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ASSURED SAFETY FOR ARMED FORCES

[1]SRAVANTHI.CH, [2]HIMA SRI.D, [3]SIRISHA.K, [4]KEERTHANA.M, [5]SUDHARANI.S

Department of Electronics and Communication Engineering

Vignan's Nirula Institute of Technology and Science for Women

Abstract

Now-a-days, dispute is crucial to the security of the country. Army personnel contribute significantly to both maintaining national peace and winning battles. Since soldiers risk their lives to protect us, it is essential to defend their life with the fewest possible social obligations. Soldiers offer security for the country. The soldiers are outfitted with cutting-edge technologies to see their health status, trace the spot in real time, and much more in order to increase the security. The goal of this study is to view soldiers smart wearables to employ WSN(Wireless Sensor Network) technology to ensure their safety in every way. By doing this if a soldier is wound on the battlefield, information is immediately transmitted to the control unit using LoRaWAN (Long Range Wide Area Networking) allowing the control unit to take whatever steps are obligatory to rescue the soldiers life.

Keywords: Ardunio Uno, LoRa module, sensors, Real time monitoring, Wireless.

1.Introduction

The pillar for the country's protection is its military. Every single Indian person lives in peace and safety in view of the fact that every soldier is taking a life-threatening risk. To better protect a soldier's life safety and surveillance actions are required. All day, every day soldiers must deal with numerous environmental surroundings and worries. Wearable sensors have araised to detect a diversity of troop health metrics as a result of technological advancements. During various extremity situations, the troops may have trouble maintaining border surveillance during the day or at night, and there may not be effective communication between the soldiersand with the control unit. Taking all of these factors into account, the goal of this project is to sketch cutting-edge smart wearable for soldier safety that uses GPS(Global Positioning System), BSN(Body Sensor Network) and a variety of advanced sensors to assess a soldier condition during an emergency and to maintain live communication between soldiers and the base station. Light weight biomedical sensors and modules are connected to soldier's body for safety reasons.

2.Literature Review

Wearable technology is one of the central exploration, where experimenters find utmost of the invention in developing smart wear and tear suitables using advanced technology. The process of establishing the communication between the smart wearables plays a vital part in perfecting the dogfaces life, the communication between these wearables was made possible by hitching these bias by Bluetooth 4.0 and communication with control unit was concluded using wifi [1]. But we can't append heaps of bias to Bluetooth and limited range. The proposed system uses zigbee as a communication medium between the smart wearables so that zigbee can connect further than 1000 bumps at a time and can transmit between those bumps effectively. A relative study between different wireless communication protocols was given in[2] which explains why zigbee is

preferable than Bluetooth in data transmission rate and connectivity. The control unit is distant so long distance communication should be established. Therefore LoRaWAN based networks offer lower data rate but longer range, but LoRa based communication is better than wifi because it consumes less power. LoRa vs wi-fi performance analysis MANET (Mobile Adhoc Network) communication type the system was considered in [3]. A LoRa based IoT method for health monitoring that successfully sends data over 33km^2 in rural areas was tested in [4]. By analysing the received sensor data from the cloud using machine learning techniques to forecast the state of the soldier, the suggested design can enable long range communication between the soldier and the control unit using the LoRa-WAN network [5]. Effective communication between the standards is crucial to send data to LoRa since communication protocols use distant standards and modulation methods. LoRa [6] achieves this by transferring a data using a payload encoding methodology. Knowing the oxygen levels and any dangerous gases close them is crucial since soldiers working in conflict zone, at high altitudes, or in the underground need to have enough oxygen and avoid breathing in dangerous gases[7].

3.Proposed system Architecture

This system major goal is to use intelligent wearables to enhance communication between the soldiers and the base station. Its critical to establish a connection between smart wearables so that a soldier can be kept safe.

3.1 Proposed Methodology

The intelligent wearables carry out the following procedure while preserving connection between the soldiers and the base station.

