SMART WEARABLE GADGET FOR WOMEN SAFETY

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ABSTRACT

Women's safety has always been a concern, especially in the modern period with all the technology advancements. Women are never safe, and they are especially vulnerable when exploring remote areas and lonely highways on their own. There are numerous uses for women's protection while they are in perilous circumstances. These applications' limitation to sending alert messages solely to saved contacts is a flaw. Because of outdated systems, women have fewer options for escaping dangerous situations. A GPS monitoring gadget to find the women was also included in earlier designs, although it lacked a specified radius. The current system is lacking a component that prevents the warning message from going to neighboring cell phones. To confirm that the person on the other end has received the message, more than one message may occasionally be needed. Text message options were previously available; however, it appears that suspending that functionality has angered some customers. 35% of women worldwide, according to reports from WHO, an NCRB-social-government agency, experience a lot of unethical physical harassment in public settings including train stations, bus stops, and sidewalks. In the situations of women, there have been numerous regrettable occurrences. This study proposes a device to safeguard women. When the gadget is turned on, it begins sending real-time information to certain contacts or police command centers via the GPS receiver and IOT. Using IOT technology, it simultaneously sends a warning to that person's cell phone. When the system is turned on, a warning piezoelectric signal is immediately generated.

Keywords— IoT,GPS Receiver,Peizo alarm,Arduino UNO R3,ESP8266 nodeMCU.

I. INTRODUCTION

Every economy does depend on women, who also have a major role in determining the nation's future. She is now managing work and home at the same time, taking part in economic development on an equal basis with males, having previously stayed at home to take care of her domestic tasks.

The Factories Act of 1948 has been amended to let women employees to work night shifts, satiating a long-standing desire for gender equity in the workforce. The amendment suggests that night shifts for women should only be permitted if the employer ensures that safety requirements, adequate safeguards in the factory regarding occupational safety and health, equal opportunity for women workers, adequate protection of their dignity and honor, and transportation from the factory grounds to the closest point of their residence are met. Night shifts have been around for a while, but in India they were not legalized for women to work until recently thanks to an amendment to the Factories Act of 1948.

There are numerous women entrepreneurs and laborers who contribute to the nation's gross domestic product, from rural areas to urban centers. 60% of women are already employed in the garment business, and this percentage will rise dramatically as this sector expands. Until recently, the IT industry hired women for late-night shifts but was not required by law to take the aforementioned safety precautions. There is no doubting that women in India have come a long way in the nearly seven decades since their independence, but they still have to battle a number of disadvantages and societal ills in the male-dominated culture.

In today's Indian society, there are still many bad and male forces at work that obstruct the advancement of its women. Women now work night shifts thanks to the growth of the IT and BT industries. The company is in charge of giving these workers transportation to and from work. Today, even though businesses offer transportation services, the safety of women cannot be fully guaranteed. For example, in one incident in Pune in 2007, two of the company's assigned cab drivers brutally assaulted a girl working in a call center. In addition, we have recently seen numerous other incidents where women's safety was not fully guaranteed by the cab services offered by the company.

Swami Vivekananda, one of the greatest sons of India, quoted that, "There is no chance for the welfare of the world unless the condition of women is improved, It is not possible for a bird to fly on only one wing." Therefore, the inclusion of "Women Empowerment' as one of the prime goals in the eight Millennium Development Goals underscores the relevance of this fact. Thus, in order to achieve the status of a developed country, India needs to transform its women force into an effective human resource and this is possible only through the empowerment of women.

Women are abused in about 10% of all crimes perpetrated in the nation. Of the estimated 876 million adults world-wide who cannot read or write, two-thirds are women. Between 2001 and 2011, 30 lakh girl babies died as a result of female infanticide. In India, a woman is violated every 20 minutes. One third of women in India are still illiterate 60 years after gaining freedom. In India, only 39.5% of women are employed, compared to 80% in China. 70 percent of the 1.3 billion people who live in extreme poverty worldwide are women, while 10.9% of women own land. Less than 40% of women give birth in a medical institution.

