Alternative approach to women safety using IoT

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ABSTRACT

The raising questions on the security of women and children in our country is an obstacle that we need to overcome towards a safer India for its citizens. In such scenarios, women and children feel very helpless. In reference to the unfortunate set of events which opened the eyes of the nation towards the lack an immediate need for the safety of women in the country, there have been multiple efforts to implement different techniques to protect and thereby, assist the victims in such situations. Hence, there must be a system which can protect them with the least amount of complexity and involvement of the individual. The following project aims at improving the existing system by implementing automatic responses instead of the conventional manual method as, in such situations, the victim hardly has any time to provide a manual pre-designed operation. The device requires the following elements; Arduino UNO, GSM, Heart Beat Sensor, Temperature and Humidity sensor along with IOT. In critical situations, the victims have an increased heart rate along with an abrupt increase in body temperature and humidity (body sweat). Hence, the sensors can be used to monitor the following factors until it breaches a predefined value. Upon breaking the set limits, the GSM module will send a pre-defined message to the police and/or family member along with the GPS location which can be coupled with third-party apps like Google Maps. However, for improved functionality, the criteria for emergency contact can be a complex combination of body temperature, humidity and heartbeat of the user. Such method is very helpful for women and children as the device does not require manual operation.

Keywords— *Security, IoT, GPS, GSM, Heartbeat, Temperature, Humidity*

1. INTRODUCTION

In recent times, women don't feel safe while going out at late hours because of the increasing complaints and incidents of abuse, harassment or eve-teasing. The working class women, or considering any profession which requires women to invest late night work hours, face problems as they feel unsafe, both in the work environment as well as of the work environment.

The prototype developed is a system to provide aid in times of emergency. The device can either be developed as an individual device to be used as a watch or can be integrated within current smart watches. The aim for the device is to keep it mobile and in-touch with the user at all times with more features and functions. Considering its implementations in current systems, only a button/manual response mechanism can be provided, in case the user wishes to cancel the emergency message. The primary function of the tech is to provide the family and the police with the live location feature to track the user. The live location of the victim can be implemented with the help of a GPS system and the GSM module has the function of sending the alert text to the predefined contacts saved on it. Thus, by overcoming the drawback of the existing systems, the new proposed system is developed in this paper.

2. DESIGN CONCEPT

The aim of the current prototype was to develop a device that uses manual response only as a measure to stop the service instead of relying on the manual operation as input. Thus, it can be combined with the optional push to enable the option. The Arduino Board will monitor the values for a breach of values and initiate a self-protocol which can then be cancelled by manual input. The architecture of the proposed system can be defined as:

- GSM Module: The function of the GSM Module is to send the alert text when the sensor values breach a certain amount. This is regulated by the Arduino board which keeps a check on the values and upon crossing it, it sends a message to the module to initiate the process. Thus, the module sends an alert text to all the emergency contacts.
- The message includes the coordinates of the user so that the respected authorities can take steps to avoid the situation. This can be opened in third-party apps like Google Maps. Alternatively, it can also be used to provide live tracking.
- Since no manual operation is required, this system is more effective and also, faster.
- The device is a GSM-based-model which overcomes the problem of loss of internet connectivity, hence, providing an alternative, faster response.

3. FUTURE SCOPE AND IMPLEMENTATION

The aim of this project was to develop a prototype for a device which can be easily integrated into the existing technologies. As the current smart watches like the Apple Watch, FitBit, etc already include the sensors used in our project, with comparatively fewer changes, it can be used as an added feature for the safety of the user. However, this project also has the possibility of being a standalone device.

