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ARDUINO BASED WOMEN SAFETY SECURITY SYSTEM USING GSM AND GPS MODULE

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ABSTRACT: In global scenario, the prime question in every girls mind is about her safety and the harassment issues. The only thought haunting every girl is when they will be able to move freely on the streets even in odd hours without worrying about their security. This project suggests a new technology to protect women. This project focuses on a security for women so that they will never feel helpless. The system consists of various modules such as GSM , GPS, memory card , shock circuit, buzzer. Today there is many cases which are happening about women. It was high time where we women needed a change. This project is based on women security where women feel protected. This paper describes about safety electronic system for women, built in public transport vehicles such as cars, buses and auto-rickshaws as nowadays women are being molested, kidnapped and harassed by the drivers. In each field there is a special impact of women Like sports, dance, education, business, in politics also. Women are leading in each field. Are the girls in India are really safe? Always we get the answer No. Hence implemented electronic system is fitted in the jacket which has GPS, GSM, Shock circuit, Buzzer, memory card.

KEYWORDS: *Harassment, WOMEN SAFETY,* Global System for Mobile *Communications, Global Positioning System.*

INTRODUCTION: Even the common man's conversation on the streets often steers towards the escalated and horrendous attacks on women. An overbearing concern each of us has towards the women in our families has lent a sense of urgency to our dialogue on the critical and pressing issue of women's safety. Many special devices are primarily western and most of them have not reached India yet. Another issue is the high cost of manufacturing these devices. To make applications efficient, they would require GPRS services which might not be feasible. Applications get hanged, which lowers down the response time. These applications consume too much of battery power. Most of the applications available in the market do not work without the Internet or mobile network. This is exactly where the government needs to step in and try and mitigate cost and infrastructure issues for the corporations working in this direction The problem with apps is that they tend to be clumsy. The women have to open her phone, unlock it, open the app and then press a button. Also, most of the times, the perpetrators usually go for the phone first. The need is to develop independent devices like safety bands, rings, key rings etc. that can be carried around in disguise and used faster, and which will allow the women to send emergency messages with their location in times of distress. The device called as "Virtual Friend" is especially designed for the women in trouble. It is a device used for the women in chaotic situation. The basic approach is to use the Arduino Uno microcontroller based on ATmega328P has the function of send and receive data which is provided by Arduino GSM shield using GSM network. The current location of the victim is identified by the GSM network using Arduino Uno by initiating the user's smart phone. At once the Arduino Uno gets the coordinates of the current location the Arduino transfers the coordinate details to the

user's smart phone via Arduino GSM shield. The SOS light is a signal used to alert the passerby and it gives the sign of universal help to the victim who are in distress. The alarm buzzer is activated if the woman is in danger situation. In the critical situation the women send the message or make a call including the location of the particular incident to the registered contacts through the use of GSM and GPS. Even if the device is thrown away it sends the message and making a call to the registered emergency contacts until they picked up or open the message. Even in this modern era women are feeling insecure to step out of their house because of increasing crimes in our country like harassment, abuse, violence etc., The corporate and IT sector are currently in boom. Many women are working in corporate even in night shifts. There is a feeling of insecurity among the working women. The proposed device is more like a safety system in case of emergency. This device can be fitted in a jacket (similar to a blazer for women). It is an easy to carry device with more features and functions. The emergency push button is held to one of the buttons of the jacket. The main purpose of this device is to intimate the parents and police about the current location of the women. A GPS system is used to trace the current position of the victim and a GSM modem is used to send the message to the pre-defined numbers. This model is also useful for small children's, elderly aged people also.[2 In today's world, women safety has become a major issue in our country as women can't step out of their house at any time, especially during night. It is primarily due to fear of violence against them or being physically or sexually abused. The fear of harassment against women is not only the condition at outside but it may also happen at homes. Even in the 21st century where the technology is rapidly growing and new gadgets are being developed but still women and girls are facing problems. They often work across ethnic, religious, political, and cultural divides to promote liberty. We know that our society is all aware of importance of women safety, but it is also a duty of individual that they should be properly protected. Not only this, we must create such an environment in our society that women must feel secured outside their house even when they are alone at any time. Women are not so physically fit as compared to men so in case of a need a helping hand would be a boon for them. The best way to reduce probability of becoming a victim of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defense and look up resources to help you out of hazardous situations. If a women is in dilemma or get split from friends during a night out or someone is following with bad intention (sexual assault) or don't know how to find back residence then this device with her will guard her and bring assistance when she needs it by giving her current location and health conditions to her associates and control center through SMS and call. This device not only provides family and police support but also helps in getting medical support as fast as possible. When women are travelling or doing any outdoor activities and if unfortunately they go through these problems and to avoid these crimes to be faced they pronounce or rather say speak keywords which will give a signal to android but this can also give suspicion to the criminal and then he/she will throw victim's android.

