Night Safety Robot for Women

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Abstract

The Women's Night Safety Robot is an automated security gadget designed to improve the protection of ladies while journeying at night time. The robotic makes use of a motion sensor to constantly monitor its environment and hit upon any unusual moves. It is attached to a temperature sensor to monitor environmental changes that would indicate a capacity risk. The system works with a NodeMCU microcontroller, which provides sensor records and responds at once if essential. When suspicious hobby is detected, the robot abruptly turns on a mechanism that sends real-time area records to distinctive contacts or protection officials. In addition, folks who revel in severe panic and flashing lights are fearful. With GPS monitoring, the robotic gives real-time place to offer instant assistance. The purpose of this venture is to provide a simple, dependable and IoT-enabled way to ensure the protection of girls through combining movement detection, environmental monitoring and emergency reaction capabilities.

Keywords: Embedded C, Node MCU, GPS, IOT, ARDUINO IDE

INTRODUCTION

Women have placed their safety above all else for a long time. Ladies have a feeling of instability both inside and beyond their families. Women in many parts of India are afraid to leave their homes at night because the living conditions are so deplorable. There are by and by a ton of ladies working in the business and IT enterprises, which are seeing development. Women must work night shifts as a requirement. As a result, there is no adequate mode of transportation, such as buses, which are unavailable at that time and taxi services, which are scarce and frequently pricey in rural areas. Therefore, it is difficult for women to walk by themselves or return home. The suggested device functions more like a safety feature in an emergency. It's a small, versatile, and portable device with a lot of features. This gadget's primary design is to illuminate the enlisted crisis number of the lady's current area.

A modem is used to send the message to a pre-arranged phone number and a GPS system is used to track the victim's current location. This haircut is suitable for both older adults and young children. We will show the plan of a savvy pack that offers ladies security in this paper. The smart backpack includes the module, voice sensor, emergency switch, Arduino board, and a number of actuators. Either pushing a crisis switch or having a vocal sensor recognize the lady's voice initiates the gadget. While a disturbing situation is identified, an alarm discharges a sharp solid, an extreme focus light starts to streak, and a pepper splash starts to shower. Furthermore, an exceptionally impressive voltage is created on the facade of the sack, harming the assailant. A message specifying the area and the conditions is naturally shipped off enlisted telephones meanwhile.

RELATED WORK

Writing assessment is an absolutely essential step inside the product improvement process. Prior to developing the gadget, it's miles pivotal to decide the time component, value reserve funds and business venture strength. When these things are happy, the subsequent stage is to figure out which running contraption and language can be utilized to expand the gadget. Programmers need a lot of outside help once they start building a device. This help might be gotten from senior software engineers, books or sites. The aforementioned concerns are taken into consideration prior to system design to enhance the proposed device.

The primary responsibility of the department responsible for task improvement is to thoroughly examine and evaluate all of the task improvement's requirements. The most crucial step in the software development process for each assignment is literature review. Time components, asset necessities, labour, financial matters, and authoritative power should be analysed and examined sooner than developing the hardware and related design. When those components are fulfilled and painstakingly investigated, the accompanying step is to conclude the product program specs of the particular pc, the working machine expected for the endeavour, and any product program expected to move forward. a step like developing their capabilities and tools

We plan to create a device that combines several different devices. The hardware will include a wearable Splendid band that constantly communicates with a smartphone that uses the internet. The application has been modified and packed with all of the crucial information that connects human direct and reactions to various conditions like fear, anxiety, and shock. This conveys a sign which is sent off the cell phone. The thing or application approaches GPS and Informing associations which are pre-changed so that at whatever point it gets the crisis signal, it can send assist with fascinating nearby the space headings to the closest Police headquarters, family members, and individuals close to go who have application. This action prompts prompt assistance from nearby members of the public as well as the police, who can arrive at the scene of the crime with unprecedented precision[1].

