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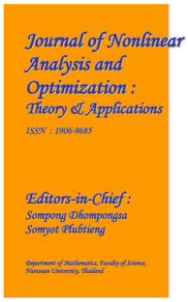

ENHANCING WOMEN'S SAFETY WITH RASPBERRY PI PICO

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ABSTRACT
Women's safety has become a serious concern in today's society since they are afraid to leave their homes at any moment for fear of physical abuse and violence. With the use of a women's safety device, they may now be stopped. The components of this safety gadget are an emergency button switch and a RASPBERRY PICO controller. This gadget uses a GSM module to recognize emergency situations and sends the position of the woman to emergency contacts. This safety gadget has two sensors: a DHT11 sensor that will sound a buzzer alarm if the temperature rises, and a heartbeat sensor that will send the user an SMS with their position anytime the pulse increases. A push button allows the ladies to be alerted of an attacker and request assistance, giving them an opportunity to flee. GPS receivers get position data in the form of latitude and longitude from satellites. An SMS is sent to the pre-specified mobile number using the GSM modem. A woman may activate the switch that is carried by her when she feels threatened. The complete system will turn on when the switch is pressed. The recipient will then get the SMS right away, along with a location-tracking GSM and GPS link that can be found on Google Maps.

I. INTRODUCTION

1.1 INTRODUCTION:

The main purpose of this device is to act as an emergency device for women who are in potential danger of being attacked. The Women possessing this device will press the panic button if in danger. An SMS containing the latitude and longitude coordinates will be sent to mobile numbers informing them about the danger and the location. The received coordinates can be viewed on Google maps to determine the location of the women and appropriate help can be provided .For sending the message to relevant controlling authority, GSM technology can be used . This concept was devised for the rouse of serious crime against women in India and to help curb those crimes. Women's safety in India has become a concerning issue, crimes against women growing at an appropriate rate . Crimes like kidnapping, sexual harassment towards women and young girls have been increasing day by day. The cases of crime against women have been registered of the total 4.05 lakhs by National Crime Records Bureau (NCRB) during 2019 . Violence against women is a serious problem in India. Overall, one-third of women age 15-49 have experienced physical violence and about 1 in 10 has experienced sexual violence. During the first four faces of the COVID-19 related lockdown, Indian women filed more domestic violence complaints than recorded in a similar period in the last 10 years. In our project we use three ways of connecting to the concerned authorities.

- In first when women in danger she can press a button then the SMS will send to the concerned contact number with the current location.
- In second the existing device is redone to become familiar with the individual example of temperature, Heart Rate of the human body then find out the threshold. When these both are in the above threshold value then it automatically sends a message to concerned authorities.

- In the third condition when women are in danger and she is unable to press the button in that situation we use sound module (for example the women is used to say HELP) then the message will send to the concerned number with location which is one of the major advantages of this project.

1.2 BLOCK DIAGRAM:

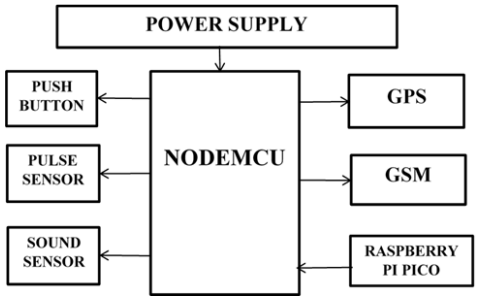

Figure 1. Block Diagram

1.2.1 FUNCTIONS OF COMPONENTS:

RASPBERRY PI PICO:

Raspberry Pi Pico was released in January 2021 with a retail price of $4. It was Raspberry Pi's first board based upon a single micro controller chip; the RP2040, which was designed by Raspberry Pi in the UK. The Pico has 264 KB of RAM and 2 MB of flash memory. It is programmable in C, C++, Assembly, Micro Python, Circuit Python and Rust. The Raspberry Pi Foundation has partnered with Ada fruit, Pimoroni, Arduino and Spark Fun to build accessories for Raspberry Pi Pico and variety of other boards using RP2040 Silicon Platform. Rather than perform the role of general purpose computer (like the others in the range) it is designed for physical computing, similar in concept to an Arduino.On 30 June 2022, the Raspberry Pi Pico W was launched, a version of the Pico with 802.11n Wi-Fi capability, for US$6. The CYW43439 wireless chip in the Pico W also supports Bluetooth, but the capability was not enabled at launch.

NODEMCU(ESP8266):

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. NodeMCU can be powered using a Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

GPS MODULE:

The global positioning system (GPS) is a network of satellites and receiving devices used to determine the location of something on Earth. Some GPS receivers are so accurate they can establish their location within one centimeter (0.4 inches). GPS receivers provide location in latitude, longitude, and altitude. They also provide the accurate time. GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from each visible satellites, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.

