Real time soldier health and geo position tracking system with toxic bomb detection

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Abstract –Now a days, enemy warfare is an important factor in any nation's security. One ofthe significant andvital role is been played by the army soldiers. There are many concerns regarding the safety of soldiers. So for their security purpose, many instruments are mounted on them to view their health status. Bio-sensor systems comprise various types of small physiological sensors like Gas sensor, Fire sensor, Heart beat sensor, Vibration sensor, transmission modules and processing capabilities, and can thus facilitate low-cost wearable unobtrusive solutions for health monitoring. GPS is used to log the longitude and latitude so that direction can also be known easily. These devices are being added to weapons and fire arms. By using these equipments this can be implemented in the basic life- guarding system for soldier in low cost and high reliability.The "Real time Soldier Health and Geo Position Tracking System With Toxic Bomb Detection" is an Effective Security and Safety System Which is made by Integrating the advancements in wireless technology. This System can be used in critical conditions. This strengthens the defense system.

Index Terms— Global positioning system (GPS), GSM (Global System for Mobile Communication), LCD (Liquid Crystal Display), Future Infantry Soldier Technology (FIST), Future Force Warrior (FFW).

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. It is capable of displaying ranges, physiological sensors monitoring heart rate, fire etc.

These devices will improve situational awareness, not only for the host, but also for collocated 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 and cumbersome or requiring too much power.

The fundamental challenges has been overcome in military operations lays that the soldier's are able to communicate with control room station using Help Button. In addition, the proper navigation between soldier's organizations plays important role for careful planning and co-ordination. This paper focuses on tracking the location of soldier from GPS, which is useful for control room station to know the exact location of soldier and accordingly they will guide them. Also, Bio-medical sensors such as Gas sensor, Fire sensor, Heart beat sensor, Vibration sensors are used for monitoring their health status.

An accurate and reliable positioning system with seamless outdoor and indoor coverage can significantly increase the safety of military personnel and first responders. It should be lightweight, small, inexpensive, and power efficient and still provide meter-level accuracy during extended indoor operations. Global positioning system (GPS) receivers provide high accuracies in many scenarios. Hence, the main technical challenge lies in creating a system that is sufficiently accurate in GPS denied environments. Furthermore, it reduces the risk for users losing trust in the system, which could leave the system unused. Realistically, researchers and prospective users need to accept that it will not be possible to guarantee 100 percent availability and fulfillment of the accuracy demands in all possible scenarios, while simultaneously meeting the weight, size, and cost requirements. The most important capability desired from a soldier positioning system is the ability to more efficiently lead a task force in urban operations. Other important usages for soldier and first responder applications include faster rescue of injured personnel,

navigation support, freeing the radio resource for leading the operation, and after action review.

II. EXISTING METHOD

[1]Wrist Watch for Mountaineers: The idea of this paper was taken from the wrist watch used by mountaineers. The watch displays position, direction, surrounding temperature, and it also acts as altimeter. Soldiers carry walkie-talkies, which are bulky. So it is been developing an alternative system using sensor system which will save the soldier during danger.

[2]Radio Collars with GPS Tracking: Recently in the US and Australia some of the Indian students were forced to have a Radio Collar strapped to their ankles, so that their movements can be tracked by the officials. This is similar technology which will display the soldier's current location on a map at the base station.

[3]Tracking of Tigers: Recently India announced plans to use a new tiger tracking system in order to crack down on "lazy" wildlife guards. The new tracking system involves fitting tigers with radio collars. A GPRS (general packet radio service) device, along with the M-STRIPES software, will be used to track the movement of the tigers.