An Arduino-based wearable safety device for women is presented in this project. The motivation behind this gadget is to shield ladies in the occasion they could confront any risk. The device communicates with them and sends them alerts through a wireless sensor network. The GPS and are utilized to share the used to share the client's area straightforwardly to the significant specialists and saved contacts. The switch in the gadget work for sending manual alarms in the event of crisis and as frenzy change to get the shock, then the Signal will likewise actuate along laser diode[2].

A wearable device that will improve women's safety is our idea in this paper. This objective is accomplished by examining the client's heartbeat rate and oxygen estimations and refreshing them down and out IoT web server. The client's heartbeat rate and blood oxygen not set in stone by obtaining crude pulse and oxygen values from a heartbeat oximeter and oxygen sensor introduced at the core of the gadget. Transferring sensor data to the Blink IoT web server enables real-time monitoring of user data. This remote gadget is explicitly modified to consistently screen the client's heartbeat rate and oxygen esteems and respond in the event of a peril circumstance. It does as such by recognizing the strange heartbeat rate and oxygen values, after which it sends the ready instant message alongside the area and live video web based to the watchman's cell phone through the Tasker application. In the meantime, the alarm begins to sound. In addition, we approve our framework design utilizing different continuous

experiments. In addition, we present a comparison of our proposed architecture to that of the existing body of[3].

An overview of the most recent developments in battery-free near-field communication (NFC) sensors and a brief comparison of other short-range RFID technologies are presented in this article. The practical design of NFC-based tags and NFC readers is recommended following an examination of NFC-based power transfer. Additionally, a list of commercially available energy-harvesting NFC integrated circuits is provided. At last, a study of the cutting edge in NFC-based sensors is introduced, which exhibits that a large number of sensors (both substance and physical) can be utilized with this innovation. Wearable sensors and applications for cold-chain traceability sparked a lot of interest. NFC technology is essential to the creation of environmentally friendly Internet of Things (IoT) applications due to the availability of low-cost devices and the incorporation of NFC readers into the majority of current mobile phones[4].

To suggest a way to use the Raspberry Pi, which has a sound sensor, camera module, GPSto make wearable IoT devices. The SVM (support vector machine) algorithm in machine learning evaluates only the victim's screaming when the sound sensor detects screams. Subsequent to evaluating the casualties shout, the device speedily enacts the camera module, which requires 30 seconds of film. Using the module, the GPS will track the location and send an alert message and an emergency call to the nearest police station. In the second scenario, when the victim presses the switch, the camera module immediately kicks into action, and a 30-second video is recorded. will send an alert message with the status once the GPS is turned on. The thoughts significant objective is to introduce a savvy contraption for a lady that is completely comfortable and convenient. When contrasted with other existing wellbeing gadgets, the first and most essential distinction is the savvy groups capacity to shrivel the size of contraptions [5].

The framework is controlled through raspberry pi, and it has two distinct modes in particular typical mode and security mode. In security mode, the fingerprint sensor acts as a panic button, and when a fingerprint is detected, the system shares the location and takes a picture of the offender and stores it in the cloud. In normal mode, the user can register their fingerprint. In security mode, the fingerprint sensor does the same thing. The AI calculation gets the client area as information and predicts the closest protected place area [6].

Every day, new ideas are dealt with in the intelligence world. Human intelligence is rapidly increasing, but maintaining safety in the face of constantly evolving technology is a challenging endeavour. Since, security qualifications are much powerless and yet it is exceptionally open to the work space. Additionally, the wellbeing of that weak information is vital to protect to keep the information at high security new advances were creating. The refreshing in innovation with that respects goes to IoT based stage. The Internet of Things (IoT) of the future will connect numerous everyday components via network. The basic idea behind the Internet of Things (IoT) is the collection and sharing of information within themselves through monitoring and sensor collection[7].

