Arduino Based Women Security System Using GPS and GSM Modem

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Abstract: Women security has emerged together of the essential requirements in our country. In today's world of advanced technology and smart electronics it's required to possess an easy and cost-effective safety gadget that helps the victims during unexpected dangers. But the planet Health Organization estimates that about 1 in 3 (35%) of girls worldwide have experienced either physical and/or sexual violence in their lifetime. during this paper "WOMEN SAFETY AND SECURITY SYSTEM USING GSM AND GPS" is defined to guard the ladies by oneself. This paper proposes a thought of alerting people to rescue her along side the SMS. When someone approaches to harass, she will just press the button and therefore the location information is shipped as an SMS aware of few predefined numbers in terms of latitude and longitude. then it plays a prerecorded voice which generates "HELP HELP" during a voice. the aim of this paper is to form the lady feel safe. This paper gives descriptive details about the planning and implementation of prototype for an electronic gadget which has the potential to function a security wear. With all the developing technology available to us , it is easy to create a security device for ladies which can not only send a message to your friends, family, or concerned person but also playing a voice file with "HELP". For this, here we are using an Arduino Mega which may be interfaced with GSM and GPS module for sending SMS alerts and getting the situation coordinates. And DF3 Mini player for enjoying pre recorded MP3 file.

KEYWORDS - Emergency Button, Arduino Mega, GPS Tracker Module and GSM Module, DF3 mini player, Etc.

INTRODUCTION

When women are travelling or doing any outdoor activities and if unfortunately they are going through these problems and to avoid these crimes to be faced we developed this prototype which can reduce the danger level. Women safety has become an important issue in our country as women can't exit of their house at their will, especially during night thanks to fear of violence against them or being physically or sexually abused. to scale back and overcome of these problems we developed this prototype. This prototype allows them to click a button once they are in trouble. After clicking the button the system automatically grabs the situation coordinates of the ladies , these location co-ordinates are been grabbed by the GPS module. This GPS module collects the Latitude and Longitude co-ordinates and send these to the Arduino mega controller. These location coordinates are now been send to the family ones i.e the predefined numbers we would like to send the message. the situation coordinates are embedded in google maps which can send a embedded google maps link to the predefined number. With the assistance of the embedded google maps link with the present location co-ordinates of the ladies , the recipient person will directly navigated to the precise location coordinates through google maps. And also this technique generates a pre recorded voice that's played with "HELP" voice. With the assistance of the voice speaker we generate this sound. By generating a sound like this might lead someone to assist who are almost the ladies ,by hearing the help voice played by the module.

LITERATURE REVIEW

Previously, there are many works wiped out order to make sure women's safety by proposing various IoT and Application-based devices. The function of the opposite proposed device is to send SMS and therefore the victim's current area to the closest police station . This device isn't useful for urban women. And also another proposed system grabs the GPS location co-ordinates of the ladies with the assistance of GPS module and that they use RF transmitter module to transmit the situation co-ordinates to the near police headquarters as they set the RF receiver unit in police stations. This doesn't add real time because the RF has short communication distance or the frequencies are

often easily tapped. So we use GSM technology for sending the situation co-ordinates. And also we play the voice that which is prerecorded it'll help to spot and save the ladies . As compared to other prototypes they use buzzer module it can't be identified easily by the people round her . So we opted to use the voice speaker, in order that it are often identified by nearby people.

I. EXISTING IDEA
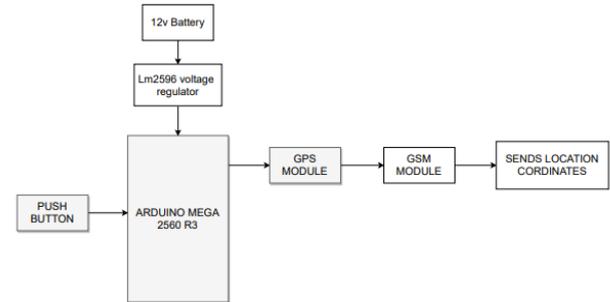
In the above mentioned projects, when a lady is in peril or when she senses any threat, she presses the button which acts because the input to the arduino microcontroller. Upon pressing the push , the GPS connected to the microcontroller takes the latitude and longitude coordinates of the victim's location. The GPS then sends the situation details with the assistance of the GSM module to the telephone number fed in it. during this way, she will be saved by indicating the police or the loved one about her whereabouts through an SMS.

