

AN ANALYTICAL STUDY ON WOMEN'S ANTI-MOLE STATION SELF SECURITY SYSTEM USING IOT

¹Neelima Gottimukkala, ²Busa Nirmala Mounika, ³Shaik Sharmila, ⁴Bhumi Reddy Manikanta Reddy
^{1,2,3}Assistant Professor, ⁴Student, Dept. of Electronics & Communication Engineering, Newton's Institute of Engineering, Macherla, Andhra Pradesh, India.

ABSTRACT

The safety of women is a serious issue in today's society. Many individuals now find it more difficult to ensure the safety of women in their everyday lives, thus a system was created employing quickly advancing technology to address these issues. The major emphasis of this study is a women's IoT-based self-security system. Assaults and other illegal activity figures are on the rise right now. In order to address these issues, we created an integrated IOT device in this paper that can contact the pre-stored emergency number "+91XXXXXXXXXX" when necessary. The system includes an Arduino Nano Microcontroller with a Global System for Mobile Communication (GSM) module, and it can make on-demand calls, send SMS messages, and capture motion of the picture of the current scenario. The designed system is user friendly and it can be accessed by a specific person who is in danger. The device features the "Plug & Play" functionalities, which means buttons can operate the entire device. Also, the device is affordable at a reasonable price. So, this project focuses on a safety system that is designed completely to serve the purpose of providing security and safety to women so that they never feel helpless while facing such social challenges.

Keywords: IOT device; smart-safety; Anti-rape; device; Women safety; GSM; Plug & Play functionalities.

INTRODUCTION

In the present scenario, women's safety has become one of the most common issues in society, even though strict actions are taken against criminals, the problem still persists. Now a day, women have to work in odd hours but, because of insecurity they are forced by family members to quit the job. If women want to work in other states, there will be a question of her safety and security to their family. Technology is advanced so much, but still, the problems faced by women are not solved. This paper involves few preventive devices and applications in order to avoid the problems faced by women. It is not only about prevention, but it also helps the women to deal with the problems faced in the past and to achieve fair justification and morality in the society. The safety and security of a woman can never beat rest, no matter what new device is on the market or a new application is made, there always can be something added to it. There cannot be a cop or person always guarding a woman, but there can be secret safety measures with them which can be easily used at the time of threat and let the nearby people or cops know that there is something bad happening and their support is need. By keeping all these things in mind many safety devices have developed and few of them are discussed in this paper.

RELATEDWORK

Many of the scientists have proposed and contributed their works to ensure women's safety by developing different IOT Application based devices. U.Raiet al.[1] developed a safety device using Raspberry-Pi with a GPS module and a panic button. When a girl presses the panic button when she is in trouble, the device sends its

longitude and latitude via a GPS module so that the location finder application can identify the victim's location. The prototype is simple but very large in size. Raspberry-Pi needs the internet to capture the victim's location. T. Sen et al. [2] developed a women's safety device with Raspberry-Pi. The device contains a huge architecture with its camera module nerve simulator. The device can track the victim's location via GPS and GSM module. The authors developed an android application and local server to maximize women's security. Nevertheless, the problem is that the device is too big and cannot be carried out easily. A.Z.M. Tahmiduletal. [3] proposed an application wearable device. So, the function of the device is to send SMS and it can trace the victim's location to the given police headquarters or pre-saved number. The application is designed in such a way that, the map indicates a safe location from criminal attack. The device is not rural friendly for rural women. Most of the rural areas were not aware of the mobile application due to lack of mobile phones. It's bulk to carry. S.R.Mahmud [4] proposed a smart mobile application "BONITAA" which consists of various features such as SMS and location sending via GSM, health supports, medical supports, counseling, self-defense tips for the rape victims. To acknowledge the problem of rural women, they developed the "Bangla" language in their application and tried to make it user friendly. V. Sharma et al. [5] developed a smart shoe to ensure women's safety. They used Raspberry-Pi and Arduino-Uno Microcontrollers to implement their system. Firstly, a shoe base video capturing devices are not efficient to capture correct frames. Besides, the use of Arduino Microcontroller rather than Raspberry-Pi is insufficient. Also, the shock generation of 400KV can kill a human within few minutes. N. Islam[6] proposed a device for supporting the women in danger. The device is designed to send SMS and location to relatives of the victim. The device is too large with its AAA size batteries and the large LCD screen. M. R. Ruman et al. [7] developed a safety device for women's safety which can send the location of the victim and can be rescued early. The device contains a shock generator also. Integration of various extra facilities, the prototype is too huge to carry.