III.PROPOSED METHOD

This paper has an idea of tracking the soldier and navigation between soldier to soldier such as knowing their health parameters and their range of them during the war, which enables the army personnel to plan the war strategies. Base station gets location of soldier from GPS. It is necessary for the base station to guide the soldier on correct path if he is lost in the battlefield. The base station can access the current status of the soldier which is displayed on the mobile and hence can take immediate action by sending help for the soldier or sending backup for threat ahead. The block diagram of GPS based soldier tracking and health indication system is shown in fig 1.Using various biomedical sensor health parameters of soldier's are observed, the position and orientation of soldier is trapped using GPS.
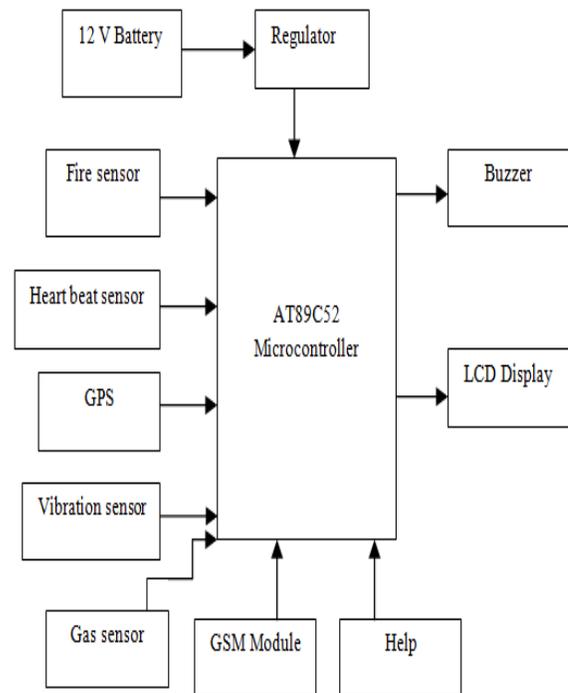

Fig.1 Proposed Block Diagram

A. Soldier Unit

Fig.2 Soldier Unit

Fig.2 shows the soldier unit.As it requires high speed communication it is intended to use Atmel89C52 microcontroller which is based on 32 bit microcontroller CPU with real-time emulation. Biosensors such as Gas sensor, Fire sensor, Heart beat sensor & Vibration sensors are integrated to microcontroller to monitor the health status. The GPS receiver is used to log the longitude and latitude of soldier, which is stored in microcontroller memory.

GPS receiverreceives and compares the signal from orbiting GPS satellite to determine geographic position.Using Help Button we can send messages to the base station & the Medicorps.GSM Modem gets the latitude and longitude of the soldier and it also send the information to the army base station containing the

health parameter and the location of the soldier.

B. Base Station

Fig.3 Base Station

Fig.3 shows the base station unit. At Army Base station unit (via Mobile), it gets the details of soldier through GSM Modem, the soldier health parameter. They can alert the soldier nearby regarding the hazardous scenario.

C.Algorithm
1. Power on.
2. Initialize GSM & GPS Modem.
3. Initialize LCD.
4. Read soldier health & other parameter status.
5. Deviation in data, sends GPS location, health& other parameter status to basestation& the soldier using GSM communication.
6. Message has been received.

D. Flow chart for Soldier unit

Base station gets location of soldier from GPS. It is necessary for the base station to guide the soldier on correct path if he is lost in the battlefield. The base station can access the current status of the soldier which is displayed. And hence can take immediate action by sending help for the soldier or sending backup for threat ahead. Using various biomedical sensor health parameters of soldier's are observed, the position and orientation of soldier is trapped using GPS.
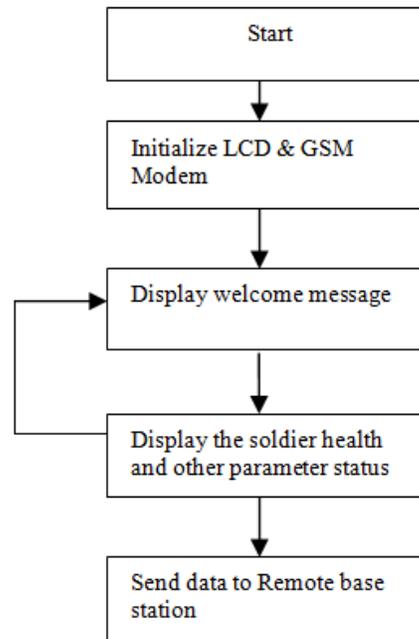

Fig.4 Flow chart for Soldier unit

E. Method of Navigation Using GPS

A robust accurate positioning system with seamless indoor and outdoor coverage is highly needed tool for increasing safety in emergency response and military operation. GPS-based positioning methods mainly used to field rescue. The position and orientation of the rescuer and the trapped is acquired using GPS. Using the GPS data of both the units are calculated from the geometric relationships based on a series of formulas in Geographic Information Science (GIS). Using this technology, we are doing the navigation between two soldier .The data will be send wirelessly by GPS Modem. This device can do accurate coordination via wireless communication, helping soldier for situational awareness. Receiver information is broadcast via this interface in a special data format.

