Rescue Wear the Cutting Edge Wearable Technology for Emergency Operations

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Abstract: An electronic gadget that may be worn on the wrist of children or adults to monitor and keep an eye on them is called a wearable smart locator band. People are often explorers by nature, thus they like to try new things in life. However, unexpected event of breathing difficulty, choking symptoms, and loss of balance can all result in abnormal conditions or fatalities. Numerous fatalities frequently result from sudden organ failure or physical imbalance because people are unable to receive the proper care in time. The ultimate purpose of a surveillance system is to automatically interpret events occurring in such settings. At present there is a requirement for having a system that will consequently detect the individuals and alarm the caretaker at such risk, We would like to present a wearable prototype that would enable a person to send an alert message when they are in danger and record their vital signs in case of an emergency. The alert message assists us in locating the person so that the rescue effort can start as soon as feasible.

Keywords: electronic gadget, wearable, surveillance system.

1. Introduction

With the rapid development of technology comes an increased threat of danger. To combat this, various safety, security, detection, and tracking devices have been implemented for children, women, vehicles, homes, remote monitoring, and more [1]. Unfortunately, accidents still happen and the World Health Organization (WHO) reports that drowning is the third leading cause of unintentional injury worldwide, with road traffic incidents being the second leading cause and heart attacks being the first [2]. People love to play at the beach, water parks, go on picnics, and travel to remote locations, but in a split second, everything can change. Sudden breathing difficulties, loss of balance and body imbalances can lead to death. Cramps, collisions, certain diseases, and mental stress can also result in fatal outcomes [3]. It is crucial to have a system in place that can quickly detect and alert a caregiver in case of an emergency [4][6]. Wearable devices that monitor health have the advantage of convenience, real-time monitoring, and, most importantly, the ability to save lives [5]. Accurately determining pedestrian location in indoor environments using consumer smartphones is a significant step in the development of ubiquitous localization services [7]. An increase in world population along with a significant aging portion is forcing rapid rises in healthcare costs [8]. This paper explores the challenges faced by automated surveillance systems in hostile conditions and presents a developed wearable system that detects life-threatening situations and alerts caretakers for a prompt rescue [9]. Join us as we delve into the importance of wearable technology for emergency situations and its role in saving lives [10].

2. Existing Reviews

"A Case Study in Safety: The Development of a Preliminary Safety Case for Military Equipment" Alan Garside et al present a real-world example of how they approached risk evaluation and preliminary safety case development for new military equipment. They aimed to demonstrate the safety case in an electronic format using graphical notations, allowing for remote demonstration and use as submission evidence in the military procurement cycle. This paper delves into the key stages of the team's process, from hazard identification to graphical argument construction and publication. They also provide valuable insights into the resources required for this component of the program, making it a valuable reference for future programs.

"Ensuring the Safety and Well-being of Army Personnel: A Qualitative Approach" Surbhi Sharma et al propose a qualitative approach to aid defence services in maintaining the safety, whereabouts, and dignity of army personnel. The system they suggest is capable of detecting the pulse (heartbeat rate) and location of army personnel and communicating

*Corresponding author: uma@vcet.ac.in e of an emergency[8]. Equipped with a pulse sensor and GPS module, the system is designed to monitor the health of soldiers and provide timely support when needed. This paper presents a

framework for the design, utilizing the IEEE 802.15.4 standard and various wireless sensor networks. The performance of the system has been evaluated using two personal computers and its real-time capabilities make it a promising solution for a wireless health monitoring network for the general public.

"Secure Health and Position Monitoring for Army Personnel: A Blockchain-based System" Jitesh Pabla et al present a revolutionary system aimed at ensuring the real-time health and safety of army personnel[7]. The system comprises a sensor module that is mounted on a soldier's arm and transmits and stores critical health and location data in an encrypted form on a Blockchain. The sensor module is equipped with temperature, heart-rate, and GPS sensors, providing accurate readings with low relative errors. The use of Blockchain technology ensures that the stored data is tamper-proof and distributed, providing an additional layer of security to sensitive information. The system operates on army-controlled computers, ensuring that the data remains within the trusted network.

3. Existing System

The safety of women and children has become a critical issue in today's society, with an alarming rise in incidents of sexual assault and violence. To address this growing concern, a new device has been developed to provide a reliable layer of security for women and children. The device combines the power of a microcontroller, GSM, and GPS modules to instantly send notifications and the user's location to designated contacts in case of an emergency. They had these drawbacks: The system's efficiency is impaired by environmental factors such as weather and physical obstacles. Privacy concerns may arise from the collection and storage of personal health data. Maintaining and updating the technology can be costly and time-consuming. Calibration of the sensors may need to be performed regularly for accurate readings. The system may not be accessible or compatible with all individuals, particularly those with disabilities.