Domestic Abuse One in three women who have ever been married say their husband has smacked them. The percentage of those who say they have had their arms twisted, been pushed, shaken, kicked, dragged, or beaten up, or had anything hurled at them, ranges from 12% to 15%. Approximately 10% of wives claim that their husbands have physically forced them to have sex. Domestic abuse affects almost two-thirds of married women in India, where one act of violence costs a woman seven days of employment. Every seventh married woman has experienced bodily harm as a result of marital abuse. The first instance of marital abuse for the majority of women who have ever experienced it happened within the first two years of their marriage. The only approach that will work in this situation is to give women a portable safety device [1] that guarantees their safety.

Our project is focused on creating a smart device based on IoT [2] solutions that aids women in escaping dangerous circumstances. Women are growing more independent and keeping up with the latest trends in today's world, but their safety has been a concern because it is so difficult for them to leave the house at night due to physical/sexual abuse and a fear of violence. Nowhere is safe for women, and they are particularly vulnerable on lonely roads. Women and girls still confront difficulties today, despite the rapid advancement of technology and the creation of new technologies. Women should be treated with respect by society, and they should have adequate protection. However, there are some locations with installed video surveillance cameras and storage for the recordings. They only take action once everything has taken place. In order to prevent such situations, we add IoT devices that detect people's locations, motions, etc.

II. EXISTING SYSTEM

A. Existing Systems

The recently developed solutions for the safety of women include Smartphone Applications, Intelligent Security Systems [3] and Wearable devices [4]. These types of wearable devices are generally designed as mobile applications, Wearable bands [5], accessories etc. Suraksha [6] is a security device that can be activated in three ways; a voice command, click of a button and when it is thrown with a force. Upon activation, this system sends the location of the device to preselected contacts via an inbuilt GSM module. But during times of distress, it might not always be possible for the user to carry this device in her hand. Also, the attacker might notice the device that the victim is holding [7]. Another such solution is a one touch alarm system designed to look like a watch [8]. The GSM and GPS module within the device is used to send the user's location to preset SOS contacts when triggered by pressing a button. This device may be aesthetically unappealing to the user and might be noticed by the attacker [9].

Dr.C K Gomathy and Ms.S.Geetha [10] has suggested that, women safety has become a major issue as they can't step out of their house at any given time due to physical/sexual abuse and a fear of violence. Even in the 21st century where technology is rapidly growing and new gadgets are developed. We are all aware of the importance of women safety, but we must analyze them using various machine learning algorithms [11] that they should be properly protected. They have designed equipment for alerting the system by using the Arduino controller for controlling the whole process of the system. The GSM is used to send SMS regarding GPS locations. LCD is for displaying and the switch is pressed when the person is in danger. Here we are adding a Buzzer Laser Diode which will activate when the women press the switch. The devices switching from remote location removes the necessity of the person to be present near the device to operate it. This approach allows more than one person to control the device functionality and the authentication facility provided by the switch helps to reduce the fault correction time.

The other paper [12] suggested all about the applications with an innovative idea for security and protection for women and more research is possible with introducing smart technology where people and objects form a network. This will help to solve them technologically with compact equipment and ideas. Using screaming

alarms and also alerting the emergency contacts by sending the messages with the location is helpful for women's security. This system can overcome the fear that scares every woman in the country about her safety and security.

Another Solution proposed [13] the system for the security of women. With the help of the wireless method which will communicate and alert the messages sent to the predefined number with the secure medium. When the button is pressed information of the user is collected by the sensors and then information will be sent to the predefined number along with calling. This system will be helpful for speed up the monitoring for women safety by using the GPS tracking Mechanism. SMS will be sent to the preprogrammed numbers, and this will help to save the time and the victim gets help without any loss of time. The project is to ensure security for the women by providing automatic sensing of problems, threats.