PROPOSED IDEA
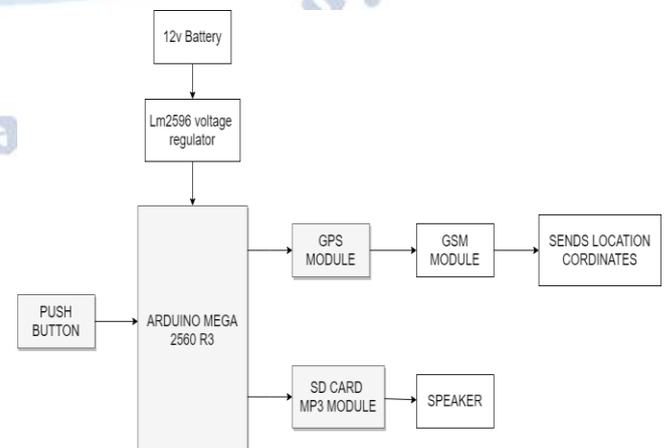
In the proposed idea, we are introducing a further setup the prevailing one with an SD card and speaker. during this setup, there'll be a recorded audio within the SD card connected to the speaker. Thus, when the lady presses the button, along side the SMS sending the recorded audio beeps through the speaker. With this the encompassing people near her are going to be alerted regarding the attack and that they could be ready to come to her aid. during this way there's a high chance of security for the lady .

HARDWARE USED

For developing this prototype we used the following hardware mainly

1. ARDUINO MEGA 2560 R3
2. SIM 900A GSM MODULE
3. GPS MODULE
4. DF3 MINI PLAYER
5. SPEAKER MODULE
6. PUSH BUTTON
7. BATTERY
8. LM2596 VOLTAGE REGULATOR

Arduino Mega 2560 R3:

The Arduino Mega 2560 may be a microcontroller board supported the ATMega 2560. it's 54 digital input/output pins, 16 analog inputs, 4 UARTs, a 16 MHz quartz oscillator , a USB connection, an influence jack, an ICSP header, and a push button . It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to urge started.

USART Pins :

Pin 0 – RXD0, pin 1 – TXD0

Pin 19 – RXD1, pin 18 – TXD1

Pin 17 – RXD2, pin 16 – TXD2

Pin 15 – RXD3, pin 14 – TXD3

This pin is employed for serial usart communication with any system for data sharing. it's used with serialBegin() to line baud and begin communication and Println() to print array of characters as output on other device. In our project we used these pins to interact with the GSM MODULE and GPS MODULE and DF3 mini player. These three modules use USART

communication protocol for communicating between these three.

Sim 900A Gsm Module:

SIM900 GSM/GPRS shield may be a GSM modem, which may be used for several IoT projects. this will be used as an alternate to a traditional telephone where we will SMS text messages, make or receive phone calls, hook up with internet through GPRS, TCP/IP, and more. This shield also supports quad-band GSM/GPRS network, meaning it works just about anywhere within the world.

A number of the features of SIM900 shield are listed below:

- Supports Quad-band: GSM850, EGSM900
- Connect onto any global GSM network with any 2G SIM
- Make and receive voice calls using an external earphone & electret microphone
- Send and receive SMS messages
- Send and receive GPRS data (TCP/IP, HTTP, etc.)
- Serial-based AT Command Set
- U.FL and SMA connectors for cell antenna
- Accepts Full-size SIM Card

LED Status Indicators:

There are three LEDs on the SIM900 GSM/GPRS shield which indicates connectivity or power status which provides a visible feedback on what's happening with the shield.

PWR: This LED is connected to the shield's power supply route . If this LED is on, the shield is receiving power.
Status: This LED indicates SIM900's working status. If this LED is on, the chip is in working mode.
Netlight: This LED indicates the status of your cellular network. It'll blink at various rates to point out what state   it's   in.

- off: The SIM900 chip isn't running
- 64ms on, 800ms off: The SIM900 chip is running but not registered to the cellular network yet.

