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IoT Based Women Safety Device

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Abstract: *Women's safety is a significant priority around the world right now. Women encounter a range of scenarios every day, including abuse, assault, rape, and kidnapping, which make them fear leaving their homes. This paper demonstrates how to make a wearable safety device for women using an Arduino microcontroller. The research purpose of the technology is to protect women who are in danger. The module is interfaced with the secure networks and sends an alert via IoT. The device is programmed in such a way that the algorithm is activated as soon as the sensor readings exceed the threshold values. The proposed gadget's main goal is to provide security for women everywhere. As a result, gadget employs cutting-edge technologies such as the Internet of Things (IOT) and the GPS, GSM modules are used to transmit the user's location to the appropriate authorities and saved contacts.*

Keywords: Women safety, Arduino UNO, Accelerometer, GPS, GSM, Safety device.

I. INTRODUCTION

Women are the most important part of a country's economy as they help to shape its future. Due to society's hypocritical attitude many crimes committed against them go unreported, victims who attempt to report the assaults experienced by them to the society are subjected to a slew of humiliations and abuse. Only one out of every four cases in India results in a conviction trial.

Despite living in the twenty-first century and in an era of rapidly developing technology, young girls and women continue to feel insecure and face a variety of challenges and issues. By giving a voice, today's women are breaking down barriers and working in all fields. Men face tough competition and while women excel in their chosen fields proper precautions must be taken in order to develop the best solution to this problem this paper proposes an iot-based smart safety device for women and can be used to detect any such situations automatically and notify the appropriate parties it also helps women in danger but it also ensures that women receive justice by assisting them when they are in need.

II. LITERATURE SURVEY

[1] The objective of this research is to introduce a women safety device. This device includes a panic button that the victim can press if she is in danger. When the panic button is pressed, an alert message with the live location is sent to the predefined numbers via GPS and GSM modules.

[2] This paper proposes the creation of a device that combines multiple devices. This device is made up of an ATMEGA 2560 microcontroller, IoT modules, and vibration sensors. This device is suggested as a wearable smart band that the user can activate when She clutches the device's trigger button. When activated, it sends the current location and an alert message to predefined numbers.

[3] This paper proposes a safety device that can be used to locate a missing child and track the child's movements outside the home. GSM and GPS are used to communicate the current location

III. SYSTEM OVERVEIW

The system design comprises of Power Supply, Arduino Board, ESP32 Cam, Temperature Sensor, Heartrate Sensor, Sound Sensor, ADXL Accelerometer, Push Button, GPS Module, GSM Module, LCD Display, and Buzzer.

3.1 Arduino Uno

It is a high voltage Microcontroller board based on ATmega328P. It consists of 14 digital pins called GPIO (General Purpose Input/Output) which indicates that we can connect input or output devices. Here all the pins are exposed. The

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I/O devices can be connected to any pin but some devices like GPS, and LCD are registered for specific jobs which cannot be changed. The sensors will give us the data like the heart rate and temperature of a person whereas the actuators like buzzer and LED receive the commands from the user and act accordingly. We declare how these pins should act as (Input or Output or both) in our program.

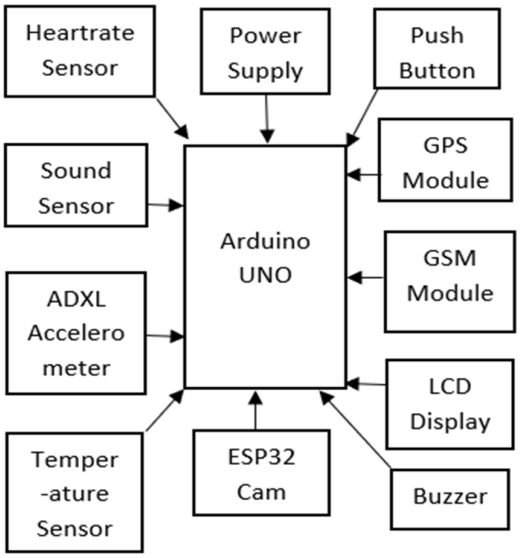

Fig 1. Block diagram of proposed system

3.2 Power Supply

The power supply is required for the components to work. The power supply is given to the Arduino Board via a USB power line. The power supply to GSM Module, GPS Module, and ESP32 Cam is sent via a serial bus.

3.3 LCD Display

LCD (Liquid Crystal Display) is a thinner display technology that uses an I2C module. It has a 16*2 display i.e., 16 columns and 2 rows which shows the alert message to the user when the panic button or the sensors are triggered. It also shows the 2-way communication message.

3.4 GSM Module

A Global System for Mobile Communication (GSM) module helps to set up communication between a mobile device and GSM. It uses a SIM card to send and receive SMS. It requires a power supply to get started.

3.5 GPS Module

The Global Positioning System (GPS) module provides 6 channel GPS search engine, high position, high sensitivity, velocity, and time accuracy performances as well as tracking capabilities.

3.6 ESP32 Cam

It is a camera that is used to capture the image of the surroundings and mail the picture to the given mail id. It requires 5V and it communicates through serial communication. Its purpose is to check whether the controller is saying if it has to send the mail or not.