In this work, we propose a creative plan for an IoT-based interoperable medical care framework to remotely screen and characterize patient status. We discuss standards, protocols, and technologies based on works that utilize pertinent IoT applications in healthcare to support our research. The proposed architecture is centred on a number of low-power, non-intrusive sensors that are attached to the patients' bodies and beds. These sensors include data acquisition nodes that are connected to a smart gateway that gathers data. Through the exchange of electronic health records (EHR), the smart gateway

is integrated with an existing hospital information system. This makes relevant patient data easily accessible to health professionals on systems they are familiar with. The proposed architecture is based on Bluetooth Low Energy (BLE) technology at the data acquisition level, the Message Queuing Telemetry Transport (MQTT) protocol at the internal level, and the Fast Healthcare Interoperability Resources (FHIR) standard at the higher level. A use case scenario is presented in order to fulfil both functional and non-functional requirements and provide a better understanding of connection and communication between the distinct entities[8].

Every day, women are afraid to leave their homes because of a variety of threats, including kidnapping, assault, rape, and abuse. Using an Arduino microcontroller, this paper shows how to make a wearable safety device for women. The examination motivation behind the innovation is to safeguard ladies who are in harm's way. The module communicates with secure networks and issues an IoT-based alert. The gadget is customized so that the calculation is enacted when the sensor readings surpass the limit values. The proposed devices fundamental objective is to give security to ladies all over. Thus, contraption utilizes state of the art advancements like the Web of Things (IOT) and the GPS, modules are utilized to communicate the client's area to the suitable specialists and saved contacts [9].

The goal of the project is to make a safety device for women that allows for quick response and reporting. The application assists ladies with defeating with dread and can call to her watchman that she can take the assistance. It reports what is going on by simply squeezing button on the savvy band. The various sensors that are integrated into the band make our project look like a smart band that can protect women. While she wearing the band or a watch, in the event that she faces any Sort of badgering or on the other hand assuming she feels something turned out to be jeopardize she can press the button situated on the watch, when she falls in down, the different data, for example, area, body pose, beat rate and SMS alert are shipped off the predefined number by utilizing the through Raspberry Pi. Using the GPS, we can get the exact location of the victim. It sends the victim's longitude and latitude to the police, allowing them to easily find the victim, avoid the incident, save the women, and punish the culprit. Utilizing the IoT stage one we can follow the data of the ladies from a distance. This will assist with lessening the wrongdoing against the ladies [10].

EXISTING SYSTEM

Existing safety measures are less effective in practical settings due to a number of limitations. In an emergency, it might not be feasible to manually activate the majority of traditional instruments, such as by hitting a panic button or utilizing a smartphone app. These systems typically do not have real-time monitoring and cannot identify threats on their own. Additionally, they lack deterrents like lights or alarms to frighten off intruders. Additionally, the majority of current systems can only provide simple notifications; they cannot share real-time video or precise position data. Due to their inability to see at night, they function poorly in dim light. Finally, because traditional systems lack artificial intelligence, they are unable to effectively assess or react to threats. These drawbacks reduce the effectiveness of current methods in protecting women when they travel at night.

Disadvantages
- The Node MCU has lesser memory and processor capacity when contrasted with Hub MCU. No implicit IoT capacity. More expensive: The Node MCU is less expensive than the Node MCU.
- Implementing solar batteries requires more time and money.
- There is a lack of efficiency, and messages cannot always be sent to the registered number.

REQUIREMENT ANALYSIS

Evaluation of the Rationale and Feasibility of the Proposed System

The goal of the savvy lady's wellbeing sack with Arduino and innovation is to give a viable and dependable option for women's personal safety This framework expects to guarantee quick correspondence and real-time location tracking in emergency situations by incorporating an Arduino microcontroller, panic button, GPS and the module. A definitive objective is to upgrade individual security, give genuine serenity, and work with fast reaction and help with basic circumstances. A brilliant ladies wellbeing pack outfitted with Arduino and innovation gives a creative answer for individual security. It includes an Arduino microcontroller, a module, GPS following, and sensors to offer ongoing insurance and quick communication A panic button causes the system to send an alert with the user's information in an emergency. location of predetermined contacts. By ensuring that assistance can be provided, this lightweight and simple device increases safety. be rapidly and precisely dispatched. It offers modern technology and everyday convenience a secure and discrete method of protecting women.