- 64ms on, 3 seconds off: The SIM900 chip is registered to the cellular network & can send/receive voice and SMS.
- 64ms on, 300ms off: The GPRS data connection you requested is active.

In our project we used this GSM module to send the location co-ordinates details to the predefined numbers.

GPS Module:

NEO-6M GPS Module which will track up to 22 satellites and identifies locations anywhere within the world. they're low power (suitable for battery powered devices), inexpensive, easy to interface. It consists of 4 Pins are 5V, TX, RX, and GND. This standalone 5V GPS Module doesn't require external components. It consists of internal RTC copy battery and may be directly connected to USART of the microcontroller. This module gives the precise location within the format of latitude, longitude and also we get time also.GND is that the Ground Pin and wishes to be connected to GND pin on the Arduino. TxD (Transmitter) pin and RxD (Receiver) pin are used for serial communication. VCC is directly connected to the 5V pin on the Arduino. But we connect it over the facility supply pins. GPS data is displayed in several message formats over a serial interface. There are standard and non-standard (proprietary) message formats. Nearly all GPS receivers output NMEA data. The NMEA standard is formatted in lines of knowledge called sentences. Each sentence contains various bits of knowledge organized in comma delimited format (i.e. data separated by commas). Once a GPS module is powered, NMEA data (or another message format) is shipped out of a serial transmit pin (TX) at a selected baud and update rate, albeit there's no lock. to possess our microcontroller read the NMEA data, all that's needed is to attach the TX pin of the GPS to the RX (receive) pin on the microcontroller. To configure the GPS module, we'll got to also connect the RX pin of the GPS to the TX pin of the microcontroller.

DF3 Mini Player:

The DF3 Mini player may be a small and low price MP3 module with an simplified output on to the speaker. The module are often used as a stand alone module with attached battery, speaker and push buttons or utilized in combination with an Arduino mega or the other with RX/TX capabilities.

Specification

- supported sampling rates (kHz): 8/11.025/12/16/22.05/24/32/44.1/48
- 24 -bit DAC output, support for dynamic range 90dB , SNR support 85dB
- fully supports FAT16 , FAT32 file system, maximum support 32G of the TF card, support 32G of U disk, 64M bytes NORFLASH
- a spread of control modes, I/O control mode, serial mode, Ad button control mode
- audio data sorted by folder, supports up to 100 folders, every folder can hold up to 255 songs
- 30 level adjustable volume, 6 -level EQ adjustable

We interface this module with Arduino mega through the serial data pins using RX,TX. and that we connect the 5v power supply and ground to the respective pins of the DF3 Mini player pins. We connect the external speaker to the SPK1 and SPK2 pins.It perfectly integrates the hard decoding module, which supports common audio formats like MP3, WAV, and WMA. Besides, it also supports SD card with FAT16, FAT32 filing system . We store the prerecorded enter a SD card and cargo this SD card within the DF3 mini player. We specify the trail of the recorded file in order that the Arduino mega fetches the info from the module then it plays the audio file recorded within the voice of "help help".

CIRCUIT DIAGRAM:
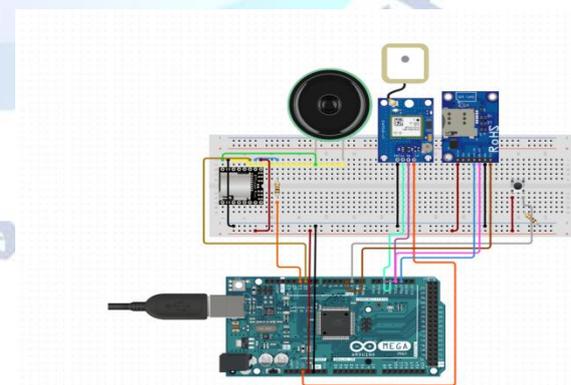
Speaker Module:

It is a little Grove module that gives power amplification and voice outputs and offers the acceptable solution for single audio signaling and sound generation; moreover, it uses a built-in potentiometer to regulate loudness and to clear sound out of a micro-controller. it's inbuilt lm386 amplifier

which amplifies the audio signal. The speaker module receives the audio signal from the DF3 mini player.

