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Women Safety with Nerve Stimulator and Alert Using IoT

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ABSTRACT: A state-of-the-art initiative called the Women Safety System with Nerve Stimulator integrates multiple technologies to meet women's safety concerns. The system makes use of an microcontroller to integrate key components like a temperature sensor for body temperature monitoring, a pulse oximeter sensor for health tracking, a buzzer for audible alerts at abnormal conditions, an array of vibration motor used for nerve stimulator, a relay for external input control, and a rechargeable battery for portability.

The Nerve Stimulator, a special element of the system, adds another degree of security by generating regulated vibrations in an emergency, which helps draw attention to the area and warn people nearby. The Buzzer alerts the user and those in close proximity of possible risks by means of an audible sound. The Temperature Sensor keeps an eye on the body temperature, while the Pulse Oximeter Sensor continuously tracks the health of the user and sounds an alarm when readings go abnormal. The Relay gives the system flexibility in reacting to various circumstances by allowing remote control of external equipment. The rechargeable battery ensures the system's portability and permits continuous operation without the need for additional power sources.

I. INTRODUCTION

The IoT-based women's safety system is designed to offer a seamless and proactive solution for enhancing personal security, especially in situations where a woman might be in danger or experiencing a health crisis. The system's primary goal is to provide real-time monitoring of crucial health parameters, such as blood oxygen levels and body temperature, using sensors like the pulse oximeter and temperature sensor. These sensors continuously gather date and sent it to a connected IoT network, which can be accessed remotely by the user or pre-designated contacts. If any abnormalities, such as a sudden drop in oxygen saturation or a sharp rise in temperature, are detected, the system immediately triggers an alarm. The relay system activates the nerve stimulator to alert the user and potentially provide physical stimulation if they are incapacitated, while the vibration motor and buzzer create an immediate, loud notification to both the wearer and those nearby, prompting assistance. Furthermore, the IoT integration allows emergency alerts to be sent to contacts such as family members, friends, or emergency responders, ensuring that help is on the way without delay. This combination of technology, sensors, and emergency response measures provides a comprehensive safety net, offering real-time awareness and response capabilities that could potentially save lives in dangerous or emergency situation.

II. EXISTING SYSTEM

The current protocols in place to protect women frequently don't offer a comprehensive and cutting-edge solution. Conventional safety precautions usually consist of alarms, pepper sprays, or smartphone apps, which have limited usefulness. While some may use GPS tracking to be aware of their location, health monitoring components, or customized alert systems are not integrated. Furthermore, in an emergency, traditional safety gear could not offer a discreet and efficient way to communicate. By fusing several technologies into a unified and creative solution, the Women Safety System with Nerve Stimulator seeks to overcome these shortcomings and offer a more thorough and proactive approach to women's safety and well-being.

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III. PROPOSED SYSTEM

By utilizing cutting-edge technologies, the suggested Women Safety System with Nerve Stimulator presents a novel solution to women's safety problems. The brains of this system are an Arduino Uno microcontroller, which acts as the central processing unit and coordinates the smooth integration of important parts including a vibration motor, buzzer, Body temperature sensor, pulse oximeter sensor, relay and a rechargeable battery.

This device is unique in that it incorporates a Nerve Stimulator, which adds an extra degree of protection by means of regulated vibrations in the event of an emergency. As an auditory alert, the Buzzer warns the user and anyone nearby of possible risks right away. While the pulse oximeter sensor continuously measures the user's health and sounds an alarm if any readings are abnormal.

Women's safety is about to undergo a revolution thanks to the proposed Women Safety System with Nerve Stimulator, which combines cutting-edge technologies for effective emergency response, personal protection, and health monitoring in a comprehensive, proactive, and user-friendly package.

A. NODE MCU ESP32

ESP32 is a single 2.4 GHz Wi-Fi-and-Bluetooth combo chip designed with the TSMC ultra-low-power 40 nm technology. It is designed to achieve the best power and RF performance, showing robustness, versatility and reliability in a wide variety of applications and power scenarios.

The ESP32 series of chips includes ESP32-D0WD-V3, ESP32-D0WDQ6-V3, ESP32-D0WD, ESP32-D0WDQ6, ESP32-D2WD, ESP32-S0WD, and ESP32-U4WDH, among which, ESP32-D0WD-V3, ESP32-D0WDQ6-V3, and ESP32- U4WDH are based on ECO V3 wafer.

6. ESP32 is designed for mobile, wearable electronics, and Internet-of-Things (IoT) applications. It features all the state-of-the-art characteristics of low-power chips, including fine-grained clock gating, multiple power modes, and dynamic power scaling. For instance, in a low-power IoT sensor hub application scenario, ESP32 is woken up periodically and only when a specified condition is detected. Low-duty cycle is used to minimize the amount of energy that the chip expends. The output of the power amplifier is also adjustable, thus contributing to an optimal trade-off between communication range, data rate and power consumption.

