Emergency Security Device for Women Using GSM and Arduino with GPS Tracking

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Abstract
Women's safety is more important and must be the prime concern of all. It has always been an issue even in these modern times with so much advancement in technology. Women are not safe anywhere when travelling alone into lonely roads and deserted places. Now these can be brought to an end with the help of a women safety device. This safety device consists of ESP32S and ESP32C3 micro controllers which belongs to the Arduino family, emergency button switch. On sensing the emergency situation this device provides the current location of women and sends it to predefined mobile numbers through GSM MODULE. This safety device also includes a Heartrate and Temperature sensors. GPS receiver gets location INFORMATION from satellite in the form of latitude and longitude. The GSM modem sends an SMS to the pre-defined mobile number. When a woman is in danger, she can press the switch. By pressing the switch, the entire system will be activated. Then immediately the SMS will be sent to the predefined mobile numbers with location using GSM and GPS which can be traced from the goggle maps.

I. INTRODUCTION

In today's world, Women safety has become a matter of prime concern as the crime against women are taking a heavy toll. The present concept and main objective of our project is to build a safety device which will save the life of a women by recognizing the location when she is in unsafe situation and send a message to the predefined mobile numbers in the form of latitude and longitude. By this process, location tracking becomes easy. So, to properly combat this, we are developing an approach in which women can self-manage any uncertain event.

Security is the condition of being protected against danger or loss. In the general sense, security is a concept similar to safety. The nuance between the two is an added emphasis on being protected from dangers that originate from outside. Individuals or actions that encroach upon the condition of protection are responsible for the breach of security. The word "security" in general usage is synonymous with "safety," but as a technical term "security" means that something not only is secure but that it has been secured.

For a well-groomed 21st century, self-protection became a priority which can be achieved with the help of user-friendly safety device provided with GPS tracking and alert.

II. METHODOLOGY

A new design of an GSM based safety device that relies on providing security to women by just triggering the switch-based method of connectivity to the device and alerting with an SMS using ARDUINO (ESP32S). Additional features will be added to this which includes Temperature and Heart rate sensors. The alert will be sent to the predefined mobile numbers provided by the person.

2.1 Proposed System

The Proposed System is going to overcome the drawback of existing systems and implement a new design of an GSM based safety device that relies on providing security to women by just triggering the switch-based method of connectivity to the device and alerting with an SMS using ESP32S which belongs to the Arduino family. Additional features will be added to this which includes Temperature and Heart rate sensors. The alert will be sent to the predefined mobile numbers provided by the person.
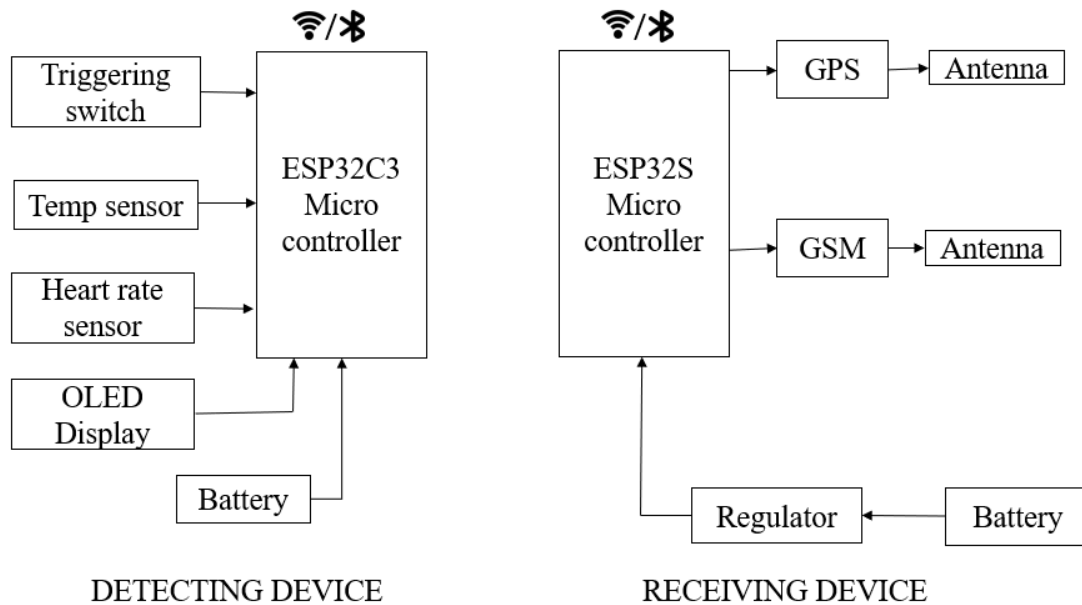

