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AN IOT-BASED SMART SOLUTION FOR WOMEN SAFETY

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Abstract — Nowadays, women's safety is critical. There are a growing number of incidents of female harassment and molestation in India. Women's safety is important, whether they are at home, outside, or at work. According to the literature examined, a variety of mobile applications are used to ensure the protection of women. We're developing a smart band prototype that can be activated by tapping the screen twice. When the gadget is turned on, it uses a GPS receiver to communicate live data position to the specific person's contacts and police control rooms. When the button is pressed then the buzzer alarm system starts to activate. At the same time sends notification to that particular person mobile phone using IOT technology. When the gadget is turned on, a Piezo buzzer alarm will be activated. The buzzer's volume ranges from 80 to 110 decibels, and it may be heard up to 50 feet away. Our proposed system uses a Node MCU to detect women safety and sends the results via Wifi using Internet of Things.

Keywords: Vibration Sensor, GPS Module, ESP8266 Wi-Fi module, Buzzar

I. INTRODUCTION

The Internet of Things (IoT) has an impact on human existence, both consciously and unconsciously. Every machine can be operated via the internet, making people's lives easier. Nowadays, children are not allowed to roam freely on the streets, where they are frequently molested by strangers. Parents are anxious about their daughters' safety, which has become the first roadblock to enabling them to leave the house. The number of children harassed has gradually increased. For everyone in the present age, safety is the most essential power in today's world. Even if our country is developing economically, there are still numerous crimes committed against children. Technology is the most effective means of ensuring their safety. We can control and access equipment and items that are connected to the internet with the aid of IOT, even at large distances. Without human-to-human and computer-to-human communication, we can send and receive data. However, harassment, rape, and acid attacks continue.

To keep them safe, a smart gadget has been created. In the event of a dangerous or emergency scenario, a kid safety device is particularly developed for them. The kid safety gadgets should be simple to use, convenient to transport, and provide a variety of functions. Smart phone usage has exploded all across the world. The government and individuals have created a number of mobile applications and smart gadgets to assist children who are in distress. The frequency of sexual offences has not decreased despite the development of a range of technology and software. The kid safety gadgets or applications should have a number of functions that are often utilised in everyday life as well as in real-world emergency situations.

II. PROPOSED SYSTEM

In this proposed system when a child screams loudly then the notification will send to a particular person via Lora transmitter and receiver using IOT. Within that temperature, humidity and pulse rate of the child will also be send. Here we are using temperature and humidity sensor, pulse sensor, sound sensor. The GPS receiver continuously monitors the location of that child. The notification and location details will send to the particular relative or others via WiFi using an IOT technology. Pulse Sensor is used to know pulse rate of the child and DHT11 use to monitor temperature and humidity level of the child. When a kid presses the buzzer button, an alarm message is sent over the Internet of Things to the nearest police station. At the same time using LoRa module the sensor value and alert signal will be send to their parents or others.

III. BLOCK DIAGRAM OF PROPOSED SYSTEM

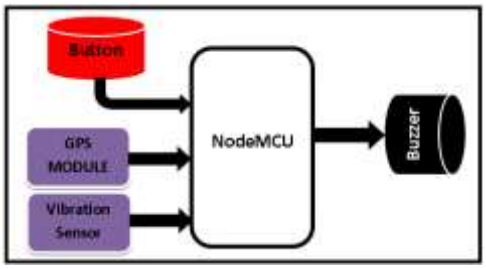

Fig 1. Block Diagram of Proposed System

A specifically created programme functions as an interface between the gadget and the phone, allowing it to connect with it. The programme that is pre-installed on the phone constantly monitors the data on the smart device. In the event of misuse, the software instructs the smart phone to do the following:

- Sends a message to the rest of the family
- It also sends a request for quick action to the nearby police station.

The app is set up in such a way that it uses the smart phone's GPS to detect co-ordinates and monitor movement for easy tracking.

The software also functions as a social network, allowing users who have the app loaded to receive messages immediately, allowing them to participate to the timely delivery of justice. This functionality is implemented by utilizing the user's phone's internet capabilities. In this proposed system when a person press a button then the notification will send to a particular person and a buzzer system starts to alarm. The GPS receiver continuously monitors the location of that woman. The notification and location details will send to the particular relative or others via Wi Fi using an IOT technology.

When an event occurs, the button is hit, which sends data to a Node MCU. At the same time, GPS is used to acquire the latitude and longitude of that specific place, allowing the exact position of the incident site to be identified. By using Internet of Things (IOT) any person can monitor the system at anywhere in the world.

IV. BUTTON

In an emergency case such as cardiac arrest or other significant health issue requiring immediate assistance, or if you are attacked by someone or thieves break into your home, a button is used to send an emergency signal to the police or surrounding individuals.