Phadtare et al., [14] presents an alert system for sociable security utilizing common or garden commercially accessible electronic bias to warn the exigency connections and the nearest public by transferring immediate position. The system consists of an Android app conforming to several features integrated with the IOT module, which can be used to smell fall discovery, race pressure, SpO2, Heart rate, body temperature etc., and deliver the information to the listed connections. The ultimate thing is ensuring that the stoner/ fatality receives help the first time.

Premkumar et al., [15] describe a one- touch alarm system for women's safety using GSM. Anytime you smell peril, all you have to do is press the button on the device. The device comprises a snap microcontroller, GSM, and GPS modules. The system resembles a regular watch, which, when actuated, tracks the position of the woman using GPS (Global Positioning System) and sends exigency dispatches using GSM(Global System for Mobile Communication) to connections and the police control room.

Nagamma H [16] describes a security device for women. Our design resembles a smart band; it can cover women with colorful detectors integrated within the band. When she wears out the bar or a guard, if she faces any importunity or feels commodity happened to be jeopardized, she can press the actuator located on guard. When she falls, the colorful information like position, body posture, palpitation rate and SMS alert is transferred to the predefined number using the GSM through Raspberry Pi.

Seelam et al. [17] describe a safe and secured electronic system for women that comprise an Arduino regulator and detectors similar to temperature LM35, flex detector, MEMS accelerometer, palpitation rate detector, and sound detector. A buzzer, T.V., GSM and GPS are exercised in this design. When the woman is in trouble, the sensor crosses the threshold limit, the device gets actuated and traces the position of the fatality utilizing the GPS module. The fatality's function is transferred to the registered connection number using the GSM module.

Priyanka et al., [18] this paper proposes a new creative idea for protecting women from tragic situations. We use temperature sensors, accelerometer sensors, Microcontroller (ATMEGA8), GSM, WIFI shield, LCD, buzzer, and RS232 cable. When the victim presses the switch, the data like the temperature and movement of the victim from the temperature sensor and MEMS accelerometer sensors are given to the microcontroller (atmega8). The microcontroller checks the data to the threshold values predefined in the controller. If it reaches the threshold value, the buzzer will be alarmed. GPS tracks the victim's location and sends the victim's location to the nearby police station and the phone numbers of the victim's relatives through the alert message.

Viswanath et al., [19] have attempted to develop an intelligent device to assist women when they feel unsafe. This innovative device will be clipped to the user's footwear and can be triggered discreetly. On tapping one foot behind the other four times, an alert is sent via Bluetooth Low Energy to an application on the victim's phone, programmed to generate a message seeking help with the attached device's location.

Magidwar et al., [20] proposed this paper for women's safety. A gadget called a security jacket has been described in this paper. By giving the suspect an electric shock, this software aids in protecting women. By sending an alert message to a registered number with the location, this security system enables quick response in the event of harassment and helps to avoid evil occurrences.

Devi et al., [21] proposed an intelligent device that is used to assist women in danger is proposed in this paper, which uses various sensors, such as a pulse-rate sensor, force sensor, temperature sensor and MEMS sensor, to detect risk and to automate the emergency alert system. The abnormal signals from the sensors are processed to send the location of the woman in danger to the police and to the victim's dear and near ones, especially when the victim is in a situation where textual or oral interaction is impossible. An alert message is sent automatically from the device to the nearby police station and relatives of the victim.

Monisha et al., [22] "FEMME" is a security device designed for distressed and tortured women. It's simple and easy to use and carry with colourful functionalities. The Figure.s of smartphone druggies are turning into lesser Figure.s worldwide. A smartphone has numerous operations which are helpful to people, and our "FEMME" will be one of those. The device can be actuated by simply pressing the exigency button formerly. This device gets actuated and sends an instant position with a torture communication to the police pre-set Figure.s through a

GSM module. When the exigency button is double-clicked, the device sends both the torture communication with instant position and records the audio of the incident.

Kale et al., [23] this proposed device combines multiple devices and hardware components of a wearable "Smart band". That communicates continuously by accessing the Internet through a Smartphone. This system is already pre-programmed and includes essentials of human behavior, such as behavior and reactions to situations like anger, fear and anxiety. This system generates a signal which is transmitted to the smartphone. This software or application has access to GPS, which is pre-programmed so that whenever it receives an emergency signal, it can send help requests along with the location coordinates to the nearest Police station, relatives and the people in the immediate radius who have the application. This system enables assistance instantaneously from the Police and the Public in a tight radius.