LITERATURE SURVEY:

The paper titled [1] discussed a voice keyword recognizing app to recognize the user and activate the app functionality even when the mobile keypad locked. The GPS module tracks the longitude and latitude to trace an exact location of a user and sends the prestored emergency message including location to the registered contact numbers. The Audio Recording module starts the recording of the conversation for five minutes and stored as evidences. The message goes in queue if network problem and send when network gets available. A notification is generated for successful deliver the message. Also, user can select contact through voice-based contact list and make a call. Note: The spoken keyword converted into a text to compare with the registered keyword. The paper [2] proposes a SCIWARS app (Spy Camera Identification and Women Attack Rescue System) which consist of two modules. A first module act as an intelligent alerts system which detects the infrared rays coming from every Night-vision hidden cameras placed in changing rooms-hotels room etc and also informed the user about unsafe place through message. Now it's the user responsibility whether to register a complaint or not by forwarding the notification

with the location to legal authorities such as Police. The second module will get activated by pressing any key continuously which will provide the help to the victim from physic attack in unsafe situation. It sends the emergency message containing location to register contacts. It also records the voice and captures the images of the surrounding for 45 seconds. This information also stored in secret location of mobile for future evidences. This app also able to converts the receiver mobile The paper [3] proposes an android app to provide security at two different situations as follows. The First module provide security to Women at Emergency Situations propose a Save Our Souls (SOS) app to provides the security on a single click of SOS button for the women travelling at night or alone. No need to unlock the screen, instead by just pressing the power button it directly triggers the application to run at the background, to send the emergency message including the location in the form of latitude and longitude to the registered contacts. The second module proposes an android based home security system that provides security of house belongings and Senior Citizen in the user absence. Since the security of senior citizen is always a concern with increasing number of robbery incidents. This app informs the user about an attempt of intrusion activity at home through a message and a feedback SMS triggers an alarm in the house. The minimum requirement is the android mobile, a hardware circuit embedded with a switch and GSM modem that are connected to the door. When an intruder tries to open the door, the switch triggers an interrupt for the microcontroller to activate the GSM modem to send warning SMS to the store registered number in the modem. At the receivers end the application pop up the menu frequently for user attention. If the user fails to acknowledge in the defined time interval, then the automatic positive acknowledgement message get send to the remote GSM modem which in turn interrupt the microcontroller for an alarm. The Paper [4] proposed a portable device as a belt which is automatically activated base on the pressure difference crosses the threshold in an unsafe situation. A GPS module tracks the location and sends the emergency messages to three emergency contacts every two minutes with updated location through GSM. The system also activates the screaming alarm that uses a siren, to call out for help and also generates an electric shock to harm the attacker for self-defense which may help the victim to escape. The device mainly consists of micro controller on the ATMega328 board which programmed using the ARDUINO programming language. [6] In our country there is no safety for women so this paper is designed for women in emergency and in distress. It is simple and easy to use. Many people uses smart phase which has many applications and it is useful to people if any emergency occurs then our intension is to provide you with the fastest and simplest way to contact to your nearest help by clicking the push button by using an GPS that which sends the location as well as notification to the registered numbers and also to the near rescue system.

PROPOSED ARCHITECTURE:

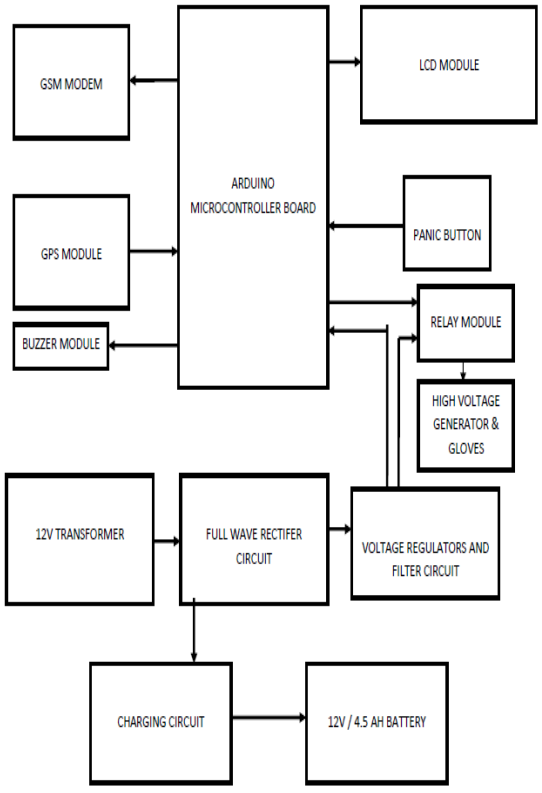

Fig1: Proposed block diagram

The proposed device is more like a safety system in case of emergency as shown in above figure1. This device can be fitted in a jacket (similar to a blazer for women). It is an easy to carry device with more features and functions. The emergency push button is held to one of

the buttons of the jacket. The main purpose of this device is to intimate the parents and police about the current location of the women. A GPS system is used to trace the current position of the victim and a GSM modem is used to send the message to two pre defined numbers. This System is designed using Arduino Microcontroller Board, SIM 800 GSM Modem, GPS Module and High Voltage Electric Gloves as Major components of this system. Embedded C Programming Language is used to Program the Microcontroller. When the user Press Panic Button / Switch Twice than GPS Module reads the Current location of the User and Sends SMS to two different Persons (Such as Parents and Police), that is preprogrammed in the Microcontroller Memory. LCD Module is used to display the notification message to user. A buzzer Module is used to produce High Alert buzzer alarm. This Alarm sound is used to alert the nearby people and call for help. This System is also equipped with an Electric Shock gloves. When user presses the Panic Button, Microcontroller activates the Relay Module which further switches on the High Voltage Generator Circuit. This circuit generates voltage of around 400V to 500V. Output of the circuit is connected to a Hand Gloves. This High voltage from the glove is enough to temporary harm any person. The power supply setup of the system contains a step down transformer of 230/12V, used to step down the voltage to 12VAC. To convert it to DC, a bridge rectifier is used. Capacitive filter is used which makes use of 7805 voltage regulator to regulate it to +5V that will be needed for microcontroller and other components operation, in order to remove ripple. This system is also equipped with 12V / 4.5 Ah batteries and a Charging Circuit. This battery voltage is also used to drive this entire circuit.

ARDUINO UNO:

The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset 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 get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter. The Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to put into DFU mode.

The board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible with both the board that uses the AVR, which operates with 5V and with the Arduino Due that operates with 3.3V. The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.

"Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards.

ARDUINO PIN DIAGRAM:

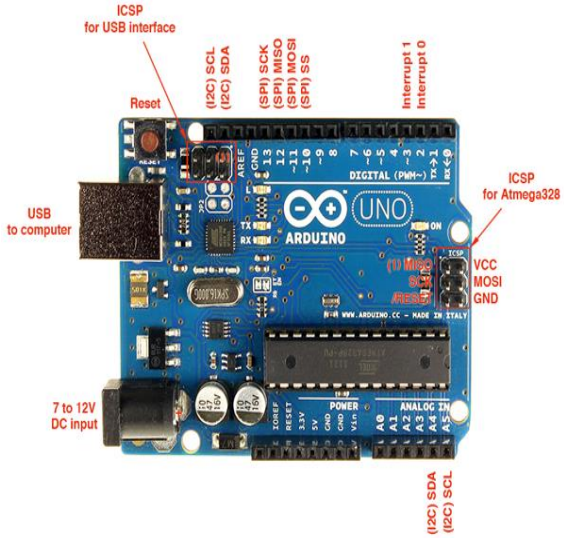

Fig2: Arduino Uno Kit

LIQUID CRYSTAL DISPLAY: The LCD is used for the purpose of displaying the words which we are given in the program code. This code will be executed on microcontroller chip. By following the instructions in code the LCD

display the related words. Fig. shows the LCD display.

Fig3: LCD Display

The LCD display consists of two lines, 20 characters per line that is interfaced with the PIC16F73.The protocol (handshaking) for the display is as shown in Fig. The display contains two internal byte-wide registers, one for commands (RS=0) and the second for characters to be displayed (RS=1). It also contains a user-programmed RAM area (the character RAM) that can be programmed to generate any desired character that can be formed using a dot matrix. To distinguish between these two data areas, the hex command byte 80 will be used to signify that the display RAM address 00h will be chosen Port1 is used to furnish the command or data type, and ports 3.2 to 3.4 furnish register select and read/write levels.