GSM MODULE:

A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM modems are used in mobile telephones and other equipment that communicates with mobile telephone networks. They use SIM's to identify their device to the network.

PULSE SENSOR:

A plug-and-play sensor that is used to detect the heart rate data is known as a pulse sensor. This sensor is used by athletes, students, mobile & game developers, etc. This sensor clips on an earlobe or a fingertip by connecting right to an Arduino board through jumper cables. In real-time, the pulse rate can be monitored through an open-source monitoring app. Here, a pulse signal is a variation within the blood level that happens when the heart forces the blood & a detector monitors the change in the blood volume.

SOUND SENSOR:

The sound sensor is one type of module used to notice the sound. Generally, this module is used to detect the intensity of sound. The applications of this module mainly include switch, security, as well as monitoring. The accuracy of this sensor can be changed for the ease of usage. This sensor employs a microphone to provide input to buffer, peak detector and an amplifier. This sensor notices a sound, & processes an o/p voltage signal to a micro controller. After that, it executes required processing.This sensor

is capable to determine noise levels within DB's or decibels at 3 kHz 6 kHz frequencies approximately wherever the human ear is sensitive. In smartphones, there is an android application namely decibel meter used to measure the sound level.

PUSH BUTTON:

Push buttons can be explained as simple power controlling switches of a machine or appliance. These are generally metal or thermoplastic switches that are intended to grant easy access to the user. Push buttons are switches that are either concealed inside machinery or plugged in. In layman's terms, they can be seen and used. The design of the push button is such that it can accommodate a human finger to control the system easily

JUMPER WIRES:

Jumper wires are electrical wires with connector pins at each end. They are used to connect two points in a circuit without soldering. You can use jumper wires to modify a circuit or diagnose problems in a circuit. Further, they are best used to bypass a part of the circuit that does not contain a resistor and is suspected to be bad. This includes a stretch of wire or a switch. Suppose all the fuses are good and the component is not receiving power; find the circuit switch. Then, bypass the switch with the jumper wire. How much current (I) and voltage (V) can jumper wires handle? I and V rating will depend on the copper or aluminium content present in the wire. For an Arduino application is no more than 2A and 250V. We also recommend using solid-core wire, ideally 22 American Wire Gauge (AWG)

II. LITERATURE SURVEY

This device is which designed can be activated as per the requirement of the individual which will locate the victim using GPS and with the help of GSM emergency messages can be sent to the respective locations as per the design.[1]

This suggests a new perspective to use technology to protect women. The system gets activated, tracks the location of the victim using GPS (Global Positioning System) and sends emergency messages using GSM (Global System for Mobile communication), to the three emergency contacts and the police control room.[2]

In this literature the focus is on creating a safety system that brings about a solution that ensures both defence and creation of a seamless pathway to initiating legal procedures, if any; have to be taken by the victim. The Proposed module will provide a complete security solution and become a utility that softens the restlessness among women and their family members. It has 3 ways for which are though sound pulse and by pressing push button. The objective of this literary work is to create a safety system in the form of a portable safety device for women that gives alerts to family and police and gives location coordinates of the woman being attacked.[3]

2.1 PROGRAM FLOW CHART:

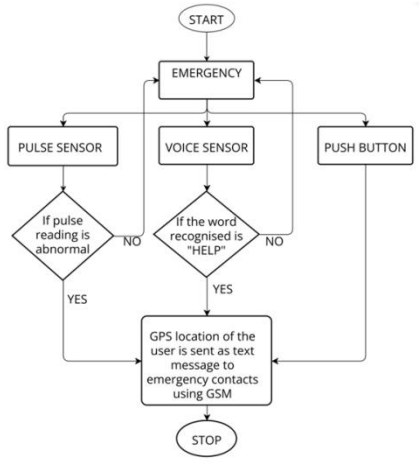

Figure 2: Program Flow Chart

III. PROJECT WORKING AND RESULT

3.1 CIRCUIT DIAGRAM:

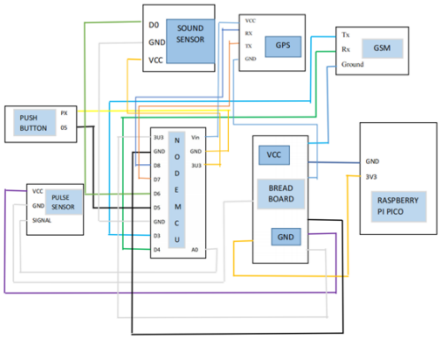

Figure 3 :Circuit Diagram

PROCEDURE:

1. Connected all the components as shown in above Circuit diagram.
2. Required code is dumped into the Raspberry Pi Pico board with a cable wire which is connected to Laptop.
3. Then after selecting the port we have to run the code.
4. Then we should check whether we are getting output by means of sound sensor, pulse sensor and push button.
5. Messages and Location will be sent to the given mobile number.