B. **Existing Apps for Mobile:**

There are many mobile apps [24] for women safety. These are available for download and are installed in mobile phones which are used by many women now-a-days. Theses are used when the women are facing abuses. A few of the apps are discussed below.

The Kavalan [25] (meaning Police in Tamil) is an SOS app developed by the Tamil Nadu Police as part of the Tamil Nadu State Police Master Control Room initiative. The app is for the people of Tamil Nadu to seek police assistance instantly in emergencies such as physical emergencies, eve teasing, kidnapping or natural disasters such as floods, earthquakes, etc. During an emergency, please press the SOS button on the home page. It will start a 5-second countdown. After 5 seconds, the app will automatically send your location and a video from your back camera to the Kavalan team. Within a minute, the team will contact you. Simultaneously, your place will also be sent to your registered emergency contacts as an SMS alert.

Noon Light [26] is a unique app that lets you deal with potential and actual threats. It works in two ways – firstly, you can use it when you're unsure whether to call 911. Secondly, you can use it when you're in trouble and want help from authorities. Press and hold the button on your Android phone when you're uneasy and release it only when you feel real trouble. Press the button when you're in danger, and the local police will be notified of your location. You can also call or text to seek help. They used to have text message options, but suspending that feature has made users furious. Even though many have said that the app's audio and video recording-related features are working well, an equal number of people have also noted that the functionality is not working.

The bSafe [27] is a personal safety app that creates a 'social safety network' of individuals who get a notification in case of an emergency or in situations where the user feels unsafe. It has a safety alarm that sends the exact location and audio video of the surrounding areas to the contact previously selected by users. It sets a timer that will automatically warn friends if they don't return to turn it off or initiate a fake call into their phone if they want an interruption.

Safety Pin app [28] acts as a guide in choosing the safest route. While reaching a hazardous location, the app gives alerts, and one can invite family or friends to track the ride. The safety of an area is measured using various parameters like public transport, visibility, and security, among others, the company mentioned.

It is a wearable women's safety device with two buttons on the side that can be used to send a message or contact the guardian member. It also syncs with the user's cell phone to start audio recording. In case of a risky situation, the concerned member who receives the alert can immediately dial the emergency number 100 from within the app.

It captures [29] audio and video of the user's surroundings and sends an alert message to the registered contacts. The app claims it has high location accuracy, functions without GPRS, and has a Safety confirmation feature. On reaching the location safely, the user can inform their near ones by pressing the "I am Safe button". It is available on Google Play Store and iTunes.

C. **Drawbacks in Existing Systems**

The current system has no means of keeping track of crimes against women. There are, however, other places where CCTV cameras are set up and where recordings are kept. They are accustomed to responding after events have taken place. They must message friends and family on their cell phones in order to receive assistance. Most women find it challenging to access their phones at this critical time. Even then, it can be challenging to communicate urgently before violence occurs. It is also incredibly unreliable.

The drawbacks of current methods include

1. Not very trustworthy
2. Costly manual labor requirement

III. PROPOSED SOLUTION

The proposed women safety device provides assistance to a woman who might be in an unsafe situation. The device is essentially ready for all the situations that might go against the will of the woman. IoT module will track the current location of the victim and update in the webpage. In addition to location tracking, it also provides some safety and security to women like giving electric shock to the attacker. When the woman feels attacked or threatened, she can press a button on the device. The iot SOS call 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.