F. Physiological Signals and Biosensors

With recent advances in technology, various wearable sensors have been developed for the monitoring of human physiological parameters. The various sensing technologies are available, which can be integrated as a part of health monitoring system,
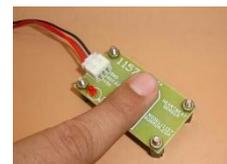
along with their corresponding measured physiological signal. The measurement of this vital bio-signal and their subsequent processing for feature extraction, lead to collection of real time gathered physiological parameter which can give an overall estimation of health condition in real time.
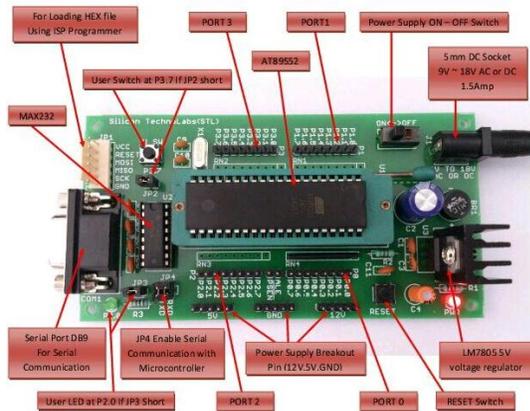
G. Modules Description

Fig.5 Modules Description

[1] Microcontroller

Fig.5 shows the module description. The AT89C52 is a low-power, high-performance CMOS 32-bit microcontroller with Flash programmable and erasable read only memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard MCS-51in-system or by a conventional Nonvolatile memory programmer.

By combining a versatile 32-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcontroller instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed which provides a highly-flexible and cost-effective solution to many embedded control applications

[2]Medical Parameters

There are a number of medical parameters of soldier that can be monitored, like heart beat, vibration etc. These are carried out by sensor interfaces. The entire system would become compatible for the soldier.

[3]Sensor Survey
There are number of sensors like vibration sensor, gas sensor, Fire sensor, heartbeat sensorare used.
i) Heart Beat Sensor: Heart beat sensor is designed to give digital output of heat beat when a finger is placed

on it. When the heart beat detector is working, the beat LED flashes in unison with each heart beat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse.

ii)Fire sensor: The fire sensor circuit is too sensitive and can detect a rise in temperature in its vicinity. The fire sensor module consists of IR sensor, comparator and LED. It has got three pins gnd, vcc and out. Whenever fire is detected by IR sensor LED glows, and out pin is set high. The out pin can be given as input to the microcontroller and can be used for any fire detection applications. Whenever the LED is ON it indicates that fire is detected.

iii) Vibration sensor: Digital vibration sensing in the ADIS16220 starts with a wide- bandwidthMEMS

accelerometer core that provides a linear motion-to-electricaltransducer function. It uses a fixed frame and a moving frame to form a differential capacitance network that respondsto linear acceleration.
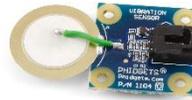
iv) Gas sensor: When the target combustible gas exist, The sensor's conductivity is more higher along with

the gas concentration rising. MQ-2 gas sensor has high sensitivity to LPG, Propane and Hydrogen, also could be used to Methane and other combustible steam, it is with low cost and suitable for different application.

