THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

A Novel Based on Soldier Tracking and Health Monitoring System Using Embedded Technology

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Abstract:
Army soldiers are protective shield of every nation, but when it comes to their protection we don't make large steps. Though there are many technologies, most of them are not used here they are given with protective bullet proof jackets, which are very helpful to save their life. But when it comes to technology they lag in large degree. We still use the old bullet proof jackets which reduce the impact of bullet. These jackets does not having warning system that would alarm the command center. This is overcome by our new proposed system with the help of various sensors and embedded system. In this research paper, automatically monitor and control the physical status of each and every soldier and tracking the place through sensors and GSM by using embedded system. Here we using temperature sensor, respiratory sensor and vibration sensor, its all are used to sense the soldier body temperature, breathing and vibration occur if any bullet will hit the soldiers respectively during war period or defense area. For this sensors placed on soldier bullet proof jackets. It will help to keep in touch with remote center via GSM and gives a signal about the soldier status and physical strength. Through this possible actions can be taken to satisfy the individual needs and can help them during emergency situations. It will be big hikes that make a new way protection of our soldiers and our nation.

Keywords: *ARM Processor 8L, GSM, biomedical sensors, mini solar panel, heater*

1. Introduction

We live a safe life because of their Scarifies of few brave people. But their protection we are providing a jacket with a single layer of plate. They have their own level of limitations. Technologies used in these Jackets are still the same as that used in the old age. In this proposed system the technology is going to make a like in the protection of soldiers. It is going to be provided with their sensor each has its own purpose. It will help to monitor the position and give their status about respiration body, temperature and bullet impact. It also monitors and control via GSM.

In present bullet proof Jacket they don't have any technical devices so not able to help them and not know about their health condition. If any soldier got injured, the command Centre will not know until they are brought to base or other soldier finds him. In critical to work in snow area like Jammu and Kashmir because if body temperature decreases below the normal level even not able to breath normally. In this proposed system, we are used temperature and respiratory sensor, it is used to monitor and control the body temperature and breathing level respectively. If body temperature decreases below the normal level, the heater is automatically ON which is inserted in bullet proof jacket. If there respiration levels goes below, give a signal to the Command center through GSM they are sent medicine to defense area and rescue the soldiers It's all going to make a new on the field of protection.

2. Literature Survey

2.1. Shruthi Nikamaal [1]

In today world, enemy warfare is an important factor in any nation's security. One of the important and vital roles is played by the army soldiers. There are many concerns regarding the safety of soldiers. So for theirs 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. These devices are being added to weapons and firearms, and some militaries such as the Israeli Army, which are exploring the possibility of embedding GPS devices into soldiers vests and uniforms so that field commanders can track their soldier's movements in real time. RF module can be used for High-speed, short-range, soldier-to-soldier wireless communications that will be required to relay information on situational awareness, tactical instructions, and covert surveillance related data during special operations reconnaissance and other missions .So by using these equipment's we are trying to implement the basic life- guarding system for soldier in low cost and high reliability.

2.2. U. Anliker al [2]

This paper describes AMON, a wearable medical monitoring and alert system targeting high-risk cardiac respiratory patients. The system includes continuous collection and evaluation of multiple vital signs, intelligent multiparameter medical emergency detection, and a cellular connection to a medical center. By integrating the whole system in obtrusive, wrist-worn enclosure and applying aggressive low
power design techniques, continuous, long-term monitoring can be performed without interfering with the patients everyday activities and without restricting their mobility. In the first two and a half years of this EU IST sponsored project, the AMON consortium has designed, implemented and tested the described wrist worn device, a communication link, and a comprehensive medical center software package. The performance of the system has been validated by a medical study with a set of 33 subjects. The paper describes the main concepts behind the AMON system and presents details of the individual subsystems and solutions as well as the results of the medical validation.

2.3. Carla Hertleeral [3]

The introduction of intelligent textile systems to increase the wearer's level of protection has exposed the necessity of wearable communication tools and has led to research in textile antennas. However, most textile fabrics are quite thin (0.5 mm), making it challenging for antenna designers to provide an antenna which operates adequately and resiliently in the 2.4–2.4835-GHzindustrial-scientific-medical bandwidth. Flexible pad foam is commonly available in protective clothing and overcomes these constraints by providing a uniform, stable, and sufficient thickness. Moreover, its cellular structure and properties, such as flame retardance and water repellence, make it an excellent substrate material this paper, we describe the design, manufacture, and performance of the first textile planar antenna to be implemented on flexible protective foam, suitable for firefighter garments. We employed shock absorbing foam with a thickness of 3.94 mm and achieved a nearly circularly polarized antenna with a bandwidth of more than180 MHz even when the antenna was compressed or bent. These outstanding substrate and antenna characteristics result in an antenna that is highly appropriate for garment integration.