Theory:

A liquid crystal is a material (normally organic for LCDs) that will flow like a liquid but whose molecular structure has some properties normally associated with solids. The Liquid Crystal Display (LCD) is a low power device. The power requirement is typically in the order of microwatts for the LCD. However, an LCD requires an external or internal light source. It is limited to a temperature range of about 0°C to 60°C and lifetime is an area of concern, because LCDs can chemically degrade.

GSM/GPRS MODEM

GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. A GSM/GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.

The MODEM needs AT commands, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command. Different AT commands supported by the MODEM can be sent by the processor/controller/computer to interact with the GSM and GPRS cellular network.

GSM/GPRS Module

A GSM/GPRS module assembles a GSM/GPRS modem with standard communication interfaces like RS-232 (Serial Port), USB etc., so that it can be easily interfaced with a computer or a microprocessor / microcontroller based system. The power supply circuit is also built in the module that can be activated by using a suitable adaptor.

AT Commands AT commands are used to control MODEMs. AT is the abbreviation for Attention. These commands come from Hayes commands that were used by the Hayes smart modems. The Hayes commands started with AT to indicate the attention from the MODEM. The dial up and wireless MODEMs (devices that involve machine to machine communication) need AT commands to interact with a computer. These include the Hayes command set as a subset, along with other extended

AT commands with a GSM/GPRS MODEM or mobile phone can be used to access following information and services:

1. Information and configuration pertaining to mobile device or MODEM and SIM card.
2. SMS services.
3. MMS services.
4. Fax services.
5. Data and Voice link over mobile network.

The Hayes subset commands are called the basic commands and the commands specific to a GSM network are called extended AT commands.

Command, Information response and Result Codes:

The AT commands are sent by the computer to the MODEM/ mobile phone. The MODEM sends back an Information Response i.e. the information requested by or pertaining to the action initiated by the AT command. This is followed by a Result Code. The result code tells about the successful execution of that command.

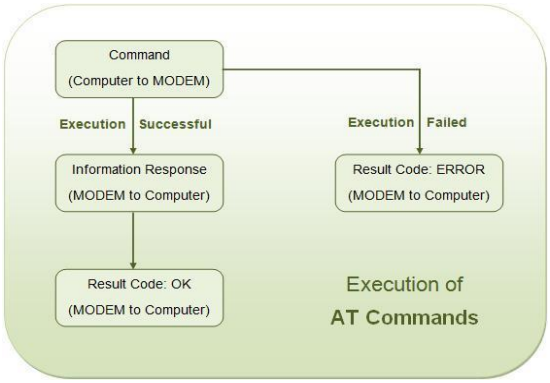

Fig4: Execution of AT Commands

There are also unsolicited Result Codes that are returned automatically by the MODEM to notify the occurrence of an event. For example the reception of a SMS will force MODEM to return an unsolicited result code.

GLOBAL POSITIONING SYSTEM:

Every single location in the entire globe can be specified in terms of geographical coordinates. The geographical coordinate is a system which specifies any given location on the earth surface as latitude and longitude. There are devices which can read the geographical coordinates of a place with the help of the signals received from a number of satellites orbiting the earth. The system of satellites which helps in the positioning of a place is called Global Positioning System (GPS). The devices which can read the geographical coordinates of a place with the help of at least four GPS satellites are called GPS Receiver or simply GPS module.

A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites high above the Earth. Each satellite continually transmits messages that include

- the time the message was transmitted
- precise orbital information (the ephemeris)
- the general system health and rough orbits of all GPS satellites (the almanac).

The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite. These distances along with the satellites' locations are used with the possible aid of trilateration, depending on which algorithm is used, to compute the position of the receiver. This position is then displayed, perhaps with a moving map display or latitude and longitude; elevation information may be included. Many GPS units show derived information such as direction and speed, calculated from position changes.

Three satellites might seem enough to solve for position since space has three dimensions and a position near the Earth's surface can be assumed. However, even a very small clock error multiplied by the very large speed of light the speed at which satellite signals propagate — results in a large positional error. Therefore receivers use four or more satellites to solve for the receiver's location and time. The very accurately computed time is effectively hidden by most GPS applications, which use only the location. A few specialized GPS applications do however use the time; these include time transfer, traffic signal timing, and synchronization of cell phone base stations.