To acknowledge these problems, we have developed a safety device to support the women and child who are in danger. The device is too tiny and can be carried out efficiently in daily life. Moreover, our device is affordable that people of all levels can afford it at a reasonable price. The device also has the feature of "Plug & Play". So, operation al buttons can activate the device.

FRAME WORK AND SYSTEM DESIGN

In this section, we have discussed the overall framework of our WOMEN safety device.

The framework contains two types of system design:

Working Framework

At first, when we turn on the device, the system is started and it will initialize the SIM800L module. Then the module gets ready. Initially, when we click on the button-1, the system sends the HTTP (Hypertext transfer protocol) POST request using the "AT" attention commands to associate application. Then it sends the message as "I need help....." to pre-saved emergency contact number and captures some motion images with help of ESP32 CAM and sends to pre-saved MAIL-ID. And now, when we press the button-2, the system will make a call to the pre-saved emergency contact number. Calls are received with high voice quality and they can be transmitted and it captures some motion images with help of ESP32 CAM and sends to pre-saved MAIL-ID.

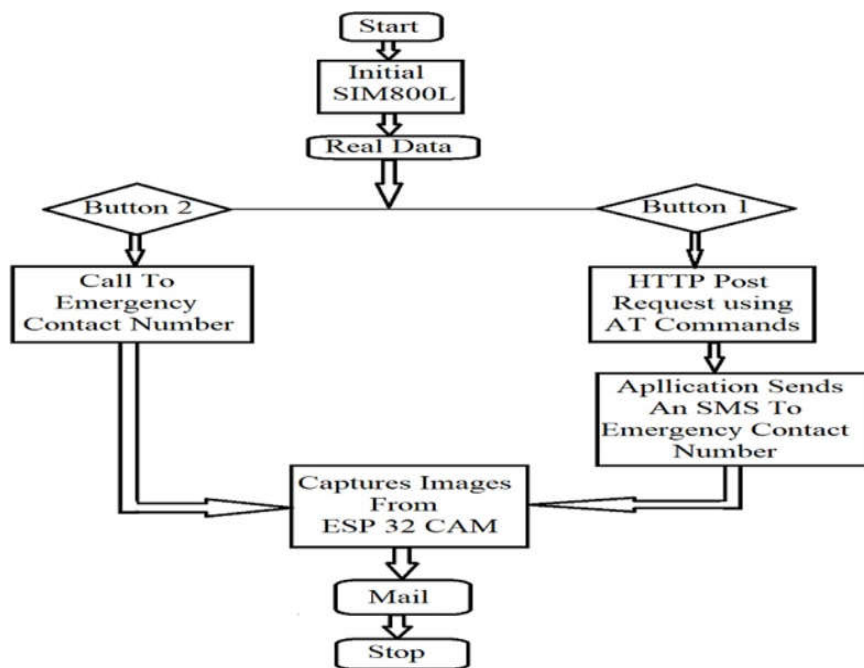


Fig1: The overall working framework of our proposed “Anti-Molestation” women safety device.

A. Block Diagram and Components:

The block diagram of the framework in Fig.2 illustrates overall hardware design required for developing the gadget.