2.4. Loverro et al [4]

The purpose of this evaluation was to examine how increasing body armor protection with and without a fighting load impacted soldiers' performance and mobility. Thirteen male soldiers performed one performance (repeated 30-m rushing) and three mobility tasks (walk, walk over and walk under) with three different body armor configurations and an anterior fighting load. Increasing body armor protection, decreased soldier performance, as individual and total 30-m rush times were significantly longer with greater protection. While increasing body armor protection had no impact on mobility, i.e. significant effect on trunk and lower limb biomechanics, during the walk and walk over tasks, greater protection did significantly decrease maximum trunk flexion during the walk under task. Adding fighting load may negatively impact soldier mobility, as greater maximum trunk extension was evident during the walk and walk over tasks, and decreased maximum trunk flexion exhibited during the walk under task with the fighting load.

2.5. P. S. Pandianal [5]

The wearable physiological monitoring system is a washable shirt, which uses an array of sensors connected to a central processing unit with firmware for continuously monitoring physiological signals. The data collected can be correlated to produce an overall picture of the wearer's health. In this paper, we discuss the wearable physiological monitoring system called 'Smart Vest'. The Smart Vest consists of a comfortable to wear vest with sensors integrated for monitoring physiological parameters, wearable data acquisition and processing hardware and remote monitoring station. The wearable data acquisition system is designed using microcontroller and interfaced with wireless communication and global positioning system (GPS) modules. The physiological signals monitored are electrocardiogram (ECG), photoplethysmogram(PPG), body temperature, blood pressure, galvanic skin response (GSR) and heart rate. The acquired physiological signals are sampled at250 samples/s, digitized at 12-bit resolution and transmitted wireless to a remote physiological monitoring station along with the geo-location of the wearer. The paper describes a prototype Smart Vest system used for remote monitoring of physiological parameters and the clinical laudations of the data are also presented.

3. Hardware Description

In this proposed system to monitor and control the army soldier's body temperature, breathing level and vibration if any bullet hit the body during the period of war by using the following sensors respectively.

- Respiratory Sensors
- Temperature Sensor
- Vibration Sensor

These sensors provide the signals to command center if any soldier get injure or bullet hit from enemies through GSM.GSM is used to find the location if any army soldiers got injured or abnormal condition through remote center and save the army soldiers life. We include solar panel with battery which provides supply to the system.

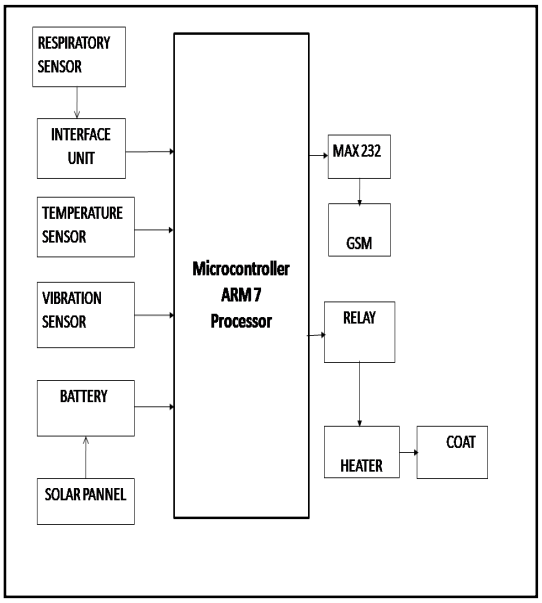

Figure 1: Block diagram of soldier tracking and health monitoring system.

Whereas in previous project the solar panel is not used and the power supply was provided by using the charger. The respiratory sensors are used to provide the signal by sensing the human respiratory system. The temperature sensors are used sense and monitor the temperature of the human body like, if the temperature got raised (or)exceed the normal temperature level the heater automatically ON and provide heat to the body up to get normal level. The vibration sensors are used to sense the vibrations like whenever there is strange noise or any soldier attacked by any bullet or collide with any rocks the vibration get sensed. The sensed signal get monitored and sensed by the GSM which get coupled with the Arm processors. The MAX232 get connected to the ARM processors which interface the signal and the relay with heater and coat.

