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Research Article

SOLDIER HEALTH MONITORING AND TRACKING SYSTEM

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ABSTRACT
The Army of a country which play a key role in today's fast-moving world need be to strong and efficient. Soldiers who are equipped with advanced technology are crucial to build a strong army. For the health monitoring purpose of army personnel, devices are attached on them to keep an eye on their health. The frame is a wearable physiological equipment which contain sensors, transmission modules. Through the utilization of the proposed hardware, health related sensors like heartbeat sensor, body temperature measuring sensor can help to make wearable gadgets for monitoring of health. GPS is used to identify the latitude and longitude of the personnel. It is realisable device which can provide an upper-hand in saving human life.

Keywords: pic microcontroller; biomedical sensors; health monitoring;GPS tracking;peltier crystal;

INTRODUCTION

The armed forces when deployed in battlefield need to be monitored for better utilisation of soldiers and using strategies to manoeuvre them to combat. Rather than reporting on the status of their health and current location which may sometimes be wrong due to human error, a device attached with sensors can be used to get precise results. Medical attention can be provided at right time.

Objective

Bio-sensor systems comprising various small physiological sensors can facilitate low-cost wearable solution for health monitoring. GPS can track the longitude and latitude of the soldier. This device can be embedded into soldiers' vests or uniforms so that the commanding officers can track the soldier's movements in real time. To be able to provide warmth or chillness when the temperature rises or falls depending on the ambiance.

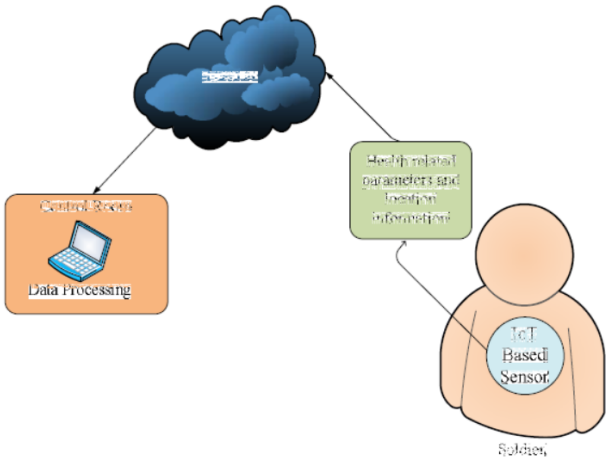


Fig.1 depicts the block diagram of the proposed IoT based system.

Methodology

Sewed in the vest

The proposed system is sewed in the vest which will be part of their attire so that the ease of carrying it in the battle field is increased.

Use of Iot

IoT module can be used for wireless communications to relay information on situational awareness, tactical instructions, and related data during operations which is stored in the cloud

server. Data stored in the cloud can be viewed in monitor to check upon the health.

To regulate the temperature

The use of Peltier A Peltier thermoelectric module consists of an array of Bismuth Telluride semiconductor pellets that have been "doped" so that one type of charge carrier either positive or negative carries the majority of current. The pairs of P/N pellets are configured so that they are connected electrically in series, but thermally in parallel. Metalized ceramic substrates provide the platform for the pellets and the small conductive tabs that connect them.

Proposed System

It consists of two unit's viz., "Solider unit" and "Server unit". The IoT module is used in our project for the purpose of communication. 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 IoT 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 situations soldier can contact the server by giving a request through keypad interfaced with the unit. To prevent inactivity in body part, a Peltier crystal which uses the Peltier effect to create a heat flux between the junction of two different types of materials which is worn by soldier for warm him/her up. LCD display shows the status. The server unit monitors via PC.

The list of sensors, components used and their functionalities are listed below

S.no	Biometric sensors and components	specification	functionalities
1	Temperature sensor	LM35	Senses surrounding temperature
2	Heartbeat sensor	LM358	Calculates heartbeat by measuring pulse
3	Peltier crystal	TEC-1 12706	Used to heat and cool the body
4	LCD display	16x2	Displays heartbeat, temperature and GPS location
5	GPS module	Ublox NEO 6M	Calculates latitude and longitude
6	IoT module	ESP8266 node mc module	To send data to the cloud server
7	Keypad buttons	Push buttons	Emergency communication buttons

Hardware description

A. PIC

The system uses PIC 16F877A microcontroller for the processing as it is simple and efficient.It is a 40 pin IC chip cable of intergrating many sensors.The cloud server used is Cayenne which uses MQTT protocol for demonstration purposes.

B. Peltier crystal

Thermoelectric cooling uses the Peltier effect to create a heat flux between the junctions of two different types of materials. A Peltier sensor is a solid-state active component which transfers heat from one side to other side,while consumption of electrical energy, depending on the direction of thecurrent. They can be used either for heating or for cooling, although in practicethe main application is cooling. It can also be used as a temperature controller that either heats or cools.

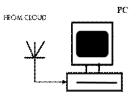
C. Temperature sensor

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in o C). The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified.

D. IOT module

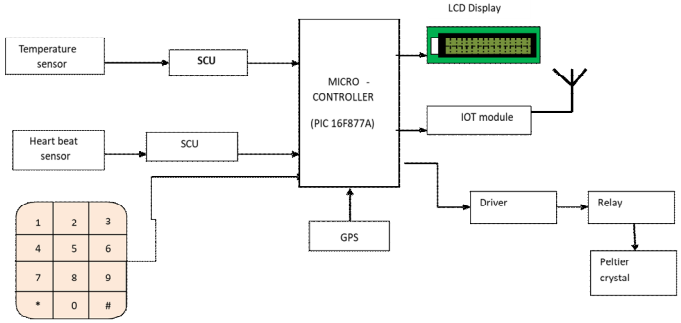
ESP8266EX (simply referred to as ESP8266) is a system-on-chip (SoC) which integrates a 32-bit

Tensilica microcontroller, standard digital peripheral interfaces, antenna switches, RF balun, power amplifier, low noise receive amplifier, filters and power management modules into a small package.



THE SERVER UNIT

THE SOLDIER UNIT



Conclusion

The above proposed system is used to enhance the chances of monitoring soldiers in close quarters this technology will provide the ability of information superiority at operational edge of military networks by equipping the dismounted soldiers with advanced data communications.

Literary survey

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