H.Calulation:
Distance:Dlan=lan2-lan1Dlat=lat2-
lat1a=(sin(dlat/2))^2+cos(lat1)*cos(lat2)*sin(dlan/2)^2
C=2*atan2(sqrt(a),sqrt(1-a))
D=R*C
Where D=distance, R=radius of circle, C=speed of light, lan=longitude, lat=latitude
Height :sea level of receiver1-sea level of receiver2
speed :Distance/time

IV.RESULTS AND DISCUSSIONS
It is an effective security and safety systems which is made by integrating the advancements in wireless communication. This system can be used in

critical conditions. The code for data transmission through GSM is written as it is required for data transmission and reception purpose. Soldier's geometric location will be displayed on mobile.GPS tracks position of soldier anywhere on globe and also health system monitors soldier's vital health parameters which provide security and safety for soldiers.

Continuous Communication is Possible, Soldierscan communicate anywhere using GSM which helps to communicate among their squad members whenever in need. Less complex circuit and powerconsumption so in this way concept of tracking and navigation system is very useful for soldiers when they are on military field during war. And also for base station so that they can get real-time view of soldier's on field displayed.
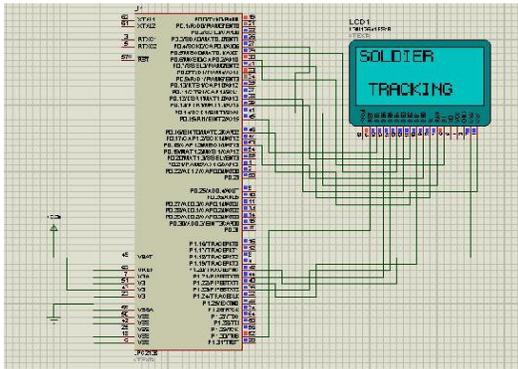

Fig.6Displays the Soldier's position

Fig 6 shows interfacing of Graphical LCD with Atmel at89c52 microcontroller. To perform this, code was written in proteus Software, used for simulation results.
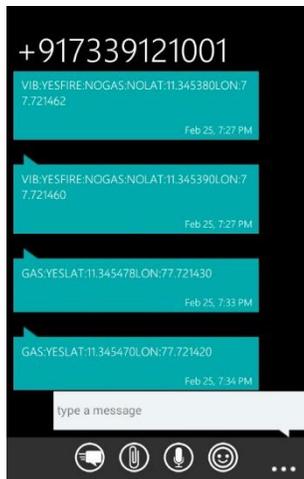

Fig.7 Result to the Medicorps

Fig 7 shows the result of Mobilemessage. When the soldier is in trouble, it sends the message to base station mobile. The mobile message contains exact location and the status of gas sensor, vibration sensor and heart beat sensor.
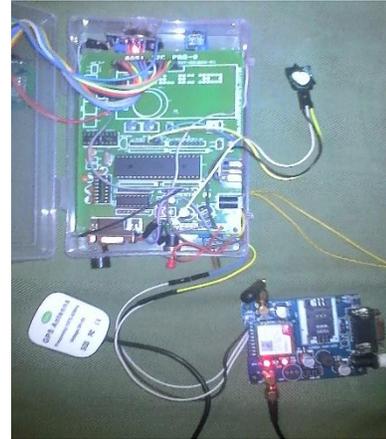

Fig.8 Hardware result

Fig.8 shows the hardware result one entire soldier unit including with Atmel89c52 controller, graphical LCD.9V Power supply is used. 5V power supply for peripherals such as GPS, graphical LCD, sensors are used.Atmel89c52 controllerrequires 5Vsupply.Soldier's latitude, longitude speed, distance, height etc. All these things will be displayed on graphical LCD.

V. CONCLUSION AND FUTURE WORK

This project is an effective security and safety system which is made by integrating the advancements in wireless and embedded technology. It helps for a successful secret mission. This system can be used in critical conditions. The most significance in this is implementation of Soldier's Health. By implementing this system we can improve the security of our country this also help to improve the safety of the soldier. Using this system we can reduce casualties of war. It also helps to giving critical information's and warnings to the soldiers and can apply more of them to the current weak locations.

This strengthens the defence system. Thus it can be concluded that these kinds of devices are very helpful for ensuring security to the soldiers.

In future, Special protocol can be done to collect and store the sensed data. An integrated data management systemand a web portal can be established to enable various users to easily access the data. The processing can be done by advanced controller.

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