- Complete Integration Solution

ESP32 is a highly-integrated solution for Wi-Fi-and-Bluetooth IoT applications, with around 20 external components. ESP32 integrates an antenna switch, RF balun, power amplifier, low-noise receive amplifier, filters, and power management modules. As such, the entire solution occupies minimal Printed Circuit Board (PCB) area. ESP32 uses CMOS for single-chip fully-integrated radio and baseband, while also integrating advanced calibration circuitries that allow the solution to remove external circuit imperfections or adjust to changes in external conditions. As such, the mass production of ESP32 solutions does not require expensive and specialized Wi-Fi testing equipment.

B. TEMPERATURE SENSOR

DESCRIPTION

This is the latest DS18B20 1-Wire digital temperature sensor from Maxim IC. Reports degrees C with 9 to 12-bit precision, -55C to 125C (+/-0.5C). Each sensor has a unique 64-Bit Serial number etched into it-allows for a huge number of sensors to be used on one data bus. This is a wonderful part that is the corner stone of many data-logging and temperature control projects. The DS18B20 communicates over a 1-Wire bus that by definition requires only data line for communication with a central microprocessor. It can derive power directly from the data line, eliminating the need for an external power supply.

C. DIGITAL TEMPERATURE SENSOR

DS18B20 sensor is a pre-wired and waterproofed. While the sensor is good up to 125°C, the cable is jacketed in PVC, so we suggest keeping it under 100°C. Because they are digital, you don't get any signal degradation even long distances. These 1-wire digital temperature sensors are fairly precise (±0.5°C over much of the range) and can give up to 12 bits of precision from the onboard digital-to-analog converter.

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D. PULSE OXIMETER SENSOR
DESCRIPTION
In its most common (transmissive) application mode, a sensor device is placed on a thin part of the patient's body, usually a fingertip or earlobe, or in the case of an infant, across a foot. The device passes two wavelengths of light through the body part to a photo detector. It measures the changing absorbance at each of the wavelengths, allowing it to determine the absorbance's due to the pulsing arterial blood alone, excluding venous blood, skin, bone, muscle, fat, and (in most cases) nail polish. This method does not require a thin section of the person's body and is therefore well suited to a universal application such as the feet, forehead, and chest, but it also has some limitations.

E. BUZZER
DESCRIPTION
A buzzer or beeper is a signaling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows.
Buzzer is an integrated structure of electronic transducers, DC power supply, widely used in computers, printers, copiers, alarms, electronic toys, automotive electronic equipment, telephones, timers and other electronic products for sound devices. Active buzzer 5V Rated power can be directly connected to a continuous sound, this section dedicated sensor expansion module and the board in combination, can complete a simple circuit design, to "plug and play."
A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices, timers, and confirmation of user input such as a mouse click or keystroke.

F. RELAY
DESCRIPTION
A relay is an electrically operated device. It has a control system and (also called input circuit or input contactor) and controlled system (also called output circuit or output cont actor). It is frequently used in automatic control circuit.
Relays are switches that open and close circuits electromechanically or electronically. Relays control one electrical circuit by opening and closing contacts in another circuit. … When a relay contact is Normally Closed (NC), there is a closed contact when the relay is not energized.
12. Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electromagnet and also a set of contacts. The switching mechanism is carried out with the help of the electromagnet. The main operation of a relay comes in places where only a low-power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits. They were used to switch the signal coming from one source to another destination. The high end applications of relays require high power to be driven by electric motors and so on. Such relays are called contactors.

BATTERY (12 V)
DESCRIPTION
Batteries are a collection of one or more cells whose chemical reactions create a flow of electrons in a circuit. All batteries are made up of three basic components : an anode (the '-' side), a cathode (the '+' side), and some kind of electrolyte.
12-volt battery, in its most common form was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in walkie talkies, clocks and smoke detectors. They are also used as backup power to keep the time in certain electronic clocks.
12V battery has a rectangular prism shape with rounded edges and a polarized snap connector at the top. A zinc carbon (6F22) battery is a dry cell battery that delivers a potential of 1.5 volts between a zinc metal electrode and a carbon rod from an electrochemical reaction between zinc and manganese dioxide mediated by a suitable electrolyte.

IV. CONCLUSION

In conclusion, the integration of IoT-based technologies for women's safety represents a significant advancement in providing real-time monitoring and immediate response to potential threats or health emergencies. By combining sensors such as pulse oximeters, temperature sensors, and wearables with IoT connectivity, these systems can continuously track vital health parameters, detect abnormal conditions, and activate alert mechanisms like vibration motors, buzzers, and nerve stimulators. These features enhance personal safety by providing proactive support, especially in distressing or dangerous situations. Moreover, IoT connectivity enables instant communication with

emergency contacts, ensuring that help is on the way without delay. As these technologies continue to evolve, the potential for further improvements in accuracy, reliability, and user experience grows, making IoT-based safety systems an indispensable tool for protecting women's and automatic response mechanisms represents a powerful, life-saving solution for enhancing personal security and peace of mind.

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