A. Architecture

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.
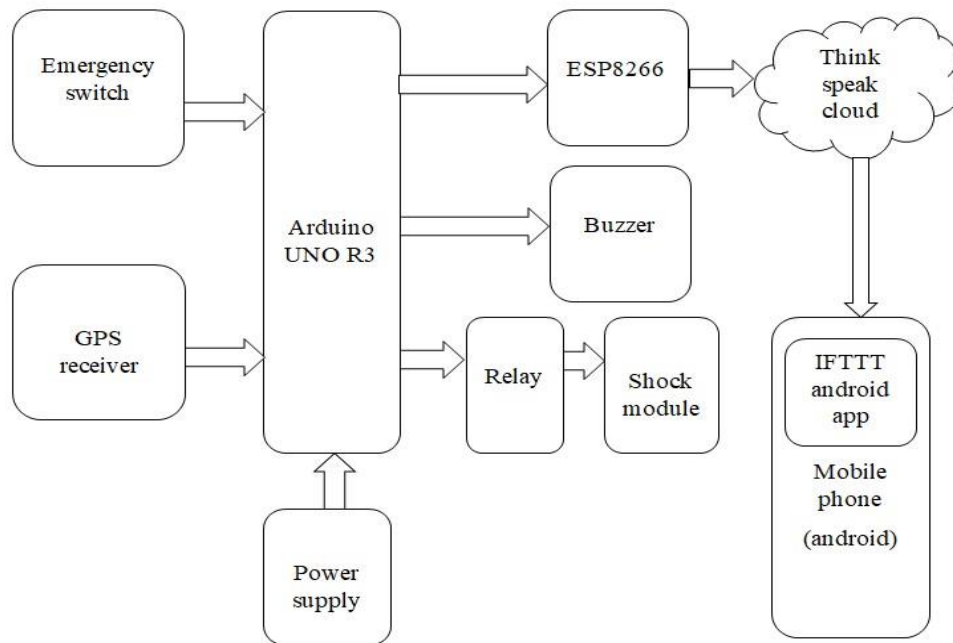

Figure. Architecture of Smart Wearable Device

B. Module and Component Description:

1. ARDUINO UNO R3

Figure. Arduino Uno R3

The Arduino Uno R3 is a detachable, dual-inline-package (DIP) ATmega328 AVR microcontroller-based circuit board. It contains six analogue inputs, a 16 MHz ceramic resonator, 14 digital input/output pins (six of which can be used as PWM outputs), a USB port, a power jack, an ICSP header, and a reset button. It has everything needed to support the microcontroller; plug in a USB cable, an AC-to-DC adapter, or a battery to get started. You can experiment with your UNO without being overly concerned that you will make a mistake; in the worst case, you can replace the chip for a few dollars and start over.

2. NEO 6M GPS Receiver

The NEO-6M GPS receiver module is a capable complete GPS receiver with an integrated 25 x 25 x 4mm ceramic antenna with powerful satellite search capability. The power and signal indicators let you monitor the module's condition. When the primary power source is unintentionally turned off, the module can still save the data because of the data backup battery. Its 3mm mounting holes may guarantee simple installation on your aircraft, enabling it to fly steadily in a fixed place, automatically return to home, and fly to waypoints, among other things. Or you could use it to program your smart robot car to automatically turn around or drive to a specific location, turning it into an accurate "smart" bot!
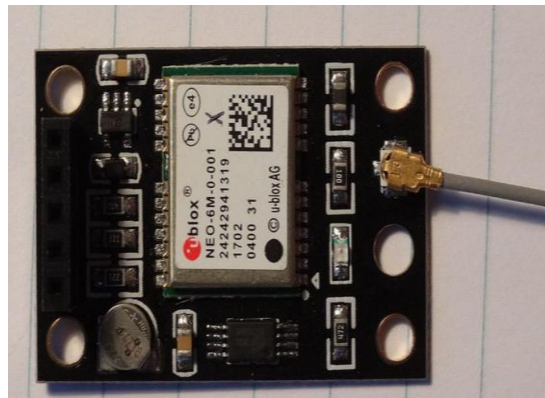