In India, the government made it mandatory for mobile phones to feature a panic button that, when hit, alerts the authorities to the person in danger's current position. So here in this project we will make a physical **button using ESP8266 Wi-Fi module** which will send an alert notification to predefined mobile number when pressed.

V. VIBRATION SENSOR

Vibration sensors are used to determine linear velocity, displacement, and acceleration. This is a directional vibration sensor with a spring that can detect vibration from any angle. There are three fundamental types of vibration sensors: displacement, velocity, and acceleration.

Displacement sensors assess how much a machine's spinning part moves away from its stationary housing (frame). Displacement sensors are placed into a hole drilled and tap ped in the machine's frame slightly above the spinning shaf t's surface. Velocity and acceleration sensors, on the other hand, measure the velocity or acceleration of the element to which the sensor is attached, which is frequently a part of the machine frame.

In a displacement sensor created by the Bently-Nevada company, the distance between the probe tip and the spinning machine shaft is detected using electromagnetic eddy current technology.. The sensor is a wire coil that is encased and activated with high-frequency alternating current (AC).

The magnetic field created by the coil creates eddy currents in the machine's metal shaft, as if the metal piece were a short-circuited secondary coil of a transformer (with the probe's coil as the transformer main winding).The magnetic connection between the shaft and the sensor coil tightens as the shaft approaches the sensor tip, resulting in higher eddy currents.

The high-frequency oscillator circuit that provides the sensor coil with its excitation signal is loaded by the generated eddy currents. As a result, the load on the oscillator is directly proportional to the distance between the probe tip and the metal shaft. This is similar to how a metal detector works: the degree of loading induced by eddy current induction is utilised to determine the proximity of a wire coil to any metal object.

In the Bently-Nevada system, a proximitor is the oscillator circuit that provides sensor coil excitation. A coaxial wire powers the sensor coil, while an external DC power source powers the proximitor module.

The proximitor module outputs a DC voltage that represents proximity to the metal shaft, with 200 millivolts per mil (1 mil = 1 /1000 inch) of motion being the typical calibration.

Any shaft vibration causes the output voltage of the proximitor to change in precise steps. The proximitor output signal, for example, will be a 28.67 Hz waveform superimposed over the DC "bias" voltage established by the initial probe/shaft gap if the shaft vibrates at 28.67 Hz.

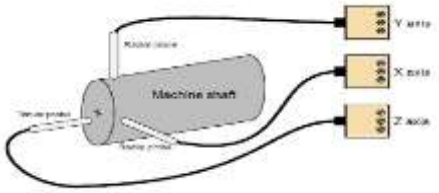

Fig 2. Vibration Sensor

Description

The Vibration Sensor (SW-420) is a high-sensitivity non-directional vibration sensor. Once the module is stable, the circuit is turned on and the output is high. The circuit is turned on and the output is high once the module is stable. When the movement or vibration occurs, the circuit will be momentarily severed and the output will be low. A trimmer potentiometer can be used to alter the sensitivity of this sensor.

Fig 3. Vibration Sensor

Working Explanation

This module is a non-directional vibration sensor with great sensitivity. The circuit is turned on and the output is high once the module is stable. The circuit will be briefly disconnected and output low when movement or vibration occurs. At the same time, you can change the sensitivity to meet your specific requirements.

An SW-420 vibration sensor, an LM393 comparator, an LED, and a potentiometer make up the circuit. The threshold may be changed by rotating the potentiometer; it will transmit a HIGH signal if it detects vibration over its specified threshold, and a LOW signal if it detects no vibration or vibration below the threshold.

Applications

- Cost sensitive, low power, motion- and tilt-sensing applications
- Mobile devices
- Gaming systems
- Disk drive protection
- Image stabilization
- Sports and health devices

VI. IOT MODULE

The Internet of Things (IOT) is an ever-growing network of physical things having an IP address for internet access, as well as the communication that occurs between these objects and other Internet-connected devices and systems. IoT solutions allow users to achieve greater automation, analysis, and integration inside a system. They broaden the scope and accuracy of these regions. The Internet of Things uses both existing and developing technologies for sensing, networking, and robotics. The Internet of Things takes use of recent software breakthroughs, cheaper hardware prices, and current technological attitudes. Its creative and sophisticated features lead to substantial changes in the delivery of products, goods, and services, as well as the social, economic, and political repercussions of such changes.

VII. ESP8266 NodeMCU

NodeMCU is an open-source firmware and development kit that may be used to prototype or construct Internet-of-Things (IoT) devices. It contains software for the ESP8266 Wi-Fi SoC from Express if Systems, as well as hardware for the ESP-12 module. The firmware uses the Lua scripting language. It is based on the eLua project and built on the Express if Non-OS SDK for ESP8266.