Push Button:

The pushbutton may be a component that connects two points during a circuit once you press it. We connect this pushbutton using three wires to the Arduino board where the primary wire goes from one leg of the pushbutton through a pull-up resistor (here 2.2 KOhms) to the 5 volt supply, the second goes from the corresponding leg of the pushbutton to ground and therefore the third connects to a digital i/o pin which reads the button's state.

When the pushbutton is open (unpressed) there's no connection between the 2 legs of the pushbutton, therefore the pin is connected to five volts (through the pull-up resistor) and that we read a HIGH. When the button is closed (pressed), it makes a connection between its two legs, connecting the pin to ground, in order that we read a coffee . (The pin remains connected to five volts, but the resistor in-between them means the pin is "closer" to ground.) The push plays the most role in our project as every thing i.e the method starts after the push is pressed. It sends the signal to the Arduino mega then Arduino mega process it.

Battery:

Battery may be a collection of 1 or more cells whose chemical reactions create a flow of electrons during a circuit. Every battery is formed from an anode (the '-' side), a cathode (the '+' side), and a few quite electrolyte. These Batteries acts as storage tanks which store energy and that they release or transfer the stored energy to the components when connected. They take the facility and consume from the battery. We use 12v battery to power-up our circuits.

LM2596 Voltage Regulators:

LM2596 is understood for its high current rating of 3A. There are many versions of this LM2596 with fixed output voltage like 3.3V, 5V and 12V among which the foremost famous one is that the LM2596-ADJ which has variable output voltage. The IC is essentially a buck converter which operates at a switching frequency of 150KHz, it takes in an input voltage and generates a desired output voltage using the interior switching circuit. it's high efficiency and in-built Thermal

shutdown and current limit functionalities. So if you're trying to find alittle high package, easy to use high current buck converter IC then LM2596 might me the proper choice for you. The input 12v is been fed into the +ve and -ve terminal of the transformer . By adjusting the knob the specified voltage is about , consistent with the sensors.

WORKING

The main controller in our project is Arduino Mega. We program the Arduino mega board using Arduino ide. the opposite sensor modules are connected to the arduino mega board through the Serial pins and digital input/output pins. initiative comes when the user or the ladies having this technique pressed the push , Then this push send the signal to the Arduino mega because the push buttons one among the output pin is connected over the Arduino mega digital input pin. Now when Arduino mega receives the signal from the push then it send the command to the GPS module through which the GPS module is attached to the Arduino mega via the interface pins. Then the GPS modules grabs the situation and sends it back to the Arduino mega via the interface pins. Now this location co-ordinates need to be sent to the predefined numbers. This process are often achieved with the assistance of gsm module. The Arduino mega now send request to the GSM module and enables it within the sending message mode. Now the Arduino mega carries the situation co-ordinates information along side the predefined number to which the sms should be sent. Now the GSM module sends the situation coordinates to the amount specified. Now the Arduino mega fetches the audio file laid out in the DF3 mini player and now it plays the audio file "help help". The spk1,spk2 pins are connected over the speaker module. this is often the general functioning of the system.