Figure. NEO-6M GPS RECEIVER

3. ESP8266 NODEMCU

The NodeMCU (Node Microcontroller Unit) is an open-source platform for developing hardware and software based on the ESP8266, a low-cost System on a Chip (SoC).
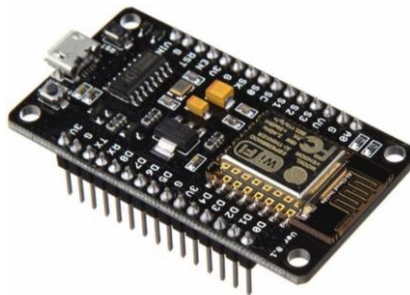

Figure. ESP8266 NODEMCU

The ESP8266, created and produced by Espressif Systems, includes all of the necessary components of a computer, including a CPU, RAM, networking (WiFi), and even a modern operating system and SDK. This incorporation makes it a fantastic option for all Internet of Things (IoT) projects.

4. Push Button

Figure. Push Button

A push button, often known as a button, is a straightforward switch mechanism to control a machine or a process. Usually constructed of metal or plastic, buttons are made of solid materials.

5. Buzzer

A buzzer or beeper is a mechanical, electromechanical, or piezoelectric (short for piezoelectric) auditory signaling device. Buzzers and beepers are frequently used in alarm clocks, timers, trains, and to indicate user input such as a mouse click or keyboard.

Figure. Buzzer

6. Shock Module

A shock module is an electronic component that can produce an electric shock or discharge when activated by an external trigger, such as a button or a switch. It typically consists of a high-voltage capacitor, a charging and firing circuits. The charging circuit charges the capacitor to a high voltage level when the trigger is activated. Then the discharge circuit rapidly releases the stored charge, producing a high-voltage shock. The intensity and duration of the shock can be controlled by adjusting the parameters of the charging and discharge circuits. Shock modules can be used in various applications, including self-defense devices, stun guns, and animal deterrents. However, their use can be controversial and regulated by laws and regulations, and it is essential to use them responsibly and with caution.

When triggered, a shock module circuit typically consists of several components that generate a high-voltage shock.
● High-voltage capacitor
● Charging circuit
● Discharge circuit
● Safety features

7. ARDUINO IDE

The Arduino Integrated Development Environment- or Arduino Software (IDE) contains a textbook editor for authoring law, a communication area, a textbook press, a toolbar with buttons for common or garden places and a series of menus. It connects to the Arduino tackle to upload programs and give with them. Allow to write and upload laws to Arduino boards, consisting of numerous libraries and a set of exemplifications of mini systems. Arduino software (IDE) is compatible with nonidentical operating systems (Windows, Linux, Mac OS X). The Arduino software is ready to exercise for newcomers or improved drugs. It was exercised to start with electronics programming and robotics and make interactive prototypes.

8. ThingSpeak Cloud Server

ThingSpeak is an IoT analytics platform indulgence that allows you to total, fantasies, and dissect live data courses in the box. You can shoot data to ThingSpeak from your bias, produce immediate live data visualization, and shoot cautions. Some of the vital capabilities of ThingSpeak bear the ability to
• Fluently conFigure. bias to shoot data to ThingSpeak by applying popular IoT protocols.
• Fantasise your detector data in real time.
• Exercise the administration of MATLAB to make sense of your IoT data.
• Run your IoT analytics automatically rested on schedules or events IFTTT

9. IF THIS, THEN THAT (IFTTT)

IFTTT is short for "If This Then That" and rhymes with "Gift. We exercised to be called' if this, also that' because Applets would have one detector and one action. If this happens — also that happens. For illustration," When you come home, also turn on your Hue radiances." You can turn on formerly live Applets or make a commodity ritual.

IFTTT helps connect nonidentical apps and biases, which allows you to do further with over 700 nonidentical apps and services, involving Twitter, Dropbox, Evernote, Fitbit, Amazon Alexa, and Google Assistant. On IFTTT, we call these services. Know the complete list of all IFTTT-enabled services here. We

connect services to Applets, robotization that has you to do affects your apps, and bias cannot do on its own. For illustration, you could exercise IFTTT to sync Amazon Alexa to-dos with your Google timetable.