The procedure entails:

- Recognition of real time data from numerous sensors.
- Sending the data without loss to the control unit and the soldiers.
- Quickly analyse cloud-based data and take the necessary actions.

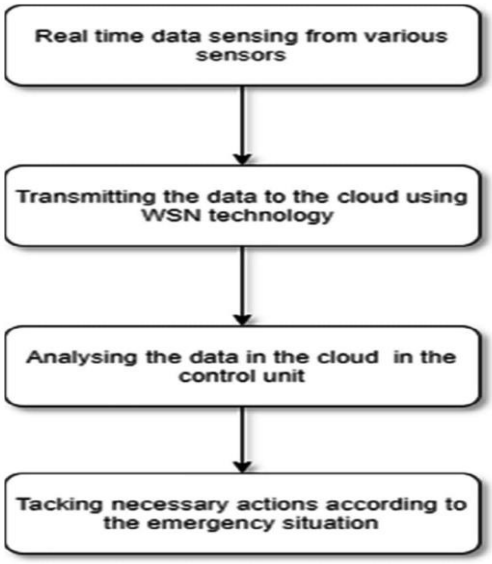

Fig 1: Sensor data path

3.2 Proposed system

The system is equipped with a number of sensors including a temperature sensor (lm35), spo2 sensor, Gas sensor, Metal sensor, Heartbeat sensor, LoRa module, panic switch and LED display, a 5v battery.

These sensors are used to monitor a soldiers numerous health metrics, and if anyone of the threshold, an alert is issued to the control unit.

The exchange of information among the military involves:

- Using LoRa-Wan, soldiers can communicate with base station.
- The LoRa gateway is used for all communication with the control unit.

Transmitter section:

This transmitter section consists of a LoRa module, an Arduino Uno board, LCD, and sensors to measure the heartbeat, oxygen levels, temperature, various threatening gases in atmosphere. LM35 is used as temperature sensor. MQ-135 is used as gas sensor to detect various dangerous gases. MQ-135 sensor is an air quality sensor used to detect CO2, CH20 and CO from the air. Heartbeat sensor is used to measure heartbeat of the soldier. SPO2 sensor is used to measure oxygen levels of the soldier. Metal sensor is an instrument which is used for detecting metal objects on the surface. The ardunio uno is used to

process sensor readings according to the parameters of the pollutants.

Receiver section:

This section receives the data from the transmitter section and forwards it to the server. The receiver section consists of an Arduino uno, a LoRa module, an LCD and a danger switch. The Arduino uno board is connected to a LoRa end module. LoRa end module is attached to LoRa gateway. All the particulars accepted from the sensor is send out from LoRa end module to the gateway. LoRa gateway is joined to the cloud. So the man inside the control unit can visualize the data from the cloud.

The receiver identifies the source of the data received from the transmitter. The received data is forwarded to the server. The data from different transmitter sections are received by the receiver and data is forwarded to the cloud server and the information is accessed by the user through mobile phones. The LCD is placed in the system to check the parameters on the screen.

4.LoRa Specifications:

LoRa was introduced as a modulation technology in 2010 by the French start-up Cycleo, which was later bought by SEMTECH in 2012. LoRa sensitivity reaches up to -148 dBm, the diffusion factor is 12. A typical range for LoRa is 3km in urban areas. LoRa technology offers numerous solutions. LoRa's long battery power lasts upto 10 years. LoRa module can connect with many end devices and provides class A, class B, class C based on different energy consumption. Class B devices powered by batteries with latency controlled down links to ensure efficient energy consumption. The class C category device continues communication and keeps listening on the second RX2 until the end node device starts to send another message. This category was designed for manually-loaded devices.

5.Software Requirements:

- Arduino IDE
- Embedded C

6.Result and Conclusion

This paper tries to epitomize the use of smart wearables for the soldier on the battlefield in guarding their life. Still there are numerous further advancements coming in the technology. The prior implementation can be used to inform the following choices. Military safety and protection, GPS track the global military situation and environmental conditions to guarantee army safety. This system decreases power consumption and circuit complexity.

7.References

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