The Jacket is coupled by the coating which do not allow any bullet which get shotted by the other soldier from the opposite member. By using the sensor and relay circuit which one coupled to the ARM processor are used to monitor and helps the soldier from the loosing life during the war.

4. Software Description

```
#include "macros.h"
#include <string.h>
#include <ulk.h>
int main(void) PROGRAM_ENTRY;
int main (){
int a, n;
ulk_proc_keypad_init();
ulk_fpga_clcd_display_on();
ulk_fpga_7seg_led_enable();
ulk_fpga_clcd_display_on();
unsigned long*base=0x80500000;
{
*(base+i)=0x000000;
}
ulk_cpanel_printf("welcome:\n");
ulk_cpanel_printf("Enter the option 1 or 2 Or 3 \n");
ulk_cpanel_printf("1.temperature\n");
ulk_cpanel_printf("2.heart beat rate\n");
ulk_cpanel_printf("3.vibration\n");
```

```
ulk_scanf_hex(&n);
switch(a)
{
case 1 :
ulk_fpga_clcd_init();
ulk_fpga_clcd_display_on();
ulk_fpga_7seg_led_enable();
ulk_fpga_7seg_led_write(1);
ulk_scanf_hex(&n);
if(n<=37)
{
ulk_fpga_clcd_display_string(" low level");
for(i=0;i<320*240;i++)
{
*(base+i)=0xff0000;
}
}
else
{
ulk_fpga_clcd_display_string("heater off");
for(i=0;i<320*240;i++)
{
*(base+i)=0x00f00f;
}
}
break;
case 2 :
ulk_fpga_clcd_init();
ulk_fpga_clcd_display_on();
ulk_fpga_7seg_led_enable();
ulk_fpga_7seg_led_write(2);
ulk_fpga_clcd_display_string("heart beat");
ulk_scanf_hex(&n);
if(n>108)
{
ulk_fpga_clcd_display_string("high beat");
for(i=0;i<320*240;i++)
{
*(base+i)=0x0000ff;
}
}
else if(n<37)
{
ulk_fpga_clcd_display_string("low beat");
for(i=0;i<320*240;i++)
{
*(base+i)=0x000f0f;
}
}
else
{
ulk_fpga_clcd_display_string("normal");
for(i=0;i<320*240;i++)
{
*(base+i)=0xff0000;
}
}
break;
case 3 :
ulk_fpga_clcd_init();
```

```
ulk_fpga_clcd_display_on();
ulk_fpga_7seg_led_enable();
ulk_fpga_7seg_led_write(3);
ulk_fpga_clcd_display_string("soldier got hit");
ulk_scanf_hex(&n);
if(n>108)
{
ulk_fpga_clcd_display_string("high beat");
for(i=0;i<320*240;i++)
{
*(base+i)=0x0000ff;
}
}
else if(n<37)
{
ulk_fpga_clcd_display_string("low beat");
for(i=0;i<320*240;i++)
{
*(base+i)=0x000f0f;
}
}
else
{
ulk_fpga_clcd_display_string("normal");
for(i=0;i<320*240;i++)
{
*(base+i)=0xff0000;
}
}
break;
default:
ulk_fpga_clcd_init();
ulk_fpga_clcd_display_on();
ulk_fpga_clcd_display_string("wrong\n");
}
}
```

5. Simulation Output

Figure 2: Body temperature normal condition

Figure 3: Heart beat conditions

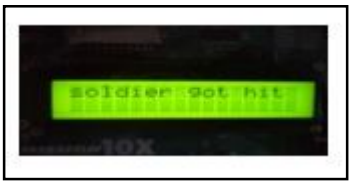

Figure 4: SMS sent to base station

6. Conclusion

In this paper we presented a system that allows preventing the soldier during the abnormal condition such as bullet hit, war field. Through this concept we can entirely monitor the soldier using GSM and then SMS is sent to the base station during abnormal condition. SMS gives the information about body temperature, vibration and heart beat. In addition to that GSM is used to find the correct location of soldier. If the message is sent to the base station while the soldier is abnormal condition, medical team is send to the spot which allows rescuing the soldier. Battery needs only asmall amount of power to operate the process. Through this concept we can easily rescue the soldier life and provide proper safety.

7. Acknowledgment

Thank you for giving the wonderful platform to deliver the project in effective manner. We would like to thank faculty mentor for awesome guidance and also we extend thanks to our management and faculty members who supported to complete this project in a successful way.

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