PROPOSED SYSTEM

A clever and user-friendly gadget, the suggested Night Safety Robot for Women is intended to increase women's safety at night. It makes use of a temperature sensor to track changes in the environment and a motion sensor to identify any odd movement. The system is managed by a NodeMCU microcontroller, which reacts to threats. The robot notifies emergency contacts with its location if it detects danger. In order to deter potential intruders, it also turns on loud alarms and flashing lights. The robot uses GPS tracking to communicate its whereabouts in real time so that assistance can be provided promptly. For women's safety, this device provides an easy-to-use, portable, and automated option.

Advantages

- The advantages of using the Arduino Microcontroller and When compared to the NodeMCU, the Node MCU supports both 3.3V and 5V modules, making it easier to interface with a variety of sensors and actuators than the ESP8266 does.
- The Node MCU can deal with a voltage of 20V. modules accompany worked in Wi-Fi capacities, permitting simple network to the web and other Wi-Fi gadgets.
- Additionally, Arduino has a larger memory, a more powerful processor, and the capacity to handle larger sketches and more intricate devices.
- Productivity is high in Arduino microcontroller.

SYSTEM ARCHITECTURE

The definition of the requirements and the established order of a high degree of the device are linked to the description of the software's overall characteristics. During building plan, various site pages and their connections are portrayed and planned. Key software components are defined, broken down into processing modules and conceptual records systems, and the connections that exist between them are explained. The proposed framework characterizes the accompanying modules.
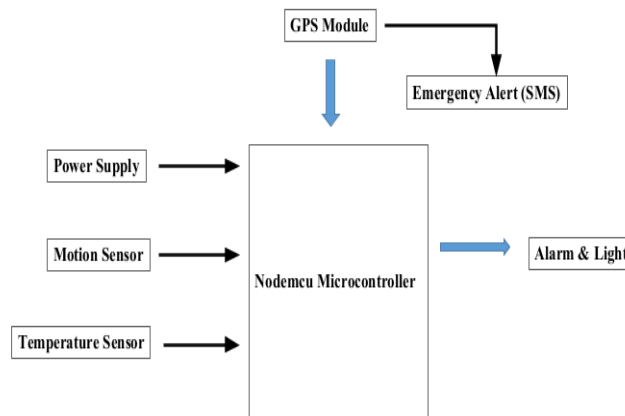
Fig 1: System Architecture

To identify and react to any threats, the Night Safety Robot for Women uses sensors and a microcontroller. It starts by continuously scanning the environment for any odd or abrupt motions using a motion sensor. A temperature sensor simultaneously looks for environmental changes that can indicate danger. The NodeMCU microcontroller receives all of the data from these sensors and processes it in real time. The system instantly initiates an emergency warning in the event that any suspicious activity is found, employing a GPS module to send real-time position information via SMS to pre-configured emergency contacts. The robot also turns on loud alarms and flashing lights to attract attention and deter possible assailants. Without any human input, this system operates automatically, guaranteeing that assistance may be summoned promptly and the user stays secure.

Hardware Components
- Power supply
- Transformer
- Rectifier
- Regulator
- Node MCU microcontroller
- Temperature sensor
- Buzzer
- GPS
- Software Components
- Arduino IDE
- Embedded C

Hardware Components explanation

Rectifier
A rectifier is an electronic device that uses one or more P-N junction diodes to change alternating current into direct current. A diode functions like a one-way valve, allowing current to flow in only one direction. The term "rectification" refers to this process. A rectifier that transforms the entire alternating current cycle into pulsating DC is known as a full wave rectifier. Full wave rectifiers use the entire input AC cycle, in contrast to halfwave rectifiers, which only use the halfwave. Uncontrolled and controlled rectifiers are the two main types. Controlled rectifiers: These are the kinds of rectifiers whose voltage

can be changed. To change over an uncontrolled rectifier into a controlled rectifier, MOSFETs, IGBTs, or SCRs are utilized. These are more desirable than those that can't be controlled.