2.2 Block Diagram

Fig: 1 Block Diagram of Proposed System

The block diagram represents the components used in our project. The battery is used for the power supply and regulator to regulate the voltage during power variations. The triggering switch is used by the women when she feels there is a threat to her. The heart rate and temperature sensors are used to monitor the heart beat and temperature of the women. GPS module is used to identify the location of the women in the form of latitude and longitude. GSM modem is used to send the message to the predefined mobile numbers.

2.3 Flowchart
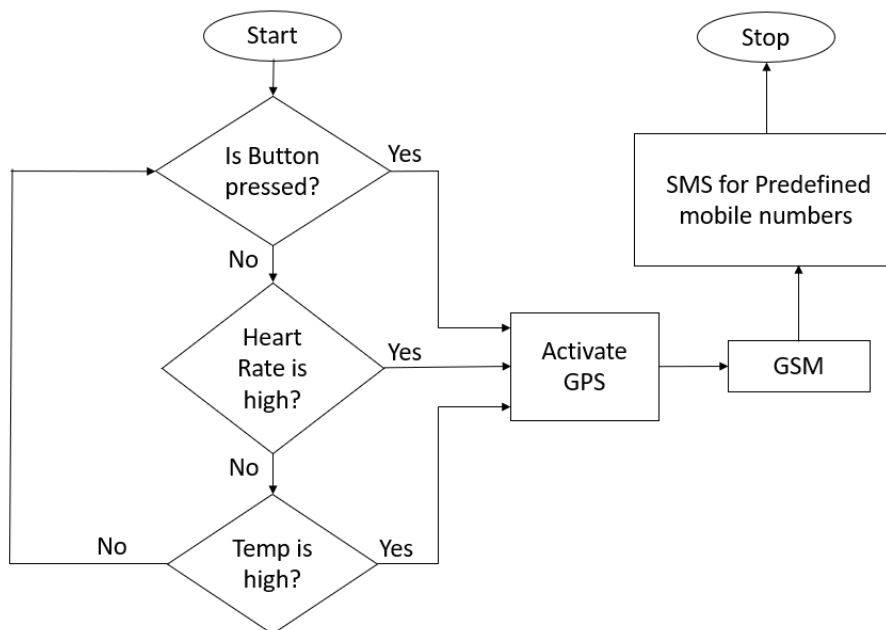
III. HARDWARE DESCRIPTION

a.   ESP32S Microcontroller

ESP32S is a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth. The ESP32S Board belongs to a ARDUINO Family which processes the information and this processed information is sent to the user using GSM module.

Fig: 2 ESP32S Microcontroller

b.   ESP32C3 Microcontroller

ESP32-C3 carries a complete Wi-Fi system along with Bluetooth Low Energy function. Outstanding RF performance, Powerful ESP32-C3 SoC and antenna provided that supports Wi-Fi/Bluetooth connection over 100m.

Fig: 3 ESP32C3 Microcontroller

c.   GPS Module

The Global Positioning System (GPS) is a satellite-based navigation system that provides location and time information. The heart of the module is a NEO-6M GPS chip from U-blox which is shown in the picture below.

Fig: 4 GPS Module

d.   GSM Module

A Customized Global System for Mobile Communication (GSM) module is designed for wireless radiation monitoring through Short Messaging Service (SMS). SIM800L GSM is a GSM modem which is used to send the message to the predefined mobile numbers.

Fig: 5 GSM Module

e.   Temperature Sensor

LM35 is the most popular temperature module for Arduino due to its many advantages. It has excellent long-term stability and relatively high measurement accuracy can be obtained at a very low cost.

Fig: 6 Temperature Sensor

f.   Heartrate Sensor

The Pulse sensor can be used by anyone who want to easily incorporate live heart-rate data. It is suitable for all projects that require heart rate data. The MAX30100 is a low-cost, integrated pulse oximetry and heart-rate sensor module. It is designed to detect the heart rate and blood oxygen saturation levels of a person using a photoplethysmography (PPG) technique. The PPG sensor emits light into the skin and detects the changes in the light that are caused by the pulsing blood flow. The MAX30100 sensor measures the amount of reflected or transmitted light, which is then processed to determine the heart rate and oxygen saturation level.

