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INTELLIGENT LIFE JACKET SAFETY WITH LORA TECHNOLOGY

Sujitha S, Sindhumathy S, Renusha K, Udhayasuriya B

Gnanamani college of technology,Anna university,Namakkal,637018,India

A B S T R A C T:

In a condition known as hypothermia, the body loses heat because it is unable to maintain its internal temperature due to an excessively cold environment. The body temperature will swiftly drop as a result. A disorder that results in a body temperature below 35 degrees Celsius and a loss of consciousness could be fatal. When climbers engage in physical activity in cold weather with strong winds and while wearing damp clothing, hypothermia is more likely to occur. Finding out one's own body temperature as well as that of one's friends and determining if the body temperature is safe or impacted by hypothermia symptoms is difficult for a mountain climber. This research led to the creation of a tool for hypothermia detection. It has a temperature sensor, pulse sensor, and wireless body area network-based heating elements. The study's findings indicate that the device can identify hypothermia symptoms and alert users and groups of mountaineers in the region to them. By being more alert to hypothermia symptoms, climbers can reduce the incidence of hypothermic mortality cases. These conditions are also applicable to water accident applications, where individuals immersed in cold water face similar risks of hypothermia, and this device could provide crucial monitoring and alert capabilities in such scenarios.

Keywords: LoRa, GPS, LCD, PWM, WAN

Existing System

In the existing system, Communication among climbers was limited to traditional methods like radios or verbal communication. There was no systematic way to monitor multiple climbers simultaneously or to track their physical condition in real-time. In the event of an emergency, rescue operations relied heavily on verbal communication or distress signals, often leading to delays in response time. Overall, the existing system lacked integration, realtime monitoring capabilities, and efficient communication channels, making it challenging to ensure climbers' safety effectively.

1.1. Disadvantages

- Limited real-time monitoring: Manual checks provide only periodic updates on climbers' health status, leaving gaps in real-time monitoring.
- Dependency on manual methods: Reliance on climbers or base camp personnel for vital sign checks increases the risk of human error and inconsistency.
- Lack of integration: Standalone devices like heart rate monitors and thermometers are not integrated into climbing gear, making data collection and analysis disjointed.
- Limited communication: Communication among climbers is restricted to traditional methods like radios, limiting the scope and speed of information exchange.
- Inefficient emergency response: Rescue operations depend on verbal communication or distress signals, leading to potential delays in responding to emergencies.

1.2. Block Diagram

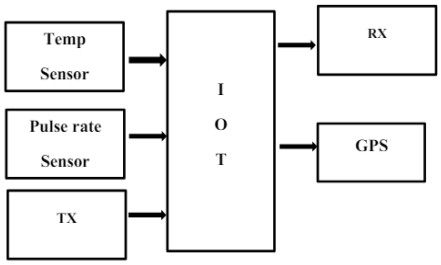

FIG:1.1 Block diagram of existing system

Proposed System

In this paper, we propose a health monitoring device embedded into climbing jackets by utilizing LoRa technology. Climbers can use the tool while they are ascending without sacrificing their comfort or mobility. The device uses a microcontroller as the sensor data processing hub, and temperature and pulse sensors are the sensors in use. The body temperature sensor, which is employed in the apparatus, makes use of infrared technology to enable temperature measurements to be made without making direct contact with the sensor. As for the heart sensor, it is the sensor pulse, which will be applied to those person fingertip to gauge heart rate. A peltier heating element is also a part of this gadget. Person can view their bodily status, along with their temperature and heartbeat circumstances, through their Android smartphone. In another side will receive guidance on how to manage according to their present health issues. Climbers can also form climbing groups to connect with other climbers in a group. Users can able to view each other's position and physical condition when they are connected to the group. Members will be notified if a physical condition deteriorates. The data about deteriorating physical condition would be kept as history. These conditions are also applicable to water accident applications, where individuals immersed in cold water face similar risks of hypothermia and health deterioration due to exposure to cold environments.

1.3. Block Diagram

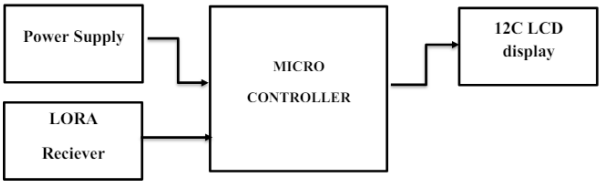

Fig. 2.1 - (a) Transmitter part

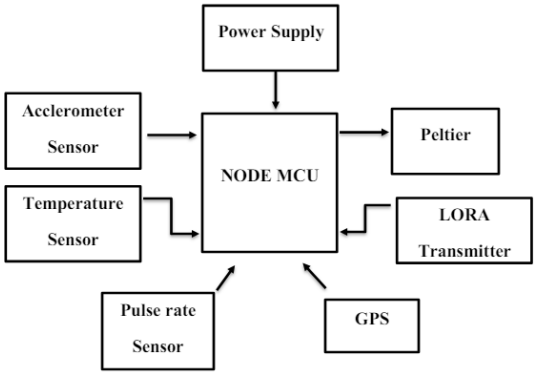

Fig. 2.2 - (b) Receiver part

1.4. Advantages

Enhanced safety

Long-range Communication

GPS tracking

Proactive Emergency response

Hardware Requirement

- NODEMCU
- Lora Pairs
- Accelerometer sensor
- Pulse Sensor
- Peltier
- Temperature sensor
- LCD
- GPS

1.5. Hardware Module

The system comprises various components and sensors connected in a specific sequence to achieve its functionality. The NodeMCU serves as the central processing unit, collecting data from multiple sensors, including an accelerometer sensor for motion detection, a temperature sensor for environmental conditions, a pulse rate sensor for health monitoring, and a GPS module for location data. The NodeMCU processes this data and controls a Peltier element to regulate temperature as needed.The output data from the NodeMCU is then transmitted via a LoRa (Long-Range) transmitter to a remote location. At the receiving end, a LoRa receiver captures the transmitted data and forwards it back to the NodeMCU. The NodeMCU, upon receiving the data, processes it and displays the relevant information on an LCD display. This creates a closed-loop system where environmental, health, and motion data are collected, transmitted wirelessly, and displayed for monitoring and analysis, making it a versatile and comprehensive data collection and display system.

Software Requirement

- EMBEDDED C
- ARDUINO IDE

Conclusion

Based on WBAN technology, this research developed the architecture and produced a prototype to identify hypothermia signs in the climber's body. The suggested device consists of a peltier temperature sensor, a peltier heating element, a body temperature sensor, and a pulse sensor. To determine the climber's health status, the data from body temperature and pulse sensors will be processed and remotely delivered through Bluetooth to an Android smartphone. The gadget will send a command to the action point to activate the peltier heating element to raise the temperature of the climber's jacket if the output condition indicates that the climber is experiencing hypothermia symptoms. The experiment's findings demonstrated that a climber may use an Android smartphone to track their body's temperature, heart rate, and overall health.

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