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BODY AREA NETWORKING AND LIVE LOCATION TRACKING SYSTEM IN WAR FIELDS

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Abstract— Security is a top priority for all nations nowadays. Wars are waged over control of territory, water, and the title of most powerful nation. The army, navy, and air force are the three professional uniformed services that make up a country's armies. Soldiers are the foundation of any military force. Soldiers who are involved in combat situations frequently die owing to a lack of medical assistance. On the battlefield, missions or special operations personnel become disoriented and lose communication with the authorities. To address these problems, this prototype was created which employs a wireless body area sensor network-(WBASN), Sensors like a temperature sensor or a heartbeat sensor will keep track of the soldier's health. Whenever the need arises we may also track the soldier's exact location using GPS. We can also monitor the ambient condition with an oxygen level sensor allowing authorities to give necessary services and first aid. Between the soldiers and the base unit, a contact is established. Anomalies in the readings of wireless body area sensor networks are seen as a trigger for GPS to establish a link between the soldier andthe base unit as well as relay the soldier's current location as well as the soldier's health status. We tried to implement the basic guarding system for the soldier which is low cost, light weighted, portable and precise device.

Index Terms- Body Area Sensor Network, Health status monitoring, Internet of Things..

I. INTRODUCTION

Body Area Networking, also known as Wireless Body Area Sensor Network i.e WBASN, is made up of multiple miniature body sensor devices that constantly check the soldier's health and communicate the information through a wireless communication channel. WBASNs are largely used in the healthcare field, particularly for continuous monitoring of physical parameters utilising biomedical sensors. Applications can also be found in areas such as a environmental monitoring, smart energy systems, battle field surveillance, home automation, elderly health monitoring, mobile computing, etc.

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II. BACKGROUND WORK

WBASN is a technology that integrates healthcare, lifestyle, and consumer electronics applicationsall over the body. By constantly connecting and sharing information surrounding the human body, WBASN is expected to bring newconvenient uses and application services to mobile devices. According to the IEEE 802.15.6 Task Group for WBASN standardisation,because the WBASN is the network that surrounds the human body, there are stringent requirements for WBASN transceivers, such asenergy efficiency, interference rejection, low cost, quality-of-service (QoS) scalability, network coexistence, safety, and so on [1]. Themost recent standardisation of WBASNs, IEEE 802.15.6 [2], aims to provide an international standard for low-power, short-range (within the human body), and extremely reliable wireless communication within the human body's surrounding area, supporting a widerange of data rates from 75.9 Kbps (narroWBASNd) to 15.6 Mbps ultra wide band; for various applications [3].

WBASNs can connect to the Internet, as well as other wireless technologies like WLAN, WPAN, ZigBee, and ZigBee, as well as video surveillance and cellular networks. As a result, a new generation of intelligent and autonomous automobiles will be able to emerge. Apps that will make people's lives better can be designed [4]. WBASNs are expected to cause a dramatic shift in how people manage and think about their health, similar to how the Internet changed how people search for and interact with information [5]. WBASNs have the ability to transform the way people interact with technology and profit from it. WBASN sensors can sample, monitor, process, and send a wide range of critical indications in real time to the user and medical personnel [5, 6, 7]. The use of a WBASN allows for continuous monitoring of physiological parameters, allowing patients to move around and be more flexible. Doctors will have a better grasp of a patient's condition since WBASNs provide large time periods of data from a patient's natural environment [8]. However, significant technological and societal challenges must be solved before they can be put into reality. Easy of use, security, privacy, interoperability, value, and safety are only a few of the user-oriented needs of WBASNs [5, 9]. Wearable technology using IoT and machine learning is discussed by the inventor [10]. Wearable sensors may be accompanied by technologies that humans can carry in a variety of places, including their pockets, hands, and various bags. A WBASN is depicted in Figure 1.