The satellites all send timing information so the receiver knows when the message was sent. As radio signals travel at the speed of light they take a very short but finite time to travel the distance from the satellite to the receiver. The satellites also transmit information about their positions. In this way the receiver is able to calculate the distance from the satellite to the receiver. To obtain a full fix of latitude, longitude and altitude, four or more satellites are required, and when the receiver is in the clear, more than four satellites are in view all the time. A fix of just latitude and longitude can be obtained from three satellites.

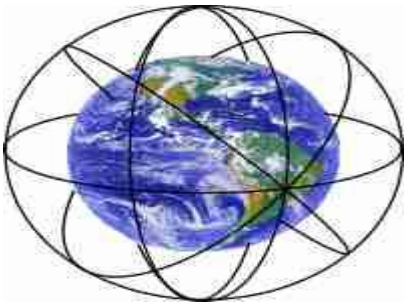

Fig5:GPS constellation

GPS satellite orbits

The fully operational GPS satellite system consists of a constellation of 24 operational satellites with a few more in orbit as spares in case of the failure of one. The GPS satellites are in one of six orbits. These are in planes that are inclined at approximately 55° to the equatorial plane and there are four satellites in each orbit. This arrangement provides the earth user with a view of between five and eight satellites at any time from any point on the Earth.

POWER SUPPLY

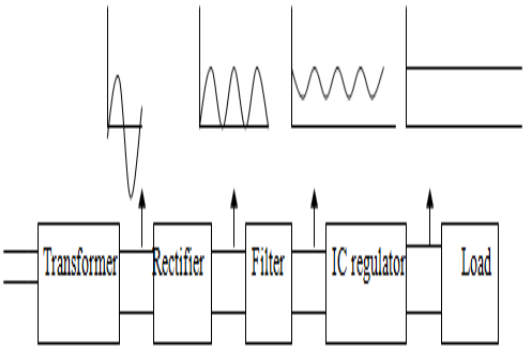

Fig6: AC- DC Conversion

The ac voltage, typically 220V rms, is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units. The potential transformer will step down the power supply voltage (0-230V) to (0-6V) level. Then the secondary of the potential transformer will be connected to the precision rectifier, which is constructed with the help of op–amp. The advantages of using precision rectifier are it will give peak voltage output as DC, rest of the circuits will give only RMS output.

CONCLUSION:

Women are the backbone of any economy primarily shaping future of the country. She who earlier stayed at home to attend her domestic duties is now maintaining work and home simultaneously, participating in the process of economic development on an equal footing with men. The Government of India, meeting a longstanding demand for gender parity in the workforce, has approved an amendment in The Factories Act 1948 to allow women employees to work in nightshifts. The amendment suggests that nightshift for women shall be allowed only if the employer ensures safety, adequate safeguards in the factory as regards occupational safety and health, equal opportunity for women workers, adequate protection of their dignity, honor and transportation from the factory premises to the nearest point of their residence are met. This System is also equipped with an Electric Shock gloves. When user presses the Panic Button, Microcontroller activates the Relay Module which further switches on the High Voltage Generator Circuit. This circuit generates voltage of around 400V to 500V. Output of the circuit is connected to a Hand Gloves. This High voltage from the glove is enough to temporary harm any person.

FUTUER SCOPE

The proposed device is more like a safety system in case of emergency. This device can be fitted in a jacket (similar to a blazer for women). It is an easy to carry device with more features and functions. The emergency push button is held to one of the buttons of the jacket. The main purpose of this device is to intimate the parents and police about the current location of the women. A GPS system is used to trace the current position of the victim and a GSM modem is used to send the message to two pre defined numbers. This System is designed using Arduino Microcontroller Board, SIM 800 GSM Modem, GPS Module and High Voltage Electric Gloves as Major components of this system. Embedded C Programming Language is used to Program the Microcontroller. When the user Press Panic Button / Switch Twice than GPS Module reads the Current location of the User and Sends SMS to two different Persons (Such as Parents and Police), that is preprogrammed in the Microcontroller Memory. LCD Module is used to display the notification message to user. A buzzer Module is used to produce High Alert buzzer alarm. This Alarm sound is used to alert the nearby people and call for help.

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