4. Proposed Methodology

The wearable device will also monitor the rescuer's body temperature to prevent hypothermia in the harsh weather conditions. The real-time monitoring and alert mechanism of this system ensure the safety of the rescuers in the field, especially in cold-weather environments where the risk of injury or death is high. The data collected from the sensors is securely stored and transmitted to the rescue team through the GSM module, making it accessible even in remote areas. This innovative solution aims to make rescue missions more efficient and safer for both rescuers and those in need of assistance.

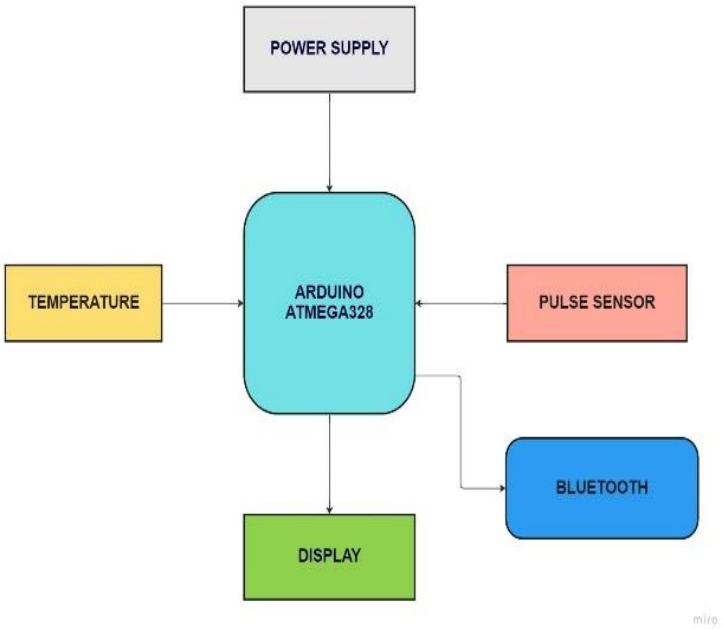

Fig. 4.1. Proposed System

5. Hardware Description

5.1. Pulse Sensor:

Pulse Sensor Amped is a compact and versatile heart rate monitor designed for use with Arduino boards and compatible devices. With its advanced amplification and noise cancellation technology, it provides quick and accurate pulse readings.

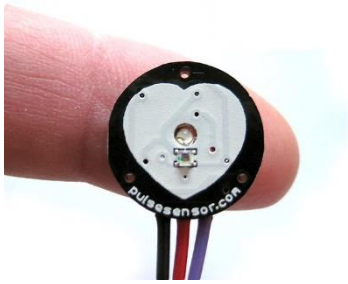

Fig. 5.1. Pulse Sensor

5.2. Temperature and humidity sensor DHT11:

The data can be transmitted wirelessly through various methods. The compact size and low power consumption of the module make it an ideal choice for a wide range of applications, including HVAC systems, environmental monitoring, and consumer electronics.

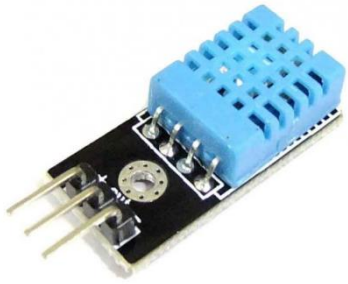

Fig. 5.2. Temperature and Humidity Sensor DHT11

5.3. Arduino:

Arduino is a popular open-source electronics platform based on easy-to-use hardware and software. It is widely used for DIY projects, educational purposes, and for creating interactive objects. With a growing community and a vast library of available resources, it is a flexible and accessible platform for both beginners and professionals alike.

Fig. 5.3. Arduino

5.4. Potential Transformer:

A potential transformer is an electrical device that steps down high voltage to a safer level for measurement or control. It isolates the measuring or control equipment from high voltage while preserving accuracy of the measurement. It is commonly used in power systems for measuring voltage and detecting faults.

Fig. 5.4. Potential Transformer

5.5. LCD – Liquid Crystal Display:

LCDs have both liquid and crystal properties. Two glass panels with transparent electrodes, polarizers, and liquid crystal material in between create an LCD display. When voltage is applied, liquid crystal molecules align to highlight desired characters, appearing visible against the transparent LCD.