C. The Circuit Diagram:

The pin diagram consists of the following components such as Arduino, GPS receiver, NODEMCU, shock module and power supply represented in
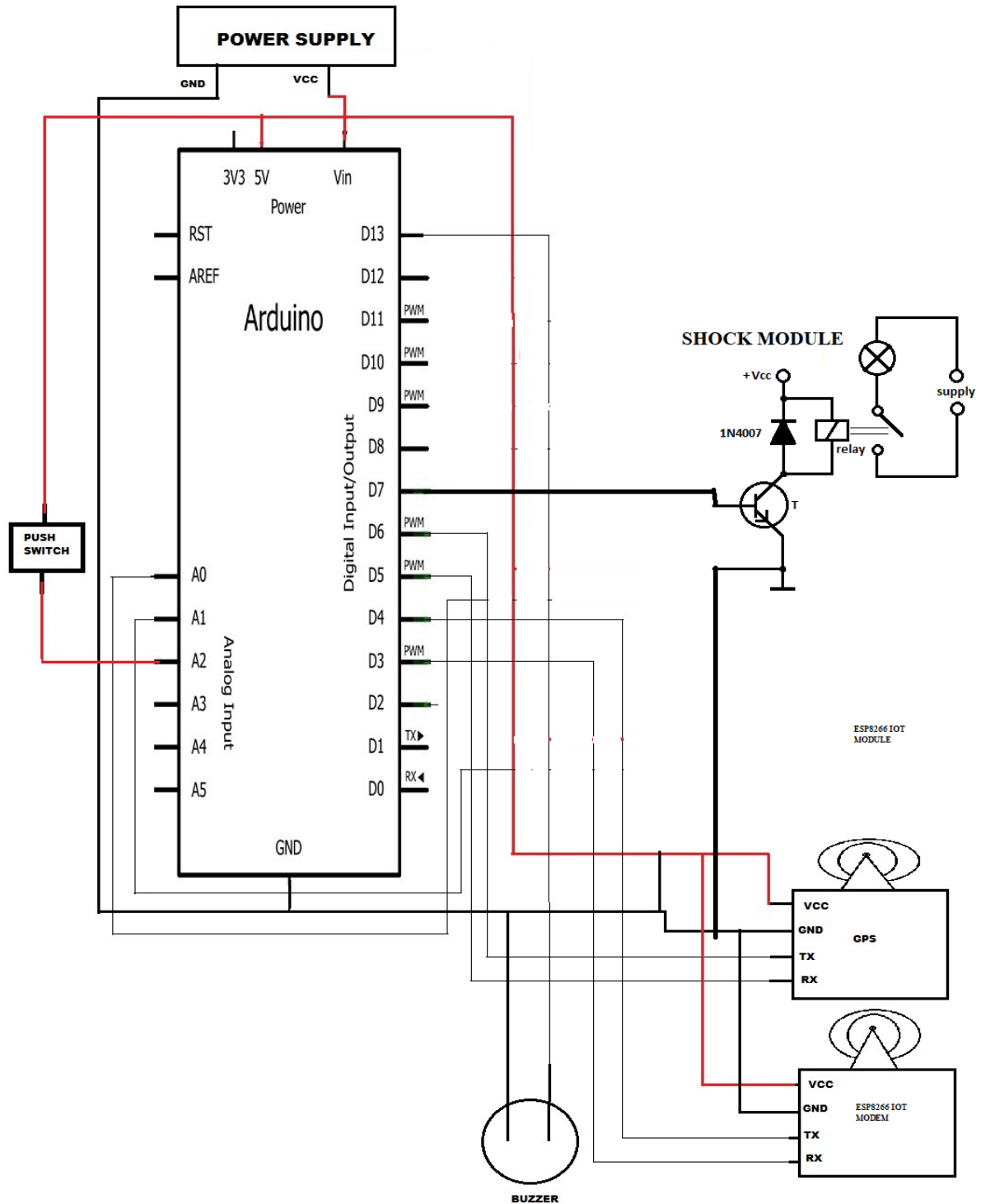

Fig. Circuit Diagram – Smart Wearable Device

IV.RESULT

This diagram depicts the output of call generation when the emergency button is hit. It generates an automated call to the pre-registered or defined contact with the pre-written emergency message.