Fig: 7 Heartrate Sensor

g.   Push Button Switch

A Push button switch is a mechanical device used to control an electrical circuit in which the operator manually presses button to actuate an internal switching mechanism.

Fig: 8 Push Button Switch

h.   OLED Display

OLEDs are used to create digital displays in the devices. The heart rate and temperature are displayed on this OLED display. OLED displays are made up of organic materials that are deposited onto a substrate using a process called vapor deposition. These organic materials can emit light when an electric current is applied, allowing for the creation of individual pixels that can produce their own light.

Fig: 9 OLED Display

i.   Battery

A 3.7V battery typically refers to a lithium-ion battery with a nominal voltage of 3.7 volts. These batteries are commonly used in a wide range of electronic devices, including smartphones, tablets, laptops, cameras, and portable power banks.

Fig: 10 Battery

j.   Regulator

It regulates voltage during power fluctuations and variations in loads. It can regulate AC as well as DC voltages. A voltage regulator usually takes in higher input voltage and emits a lower, more stable output voltage.
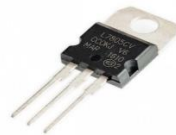

Fig: 11 Regulator

IV.   SOFTWARE REQUIREMENT

a.   Arduino IDE

The proposed device is basically a controller-based emergency kit which works when preprogramed instructions guide a path accordingly. Since for management as well as controlling the application a "c language" code has been introduced to controller using Arduino IDE (integrated development environment)

V.   RESULTS

To determine the location of the women when she is in unsafe situation by using this Emergency Security Device. We obtained the results as expected since the system was built as expected according to plan. After the Push button switch is pressed, the entire system will be activated. Then immediately the SMS will be sent to the predefined mobile numbers with location in the form of latitude and longitude. The SMS is sent when the Heartrate and Temperature are not in normal condition and it is tested.
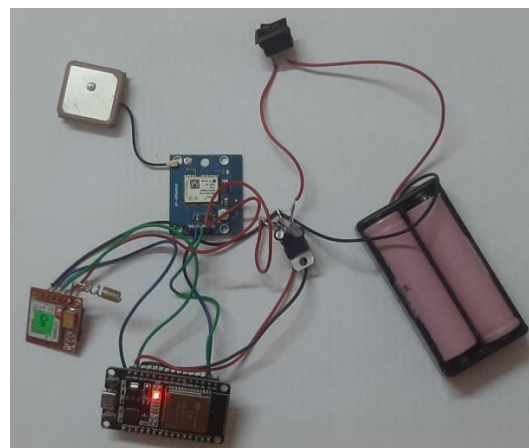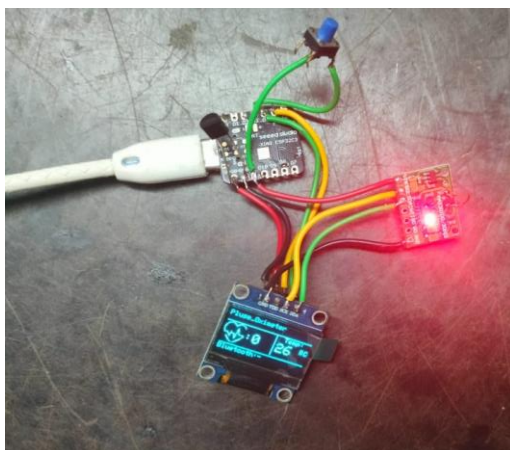
VI.   CONCLUSION

The idea provided here being first of its kind plays a crucial role for ensuring the Safety of Women that is automatically the fastest way possible. The proposed design will address significant challenges that women have experienced in the recent past and will assist in their resolution through technologically sound devices. With more research and invention, this concept could be utilized in a variety of security domains.

Women tracking is done by using GPS and Arduino through GSM module to send an SMS to the predefined mobile numbers in our system by just triggering the switch. Additional features in our system like temperature and heart rate sensors. When the temperature and heart rate are not in normal condition then this system helps by sending an SMS through GSM module to the predefined mobile numbers.

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