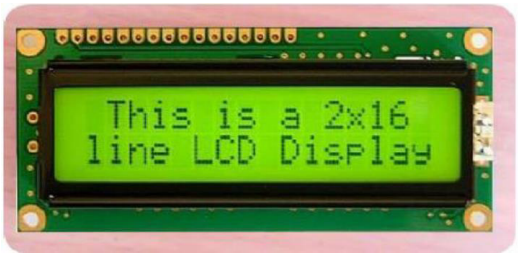

Fig. 5.5. LCD

6. Software Requirements

- OS - Windows 7 32bit
- ARDUINO Software
- 2 (dual core)
- Wi-Fi Speed of 2.4 GHz up to 150 Mbits/s
- BLE (Bluetooth Low Energy) and legacy Bluetooth
- 32 Bit Architecture
- 240 MHz Clock Frequency
- 512 KB RAM

Arduino boards can be programmed using various programming languages with a compiler that generates machine code. To simplify the programming process, Atmel offers a development platform, Atmel Studio, for its microcontrollers. It's a modern and user-friendly environment for writing, testing and debugging Arduino code.

7. Experimental Results

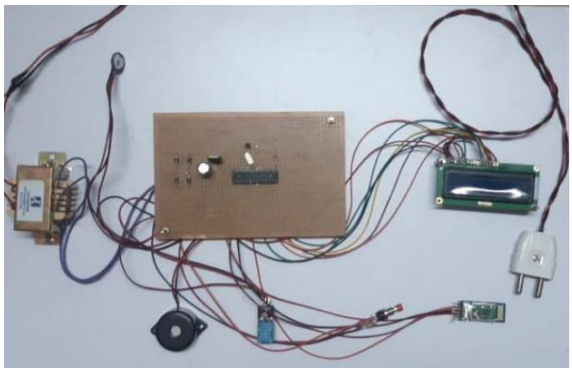

Fig.7.1. Prototype of the Proposed System

The idea behind this innovative project is to enhance the health and safety of soldiers and rescuers in challenging environments. The system combines state-of-the-art technology to accurately detect, predict and respond to potential health issues. The five key components of the system include advanced sensors, predictive algorithms, response mechanisms, communication tools, and a user-friendly interface. This comprehensive solution aims to provide real-time monitoring and quick response in critical situations. By integrating these technologies, the proposed system will enable rescuers to act swiftly to address any health concerns and ultimately save lives. Future works will focus on overcoming the challenges in implementing the system, to make it a reliable solution for rescuers and soldiers. Smart wearables for rescue are wearable devices that are specifically designed for rescue personnel. These wearables can monitor various health parameters such as heart rate, body temperature, and location, among others. The wearable typically consists of sensors, a microcontroller, GPS module, and a communication module. The sensors continuously monitor the health parameters of the rescue personnel and send the data to the microcontroller for analysis. In case of an emergency situation, the rescue personnel can press a safety button on the wearable, which sends an alert message to the authorities. The goal of these wearables is to rescue the rescuers and protect them in high-risk situations, such as during a natural disaster or a

pandemic. By providing real-time health monitoring and location tracking, these wearables can greatly improve the safety and well-being of rescue personnel.

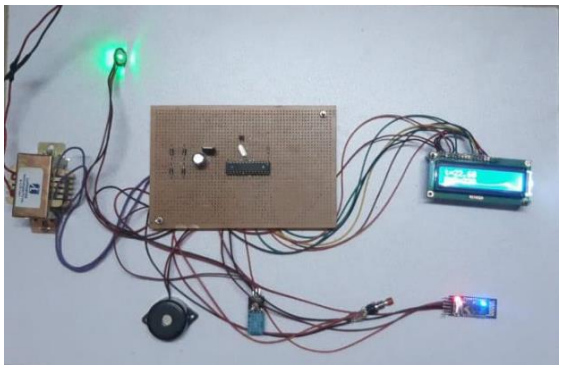

Fig. 7.2. Working Output Kit

8. Future Scope

The future scope for rescue wearables is quite promising as these devices are designed to monitor the health and location of rescue workers and soldiers in emergency situations. Some of the areas where these wearables can be used in the future include: Remote monitoring and real-time alert. Predictive health monitoring. Improved location tracking. Personalized safety features. Integration with emergency management systems. Overall, the future scope for rescue wearables is vast and is expected to play a crucial role in enhancing the safety of rescue workers and soldiers in challenging environments.

9. Conclusion

In conclusion, smart wearables for rescue operations have a significant impact on the success of these missions. By providing constant monitoring and updates on the rescuer's health and location, it enables better coordination and overall safety. As technology progresses, these devices are expected to become even more advanced and versatile, incorporating new features and capabilities to enhance their performance. It's evident that smart wearables for rescue will continue tobe an essential tool for the industry, ensuring the safety and well-being of those who bravely undertake rescue missions.

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