3.7 Heart Rate Sensor

It is used to measure the heartbeat or pulse rate of a person. It illuminates a LED into the capillaries to measure the frequency at which the blood pumps.

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3.8 Sound Sensor

It is used to detect the intensity of sound. A threshold value of 1500 is input into the sensor. If it crosses this range, then a buzzer will be triggered. This sensor has a microphone to provide input, a peak detector, and an amplifier.

3.9 Temperature Sensor

It helps in measuring the temperature of an object or a person by sensing the humidity levels. It can measure the temperature of anything on which it is placed. It is most commonly used in Air Conditioners where it detects when the room is too hot or too cold and adjusts the temperature accordingly.

3.10 ADXL Accelerometer

The I2C (Inter-Integrated Circuit) as well as SPI(Serial Peripheral Interface) serial interfaces are accessible by the 3-axis MEMS accelerometer called as the ADXL. It is used to sense the tilt from side to side. An application can be found in our smartphones when switching the layout from landscape to portrait or vice-versa.

3.11 Buzzer

A buzzer is a signalling device that produces a huge alarm sound when triggered.

3.12 Push-Button

It is a button that is used to trigger the alarm whenever the user feels unsafe. The user can simply press the button and all the sensors will be triggered automatically regardless of the threshold value

IV. METHODOLOGY

Two mechanisms can be identified in the process flow.

4.1 Manual Mechanism

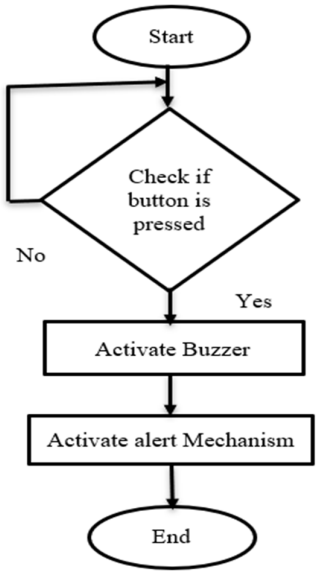

Figure 2: Flow chart of manual mechanism

The manual mechanism is the project methodology that takes place when the women are ready to reply (see Fig. 1). When the woman feels attacked or threatened, she can press a button on the device. The alert mechanism is then activated. When the button is pressed, the buzzer activates and emits a loud noise to alert anyone nearby who can help her. In order to track the user's position, the GPS location is transmitted as a Google Maps URL to authenticated contacts for quick access, can send a photo taken with the ESP32 camera to the associated email, which can be used as a reference in the future.

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4.2 Automated Mechanism

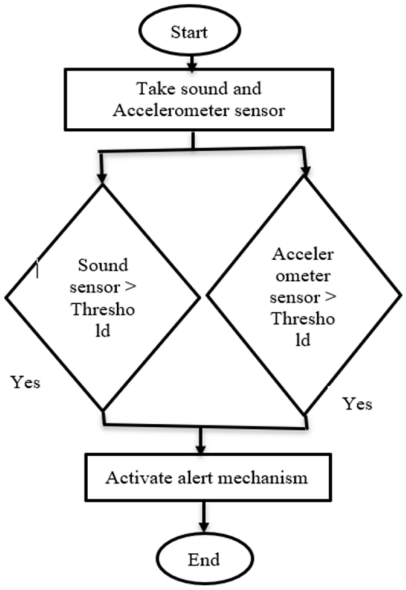

Fig 3. Flow chart of automated mechanism

In the majority of cases, the women will be unable to react and run the manual mechanism, therefore employing flex, sound, temperature, and a heart-rate sensor to automate the mechanism (see fig 3). When any of the sensors detect an abnormality or cross a threshold, the alarm system is triggered.

The sensor thresholds are established through a process of trial and error after collecting the normal and anomalous data for each sensor. The sensor measurements are regarded as HIGH whenever they surpass the thresholds. The buzzer will sound, and the Alert mechanism will be triggered whenever any of the sensors cross the threshold.

V. RESULT

This newly designed smart safety device can be used as a wearable watch which comes handy in many emergency situations. This device is automated, as well as manually triggered by the user in any unsettling situations by pressing the push button.

When this device is triggered it captures the pictures and sends them to the registered contacts. It also sends the location of the user along with the message "Alert, I Need Help". Upon receiving the alert, the contacted person can confirm that they received the message with the help of 2-way communication which the user can see in the LCD display.

VI. FUTURE WORK

With the changing and improved technology in the future, this already well-functioning safety device can be upgraded for the betterment of the people. With this being worked on the internet connectivity, it can be improved working without internet usage, with a shock generator, audio recorder, and voice detection

VII. CONCLUSION

With the world being fast-paced, it has come to be smarter as well as scarier. Therefore, to feel a sense of security we have introduced this smart safety device. The prime objective of this is to provide security to people, significantly to women. This automated and manual working device is cost-effective and works in any critical situation.

As soon as the sensors go above the threshold the gadget reacts sending the registered contacts an alarm message and pictures that were taken. With the pictures being captured and sent can be later used as proof to fight against the culprit in the courts.

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