RESULTS

When the system sends the message to the predefined phone numbers, the recipient see the message as attached. The system sends the situation coordinates embedded in google maps therefore the recipient can simply click the link and he/she are going to be guided by the google maps to the victims location.
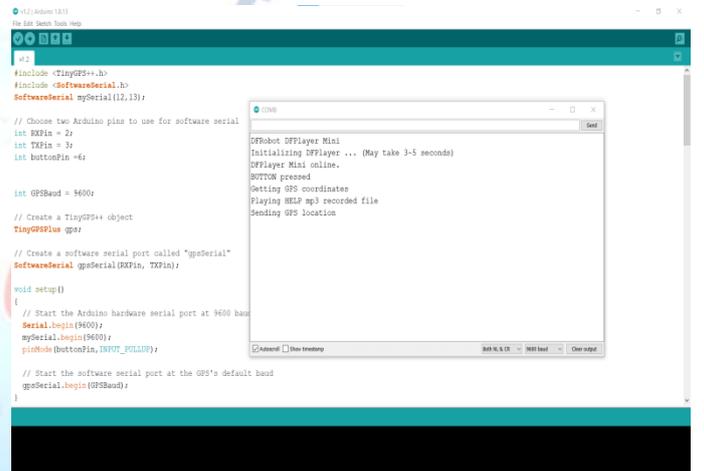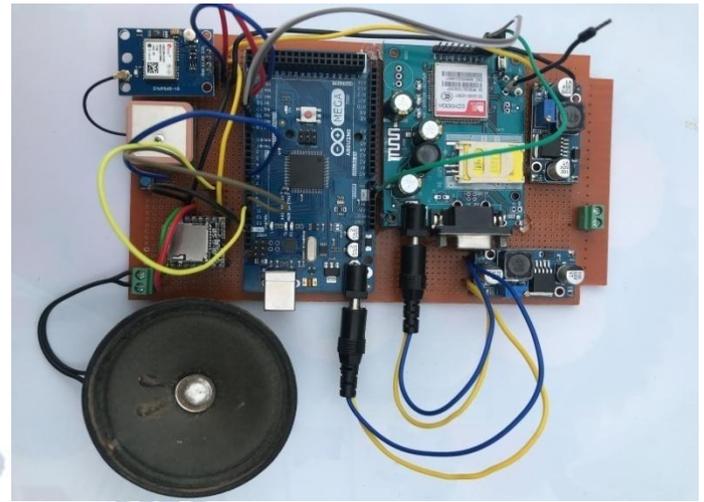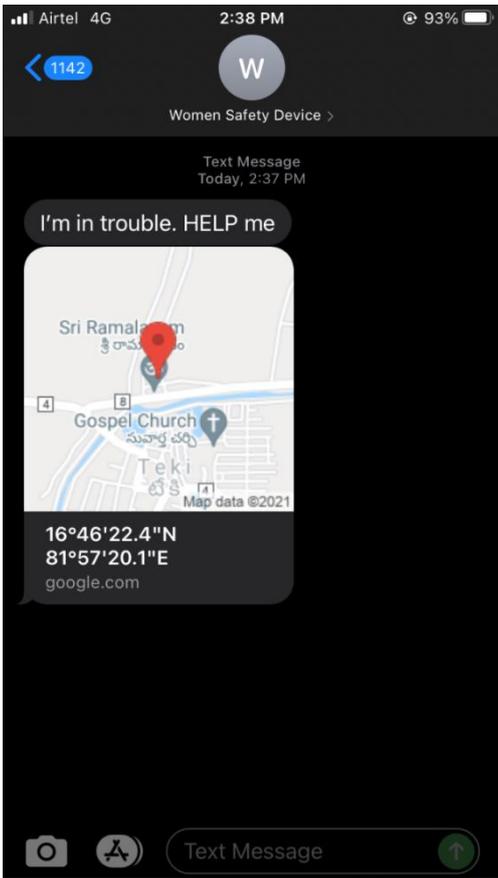
This is the screenshot after clicking the link on the recipients mobile which is been sent by the system.
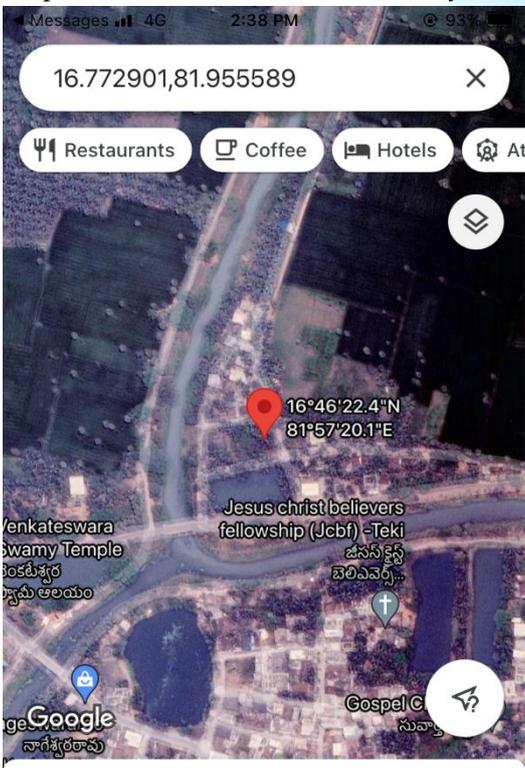
CONCLUSION

The proposed design will help the ladies any quite attacks happening on them and supply security with advanced technology which can save their lives.

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