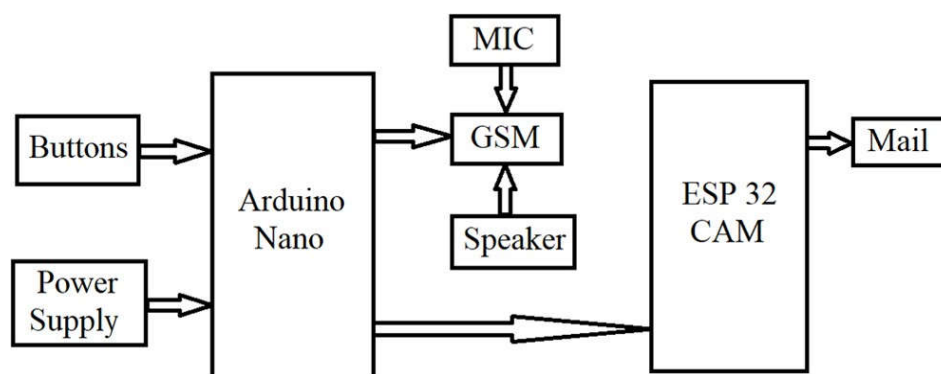
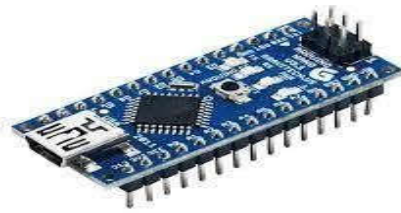


Fig. 2. The Block Diagram shows all the Hardware we have used to Develop our Women Safety Device.

The main heart of this device is the Arduino Nano Micro-controller to handle the entire mechanisms. A power supply is needed for functioning of the device. The block diagram contains a panic button 1 and panic button 2 to operate the entire device. A SIM800L module has been used for GPRS transmission, sending and receiving SMS and making and receiving voice calls. We have used a condenser microphone and a speaker to communicate with the pre-saved emergency contact numbers. A Buck converter has been used to convert the power supply into switched mode power supply. We have used ESP32 CAM to capture some motion moving pictures and send them to the pre-saved mail-ID. All those components are integrated with the Arduino Nano



Microcontroller



a.Arduino Nano

b.SIM800LModule



d.Buck Converter



c. ESP32CAM



e.Microphone



f.speaker



g.Panic Button



h.10KohmResistor

Fig. 3. The figure shows the Necessary Components that we have used for Developing “Anti-Molestation Women Self-Safety System” Device.

1. ARDUINO NANO: The Arduino Nano is a small, complete, and bread board-friendly board based on the ATmega328 microcontroller. It has same functionalities of the Arduino Duemilanove, but in a different package.

It doesn't have a DC power jack, but it works with a Mini-BUSB cable instead of a standard one.

2. SIM800L Module: We have used SIM800L GSM/GPRS module for calling and sending SMS functionalities. The module is attached to the Microcontroller. This module has a small form factor, and a Subscriber Identity Module (SIM) is attached to it
3. ESP32 CAM: The ESP32-CAM is a small size, low power consumption camera module based on ESP32. It has an OV2640 camera and provides on board TF card slot.
4. BUCK CONVERTER: Buck Converter Module LM2596 Power Supply is a step-down (buck)switching regulator, capable of driving a 3-A load with excellent line and load regulation. These implementations are available in fixed output voltages of 3.3V, 5V, 12V, and an adjustable output version.
5. Condenser Microphone and Speaker: We have used a condenser microphone and a speaker to transmit the voice through the safety device so that the law enforcement agency can hear the sounds around the prey.
6. Panic Button: We have used a panic-button to perform "Plug & Play" features. The panic-button regulates two functionalities like single press and long-press.
7. Resistance and Some wires: We used a 10K Ω resistance for voltage regularization. Moreover, some wires were used for making connections to all the components.

IMPLEMENTATIONDETAILS

In this section, we have discussed the step-by-step procedure of the overall hardware implementation of our anti-molestation women self-security system. Here, Fig. 4 illustrates the circuit diagram of our women safety system.