3.2 RESULT:

3.2.1 PROJECT MODULE:

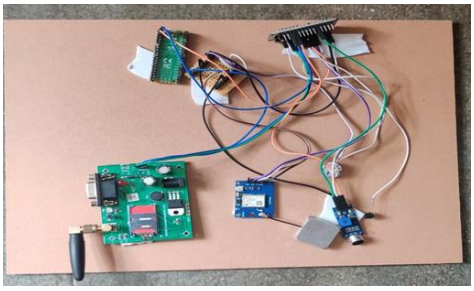

Figure 4 :Project Kit Without Power Supply

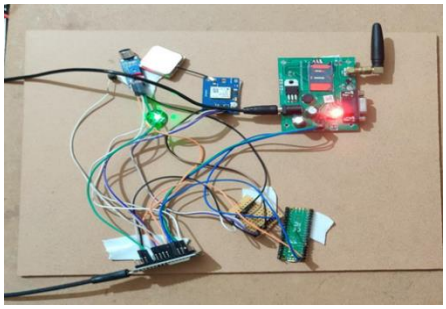

Figure 5 :With Power Supply

3.2.2 WORKING:

- The proposed module "WOMEN SAFETY SECURITY SYSTEM USING RASPBERRY PI PICO" consists of Raspberry Pi Pico, pulse & sound sensors, push button, GPS,GSM and NodeMCU.
- Whenever power supply is provided the sensors continuously monitor.
- We are using 3 possible conditions to help women when she is danger.So if she press the push button or whenever sensors sense any change it sends the alert message and location to the given phone numbers by using GPS &GSM.

3.3 OUTPUT PANEL:

This section represents the performance of the project model with the use of hardware raspberry pi pico and to obtain results we are using python as the programming language Below figures are SMS alert and current location of the victim which is forwarded to concerned authorities. In our project we are using three ways for helping women first as automatically when temperature and heart rate exceeds above the threshold and second by pressing a button and also through voice. In all conditions, it sends alert and location to given numbers.

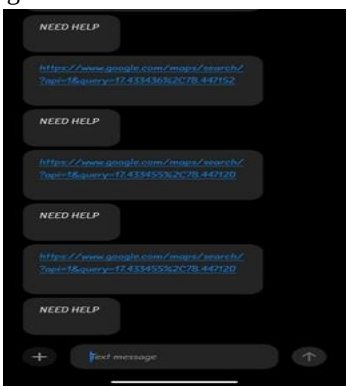

Figure 6 :SMS Alert

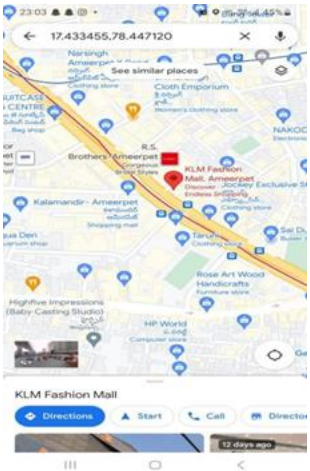

Figure 7 :The location of the victim

3.3 ADVANTAGES:

- The function of this emergency push button gives you timely information to avoid any danger or harm.

- Keeps others alert by sending instant messages.
- Exact location of victim can be tracked easily.

3.4 DISADVANTAGES:

- The equipment should be carried all the time.
- If there is no power supply kit doesn't work.

3.5 APPLICATIONS:

- Used for Security appliances.
- Used for Safety of women in any kind of difficulty situation .
- Used as a legal evidence of crime with exact information and location.

IV. FUTURE SCOPE AND CONCLUSION

4.1 CONCLUSION:

The demo unit is constructed and the suggested "WOMEN SAFETY SECURITY SYSTEM USING RASPBERRY PI PICO" is successfully tested.The module's goal is to provide ladies total protection in risky situations. This method addresses important issues that women encounter and provides solutions for them. This technology has the advantage of offering security in addition to safety via its self-defense system. Reduced crime against women when worth is evaluated in life is the system's ultimate aim.

4.2 FUTURE SCOPE:

The Raspberry Pi Pico is just used in this project to receive the position and alert message as output. An external camera must be installed since the Raspberry Pi Pico lacks an integrated camera module, however Pico Pins do not allow external cameras. Because the Raspberry Pi includes an integrated camera feature, photos may be taken and shown using later versions of the device. By hitting the push button three times, a safe message may be sent to registered cellphone numbers and a mild shock protective mechanism can be implemented.

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