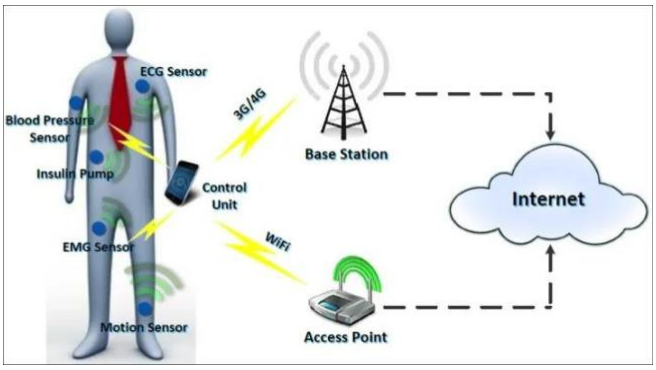

Figure 1: An illustration of body area network [10]

III. PROBLEM STATEMENT

Based on the existing literature the problem statement is as follows- "To design a Body Area Network to monitor the health parameter of soldiers, their physical location and transmit the parameters wirelessly to a digital device like phone or personal digital assistant". The following are the objectives of this work

1. To monitor the health conditions of the soldier like heartbeat and temperature.
2. To track the location of the soldier i.e. latitude and longitude.
3. To transmit the information regarding the soldier like the abnormality of his health, location, and danger condition of the soldier to a central location.
4. To alert the emergency base unit about the soldier health status.

IV. HARDWARE REQUIREMENTS

The following hardware was used in this work

1. Regulated Power Supply
2. Raspberry Pi
3. Heartbeat Sensors
4. Temperature Sensors
5. GPS
6. Emergency Push Button
7. LCD Display

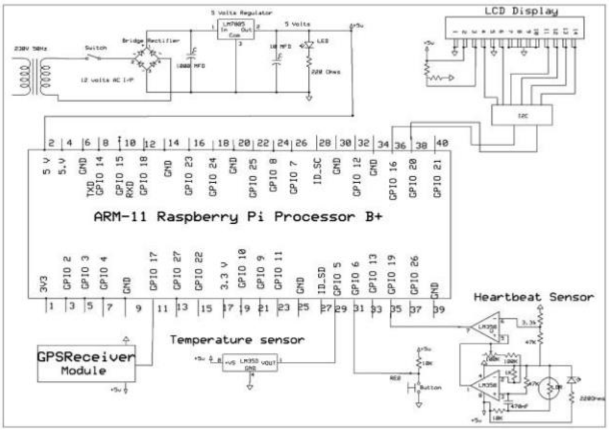

Figure 2: Circuit connections of hardware used

V. TECHNICAL APPROACH

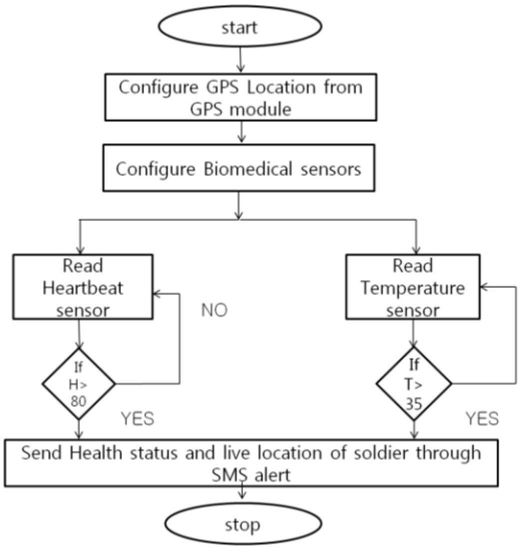

Figure 3 is the flow chart for implementing the proposed work. Python programming is used to implement the above algorithm. The GPS module sends the location coordinates to the LCD. The temperature and heartbeat are both monitored. If there is a deviation from normal readings, such as a heart rate of more than 80 beats per minute, an SMS alert is issued with the status and current location.

VI. SET UP AND RESULTS

This is the entire hardware configuration, which includes the Raspberry Pi (the system's brain), RPS, biomedical sensors such a heartbeat and temperature sensor, GPS modem, LCD, and an emergency button. We need a stepdown transformer to convert 230V AC to 12V DC since the input and output of the transformer are both AC voltages. A Bridge Rectifier is required to convert a 12V ac signal to a dc signal and to obtain an output with voltage in both positive and negative cycles. To eliminate the pulsating effect, connect a filter capacitor in parallel with the pulsating output, resulting in a proper 12V dc signal. When using the LM7805 Voltage Regulator at 12V dc, the last two numbers represent the output voltage, which is a 5V DC signal, and this 5V dc signal is supplied to all other hardware components.