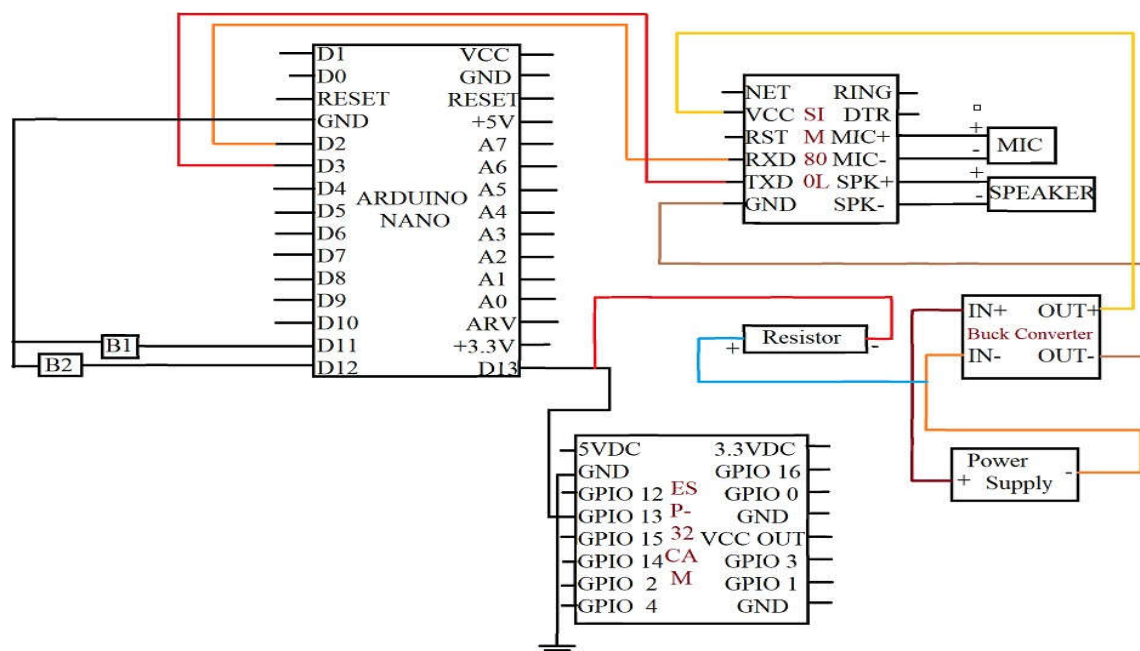


Fig.4: Circuit diagram of Anti-Molestation Women Safety Device

First of all, we need the Arduino Nano Microcontroller to connect all peripherals because it is the heart and only one thing that can operate all other hardware. Here, in Fig. 4, we can see that SIM800L has several pins and the SIMRXD pin connects with Arduino's digital Input-Output (I/O) 02 pin for serial communication. The SIM RXD is the receiver pin. The SIM TXD is the transmitter pin and connects with the PWM, Interrupt Digital 03 pin for sending data to the peripherals. We have used an adapter for the power supply and Buck Converter for the load regulation. The positive wire of the adapter is connected with the Buck Converter positive IN, and the negative wire is connected to negative IN. It regulates load and gives 3.1V to SIM800L module and 5V to ESP32 CAM. A 10K Ω resistor is also used for the voltage regulation. The SIM 800L module has the MIC positive and negative pins to connect the condenser microphone and the SPK positive and negative pins to connect the speaker. The Microcontroller has the Master In Slave Out (MISO) and Master Out Slave IN (MOSI) to the panic buttons and they are shorted. The Serial Clock (SCK) was connected to ESP32 CAM GPIO13 pin. And the ground pin of ESP32 CAM is connected to ground.

The pictorial view of Fig. 5 illustrates the overall view of the Anti-Molestation women safety device and it shows the dissection and developed view of the device.

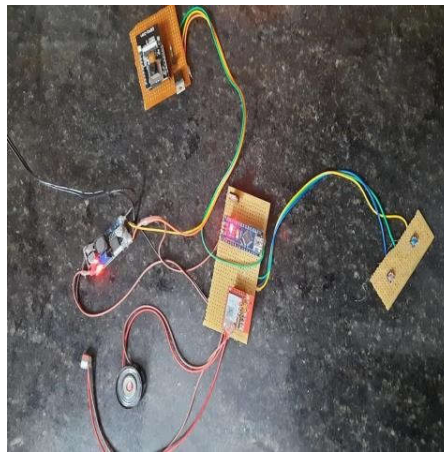
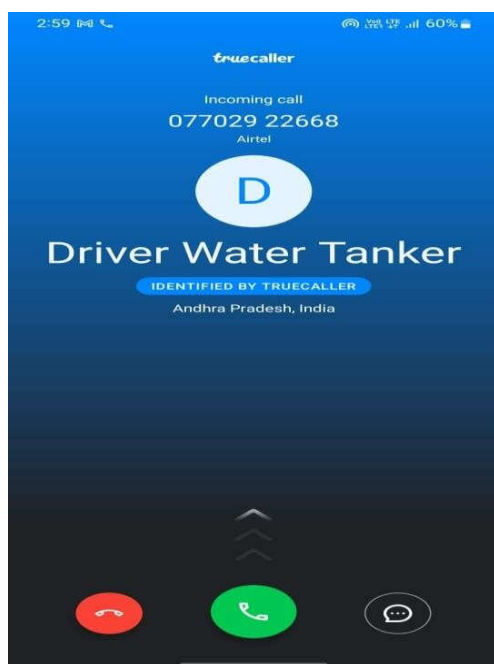