Fig 2: Rectifier

Regulator

A controller is a gadget or system that naturally controls something, like the temperature in a room or the development of an individual's body. The generator's output remained constant thanks to an automatic voltage regulator. Voltage controllers (VRs) keep the voltages from a power supply inside a reach that is viable with the other electrical parts. While voltage controllers are generally usually utilized for DC/DC power transformation, some can perform AC/AC or AC/DC power change also. A voltage controller produces a proper result voltage of a current greatness that stays consistent paying little mind to changes to its feedback voltage or burden conditions. There are two kinds of voltage controllers: straight and exchanging. On the output of regulated power supplies are voltage regulators. This means that regardless of how much current the device is using; the regulator ensures that the output voltage will always remain at the power supply's rated value.
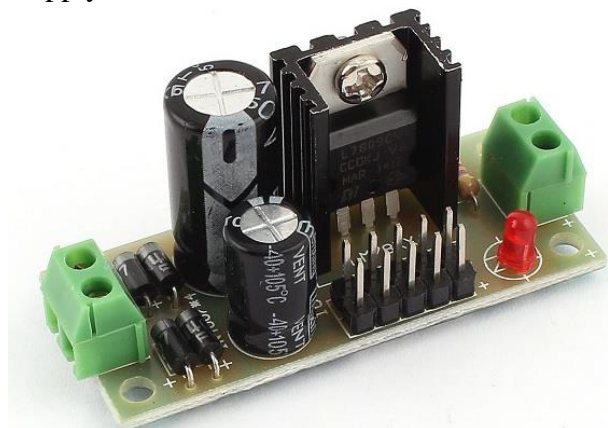

Fig 3: Regulator

Transformer

By increasing electrical current, a step-down transformer decreases the voltage that enters the site. It does this by changing over the high approaching voltage in the essential twisting to the vital lower voltage in the optional windings. step-down transformer is an electrical gadget that diminishes the

voltage of a substituting flow (AC) power supply. It comprises of an essential winding, an optional winding, and an iron centre.
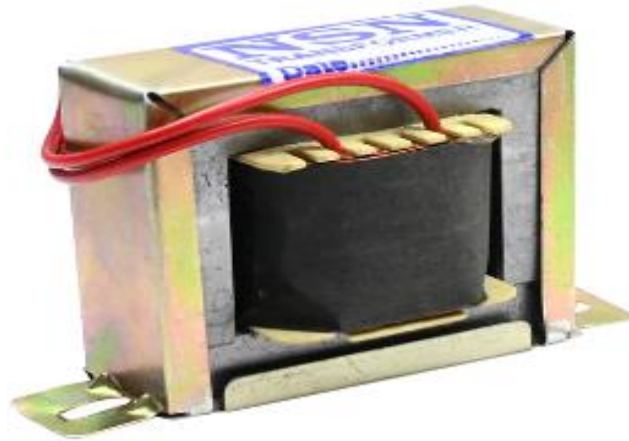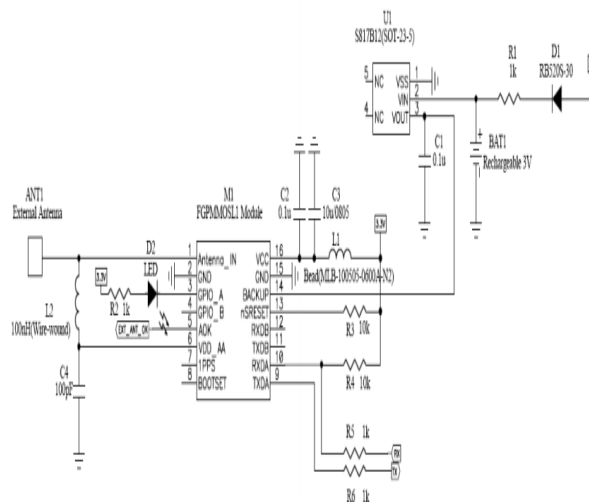