4. CONSTRUCTION

4.1 Overview

The prototype of the device, we have included an Arduino UNO Board which is responsible for processing the information from the multiple sensors. The other sensors so included are a temperature sensor, humidity sensor, and heartbeat sensor. The parameters of all these sensors have a set limit. As soon as the values breach the set limit, the Arduino UNO signals the GSM to send a message to the predefined emergency contacts with the location coordinates using GPS.
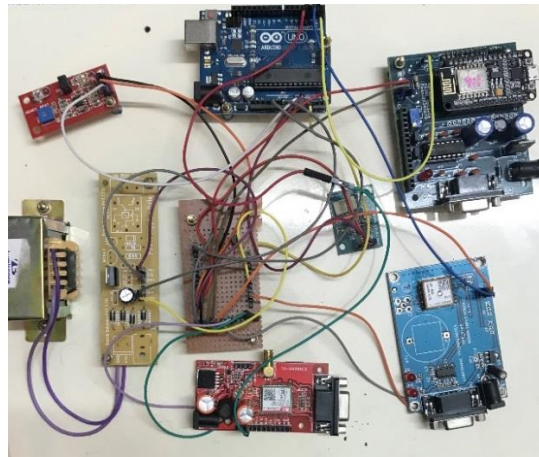

Fig. 1: Prototype

4.1.1 Arduino UNO: Pin Connections:
    Pin 1: IoT Module
    Pin 2: GPS Module
    Pin 3: GSM Module
    Pin A0, A1 (Analog Input): Heartbeat sensor, Temperature and Humidity sensor
Two added connections for **5V** supply and **GND**

4.1.2 HR202 Humidity Sensor: The HR202 sensor has an operating zone of 3.3V-5V. It consists of 4 line panel interface namely for:
    (a) Voltage Supply (3.3V-5V)
    (b) GND
    (c) Output Interface (Digital)
    (d) Output Interface (Analog)

4.1.3 M590E is a wireless industrial module with a single chip GPRS which can send SMS, provide data services, etc.

4.1.4 Heartbeat sensor: The Heartbeat sensor has an operational frequency of 50-60 Hz with a voltage requirement of 12 V. It uses bright infrared (IR) LED and a phototransistor to detect the heartbeat.

4.1.5 GPS Internal Antenna: IT provides location and time information in all types of weather conditions. It operates without the need for any telephonic connection or internet requirement and thus, is best suited for our purpose in this device.

4.1.6 Step-Down Transformer and Power Relay: These are used to convert the normal voltage supply to 12V supply and then redistribute it into 5V and 12V for the different sensors.

4.1.7 IoT Module: The IoT module saves all the data which can be accessed at iotclouddata.com. This data can be very useful for the safety of women.

5. TESTING

Fig. 2: Implementation code
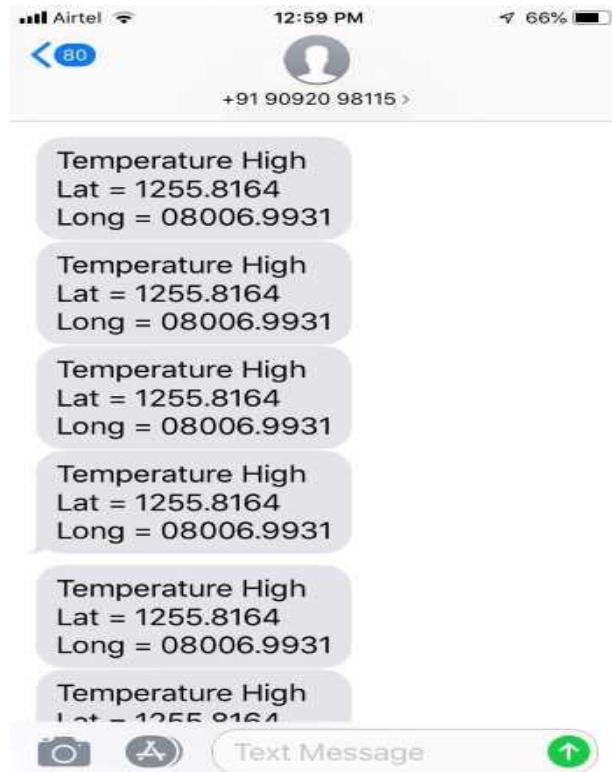

Fig. 3: Simulation in serial monitor

Fig. 5: Text Message with details

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