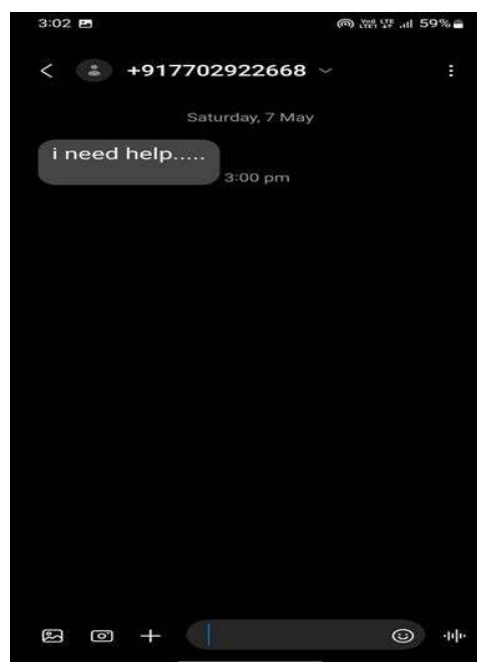
Fig.5.The Developed system of the Anti-Molestation Women Self-Security Device

RESULT

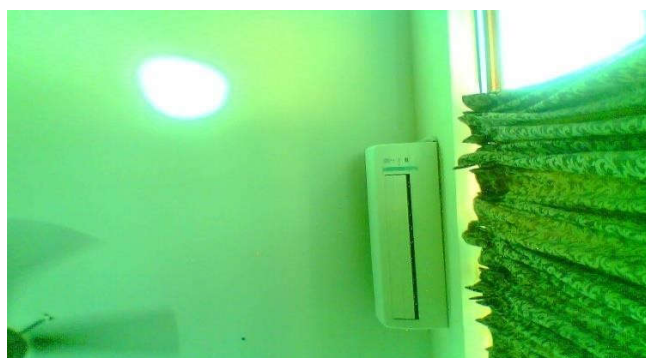
We have covered our Anti-approach Mole station women safety device's and results in this part. When a predator clicks the panic button, the SIM800L module calls the "+91XXXXXXXXXX" emergency contact number using the cell phone antennae and sends the collected photographs to the pre-saved mail-ID. The gadget also sends SMS with the captured images to the pre-saved mail-ID using GPRS technology. Depending on the message or call received together with the collected photographs received, the emergency contact person may be able to contact or assist the prey. Fig.5 illustrates the form factor of our device which is too small in size to carry anywhere easily. Here, Fig. 6a, 6b, and 6c shows the calling mechanism, SMS received and the captured images. Moreover, our device is so much power and cost efficient. Our women safety device has shown a significant result among previous devices with the small



a. Making calls



b. SMS



c. Captured image

Fig.6. The Qualitative Result of our Safety Device which can make a Call and send SMS along with captured images.

CONCLUSION

This research study is crucial in providing the quickest route to women's safety. The approach that has been created will address risky situations that women have encountered recently and assist in overcoming safety bias. The focus of this study will be on creating an intelligent, reasonably priced tool to assist women, make them feel safer, and assist in instances including abuse, prostitution, and other hazardous circumstances. The safety and security of all discouraged and harassed women and children would be improved by this design. By providing women with a secure environment in society and enabling them to work till late at night and move around with ease, the system aids in maintaining gender equality. Before committing a crime against a woman, one should counsel and warn others, which lower the overall rate of crimes against women.

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