As a gateway, the Node MicroController Unit (NodeMCU) is employed. It contains an integrated Wi-Fi module that sends sensor data to the cloud for storage and analysis. The key reason for choosing NodeMCU is that the sensors in our project only require digital pins and only one analogue pin. Also, it consumes less power (3.3v) and is of low cost when compared to other micro controllers /processors like Arduino and Raspberry pi. Ultrasonic sensors, gas sensors, temperature sensors, and an infrared sensor are all connected to the Node MCU. All of the values have been connected and are being sent to the Cloud server.

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Fig 4. ESP8266 NodeMUC

You may establish a WiFi connection and configure input/output pins according to your needs, just like an Arduino, transform your ESP8266 into a web server, and much more with just a few lines of code. It is the WiFi equivalent of ethernet module. Now have a practical internet of things (IoT) tool.

It offers a deep sleep mode that uses 60mA and is useful for applications that demand less power. The nodeMCU Dev board supports immediate flashing from a USB port thanks to its USB-TTL. It combines WIFI access point and station functionalities with a microcontroller. Because of these characteristics, the NodeMCU is a highly powerful tool for Wifi networking. It can function as an access point and/or station, as well as host a web server and connect to the internet to get or upload data.

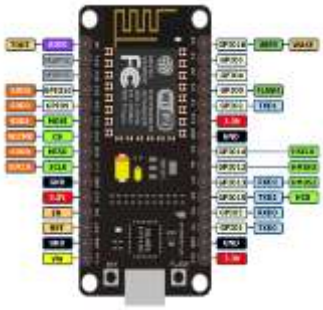

Fig 5. Pin Diagram of ESP8266 NodeMUC

VIII. GPS Receiver

The Global Positioning System (GPS) is a satellite navigation system based in space that provides position and time information in all weather conditions anywhere on or near the planet when four or more GPS satellites are visible. The system provides critical capabilities to military, civic, and commercial users all around the world.

Fig 6. GPS receiver

A worldwide navigation satellite system that provides a GPS receiver with geo-location (latitude and longitude) and time information, if four or more GPS satellites have an unobstructed line of sight. The GPS receiver serves as the accident detection sensor. GPS technology has improved in terms of accuracy, size, reliability, and cost. The technique requires a GPS signal obtaining equipment that is extremely sensitive and precise.

The Node MCU is an advancement board based on the ESP8266 microcontroller. The ESP-12E is highlighted as the handling centre. It's a 32-bit microcontroller. It features a single channel 10 bit synchronised ADC with 14 GPIO pins. It supports UART, I2C, and SPI communication. In the case that you are new to Node MCU, 3.3V is ideal. Then read our Getting Started with Node MCU guide. VCC, GND, Tx, and Rx are the four pins. The receiver keeps track of all satellites in the field of view and gives precise satellite positioning data.

Fig 10. GPS module

Its 20 parallel channels and 4000 search bins enable speedy satellite signal collection as well as a fast starting time of 8 seconds for hot start and 40 seconds for cold start. The tracking sensitivity of -159dBm enables for effective navigation performance even in urban canyons with restricted sky view. It offers a second-by-second output in NMEA standards, allowing for continuous speed monitoring.

The GPS Coder Module, which is directly connected to the microcontroller's USART, will use this information to search for an exact address of that location, such as the street name, nearby junction, and so on. The GPS Coder Module provides reliable positioning, navigation, and timing services to worldwide users on a continuous basis in all weather, day and night, anywhere on or near the Earth. If GPS is turned off, the system will only provide the longitude and latitude as text messages. As a result, Internet access is required.

CONCLUSION

The requirement of the day is to be protected and secure. Our goal with this project is to create a single system that is so small that it can serve as a personal security system. This design will address the majority of the important concerns that women encounter and will assist them in feeling safe. This design will address the most of the major concerns that women have and will assist them in feeling safe. This method aids in the reduction of female-on-female crime. Women's safety is a big issue in the current situation. The study focuses on the

low-cost implementation of a device that can save a woman's life in a critical situation. The suggested system leverages advanced IoT technologies to provide end-to-end security solutions for women's protection.

This sort of innovation, being the first of its kind, plays a critical part in assuring Women's Safety in the most efficient manner feasible. The suggested design will address key difficulties that women have encountered in the recent past and will assist in their resolution using technologically sound devices. The technology can monitor a desired region in real time and detect violence with reasonable accuracy. Thus the system when a person press a button then the notification will send to a particular person and a buzzer system is activated. The GPS receiver continuously monitors the location of those women. The notification and location details are sended to that women's family via NodeMCU WiFi using an IOT technology.

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