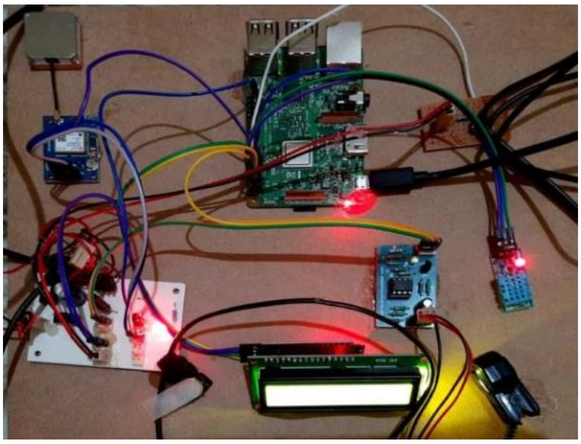

Figure 4: Body Area Networking system-set up

Figure 5: Connection of raspberry pi hardware to Computer

This Remote Desktop Connection (Figure 5) uses wireless connection to link the Raspberry Pi hardware to a computer and Raspbian operating system. This communication channel establishes a connection between the Raspberry Pi hardware and the Raspbian terminal. After connecting the pi hardware to the computer, a raspbian terminal appears, where commands to run the device must be entered.

Figure 6: Parameters displayed on LCD (No emergency)

Figure 6 shows the health status of soldier such as Temperature, heartbeat and Emergency as NO. When the Emergency push button is at rest mode.

Figure 7: Parameters displayed on LCD (Emergency)

Figure 7, When the Emergency push button is touched (The heart sensor was detached, HB i.e heart beat is zero as recorded above), the soldier's health status, such as temperature, heartbeat, and Emergency as YES is displayed as shown above.
This is the final output (Figure 8) which displays the pulse rate, temperature reading and live location coordinates of the soldier to registered mobile number, and immediate action can be taken without any loss of life.

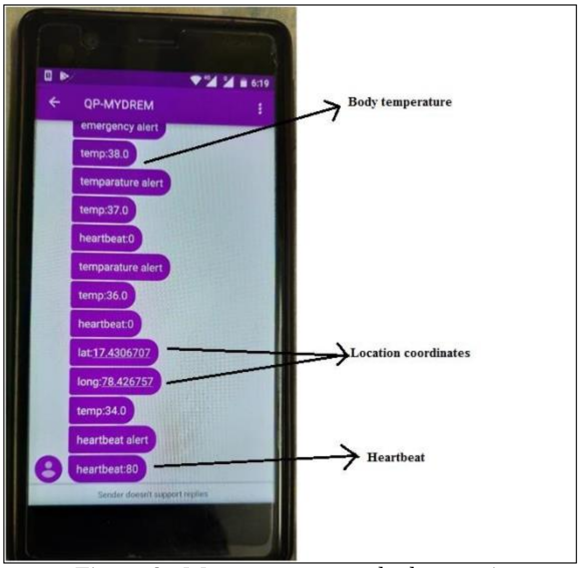

Figure 8 : Messages sent to the base unit

VII. Conclusions

A message is sent to the registered phone number confirming the GPS settings. An alert message is delivered to the base station, along with the soldier's precise location, when the soldier's regular body parameters differ.
From the above implementation, the following conclusions may be drawn:
Personnel from the military Safety and security: A soldier's location may be tracked anywhere on the globe, and a health system

analyses vital health data and environmental circumstances to ensure their security and safety. Circuit complexity is reduced, and power consumption is reduced. The system's overall power consumption is reduced because fo the employment of a PIC processor and low-power peripherals. Because the modules are smaller and lighter, they are easier to move. The future can be to embed this set up in a wearable vest.

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