Fig 4: Transformer

Circuit diagram

Fig 6: Circuit Diagram

SELECTED METHODODLOGIES

Programming Language: Embedded C

Installed C is a microcontroller-based programming language that is an expansion of the C language. The Embedded C programming language is distinct from traditional C programming due to its fixed-point arithmetic operations, I/O Hardware Addressing, and access to address spaces. The development of embedded systems makes use of the programming language embedded C. Embedded Systems are specialized systems that are made to do very specific things or do very specific things.

Software, which is typically referred to as firmware and is embedded within the system's hardware, is what is meant by the term "embedded system." Inserted C is utilized to program an extensive variety of microcontrollers and microchips.

Implanted C requires fewer assets to execute in examination with undeniable level dialects, for example, gathering programming language. Keywords and additional data types are included in embedded C. There are some exceptional datatypes in Implanted C like sbit, sfr which are utilized for tending to extraordinary capability registers in memory. Implanted C permits us to work with equipment gadgets like sensors, and info yield gadgets. There are different Installed C compilers to arrange the implanted C program like Keil Compiler, SPJ Compiler, Inserted GNU C Compiler, and so on. Small-scale, medium-scale, and sophisticated embedded systems are all types of embedded systems. Embedded C is used to program devices like air conditioners, printers, and mobile phones that we use every day.

Arduino IDE and Its Programming

Arduino is a tool for building computers that are more capable than your desktop computer of sensing and controlling more of the physical world. It is an open-source physical computing platform with a development environment for writing software for the board that is based on a straightforward microcontroller board.

Arduino can be used to create interactive objects that can control a variety of lights, motors, and other physical outputs and take inputs from a variety of switches or sensors. An Arduino project can function independently or in conjunction with computer software.

The open-source IDE can be downloaded for free, and the boards can be assembled manually or purchased preassembled. Wiring, a physical computing platform that is similar to Arduino and is based on the Processing multimedia programming environment, is implemented in the Arduino programming language.

Fig 8: Arduino IDE

RESULT AND DISCUSSION

The creation of a robot that patrols at night is a major step forward in improving safety and security protocols. The constraints of human patrolling at night or in dimly lit locations are addressed by this cutting-edge technology. Modern sensors, cameras, and self-navigating systems are combined to provide night patrolling robots with a number of important advantages. Above all, these robots ensure that no suspicious activity is overlooked by providing round-the-clock surveillance and monitoring. They are very good at spotting possible security risks since they can pick up on odd noises, motions, and even temperature changes. To properly integrate security robots into our daily lives, a great deal of study need to be done. Our prototype's shortcomings include: Increasing sensor accuracy; improving the

autonomous patrolling algorithm; improving indoor localization; Using Internet of Things (IOT) technologies like web control and camera feedback; Developing a more precise system for tracking the movement of the robot. Because the characteristics of the wheel encoders vary depending on whether the surface is slick or uneven. It does not always function correctly.

CONCLUSION

A clever and dependable solution to improve women's personal safety, particularly when traveling at night, is the Night Safety Robot for Women. This robot can identify possible threats and react promptly by utilizing sensors such as temperature and motion sensors, GPS tracking, and alert systems. In addition to providing real-time location-based emergency warnings, it deters potential intruders with flashing lights and alarms. By fusing technology and safety, this system provides a portable, easily navigable tool that can help avert mishaps and guarantee prompt assistance. It is a significant step in fostering peace of mind and a safer atmosphere for women.

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