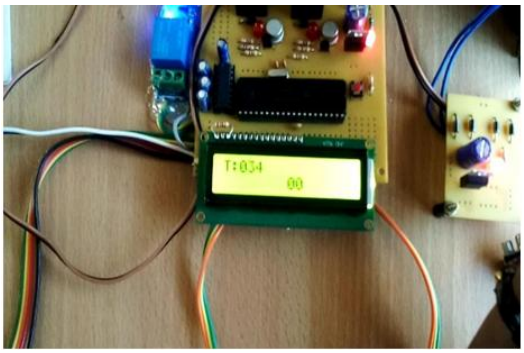

Fig. 5 Hardware Results

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VI. CONCLUSION

A portable unit has been made which helps in continuously monitoring a health person's vitals, position and also facilitates communication within the network under stationary conditions. It can also be used for strategic planning in military operations. However, it is only a prototype with a limited range because of the eZ430-RF2500 wireless module used. It can be overcome and implemented on a large scale by using long range RF modules. Data transmission can be made secure by implementing encryption. Recent advances in biosensor technology can make the sensor unit more portable and easily wearable.

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