Figure. Receiving call in IFTTT module

The output of the Arduino ESP8266-based women's safety device with a shock module would typically include visual and audible alerts and a VoIP call sent to a predefined phone number. Here's a brief description of the output:

1. Visual alerts: The device may include one or more LEDs that light up when the shock module is triggered. It indicates to the user and those around her that she is in danger and that the device has been activated.

2. Audible alerts: The device may include a buzzer or speaker that emits a loud sound when the shock module is triggered. It indicates to the user and those around her that she is in danger and that the device has been activated.

3. Shock output: When triggered, the shock module will produce a high-voltage shock, which can deter an attacker or incapacitate them momentarily.

4. SOS Call alert: The device can be programmed to send an SOS Call to a phone number when the shock module is triggered. This call alert can notify emergency contacts, law enforcement, or other relevant authorities that the user is in danger and needs help. Overall, the device's output is intended to provide multiple layers of protection to the user and help her escape a dangerous situation as quickly and safely as possible.
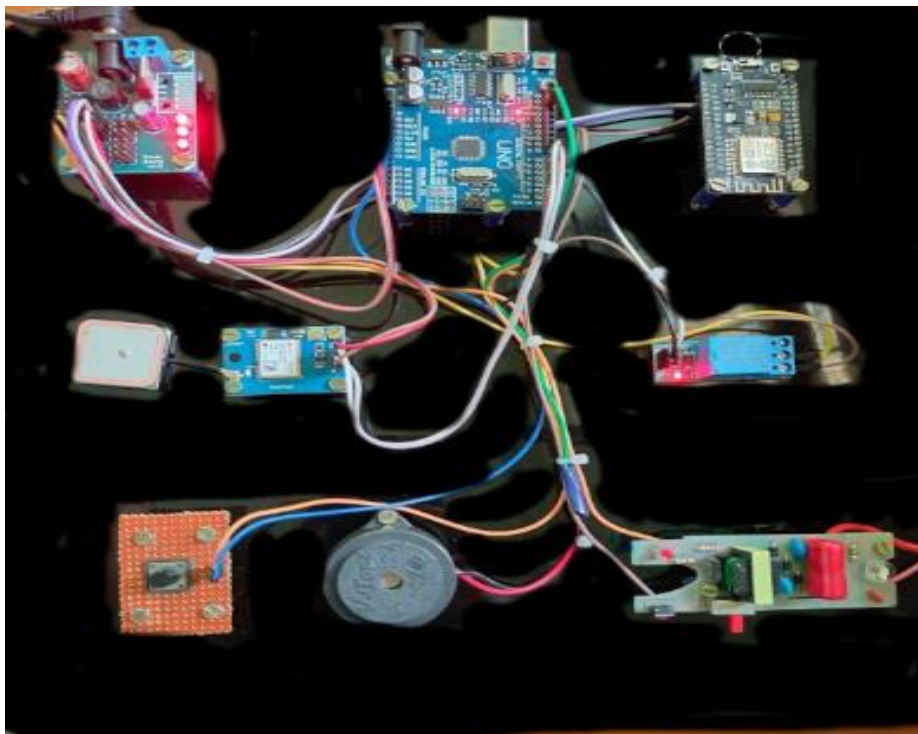

Figure. Smart Wearable Gadget - circuit diagram

V. FUTURE SCOPE

This project proposed a system for the security of women with the help of the smart gadget. When the button is pressed, the sensors collect information about the user, and then the data will send to the predefined number along with a calling and alert message. There are the highest chances to reduce crime through this system. Shock prevention tools are used to anticipate the event, and the alarm tone used for notification will support methods for alerting hostility.

In the future, this device could be incorporated into a smartwatch. The integration of this device could potentially enhance the capabilities of the smartwatch by providing additional functionality that was previously unavailable. This could include features such as advanced biometric monitoring.

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