IoT Based Smart Security Shoes

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Abstract
Women safety has always been an issue even in these modern time with so much advancement in technology. Women are not safe anywhere and are most vulnerable when traveling alone into lonely roads and deserted places. Existing hand held safety devices for women require human intervention for activating the device such as pressing the button or shake the device etc after sensing the danger. We propose a solution which will try to overcome the disadvantages of the existing systems .This study aims to design and develop a smart and integrated solution for women safety using IoT technology. The problems we have overcome here using Arduino Nano, GSM, GPS, TP4056, Push Button, and hall sensor. Anytime when women sense danger only one button is to be pressed on the device. In such case, GPS tracks the location of the women & sends an emergency message using GSM to save contacts.
Keywords— Arduino Nano, GSM, GPS

I.   Introduction

Safety has been a major concern for women for many years. Women feel unsafe not only outside but inside their homes as well. A few places in Bangladesh have such horrific conditions where women feel intimidated to even step out of their house when it gets dark. The corporate and Garment sectors are currently on the boom and at present, many women are working in those sectors. Women are required to work night shifts as part of their job. So, there is no suitable transportation, such as buses, which are not available at that time, and cab services, which are less available and often pricey in remote locations. As a result, women find it difficult to go home or walk alone. In the event of an emergency, the proposed device functions more like a safety mechanism. It's a small portable device with a lot of features and functionalities. The primary aim of this device is to notify the registered emergency number of the women's current position. The victim's present location is tracked using a GPS system and the message is sent to a pre-determined number using a GSM modem. This type is also an appropriate device for little children and the elderly.

There has been a lot of degradation of morality and humanity in our society these days. As a result, today girls and children are facing a lot of insecurity. As a result, they have trouble going out during the day and night and are not able to be self-sufficient. Today they are being kidnapped and even raped and killed. Now fear is working in their mind. So, we had a plan to make shoes to bring them out of this problem.

These shoes can play a special role in many cases.
It will work for the safety of women workers in the garment industry. There is a lot of insecurity to be faced while returning after work from the industry at night. Using these shoes will bring a lot of development in this sector along with the safety of women workers.
Many girls are now proving successful with their skills and talent in the IT sector. However, night duty is often required in this sector. As a result, many nights have to travel outside in insecurity. Using these shoes will solve this problem.
This shoe will bring many changes in the field of news media. Women journalists are often in danger. But when you use these shoes, it will be possible to work without fear.
It will also play a role in the safety of school children. Sometimes children are abducted and killed. These incidents can be prevented in many ways by using these shoes.
Patients with mental retardation are seen as lost. When they leave home, they are hard to find and their misadventures can almost be heard. This problem can be solved by using these shoes.

II. Related Work

Few studies identified the IoT-based devices for women's safety, to the best of our knowledge.

C. Sweetlin Hemalatha [1] proposed a work aims at designing an IoT based safety device that relies on providing security to women by fingerprint-based method of connectivity to the device and alerting nearby people and police when a women is not safe. An unsafe situation is sensed by fingerprint verification for a minute then it will automatically alert nearby people and police if the device senses no signal. Moreover, for first-hand safety, shockwave generator is also designed that women can use to attack the perpetrator. Additional features such as sending group messages, audio recording are also part of the proposed design. A mobile app is designed for women safety where safe locations from victim's current location will be shown on the map so that women can reach the safe place from her current location.

A research presented survey on women's security system using IoT [2]. The target of this research was mainly focused on mechanisms used for detecting human body sensors.

Whereas, the researchers in [3] presented an adult Safety System (WSS) that is designed especially for the protection of women and send message for the situation of danger. The WSS device is designed in a smart jacket that is not wearable everywhere and anytime. However, the model presented in this study is designed to be adjusted in various number of wearables that can be used in any situation.

Reference [4] presented a systematic literature review on the role of IoT in woman's safety .The researchers gathered and conducted online searches on women's safety devices showing new as well as emerging technologies. However, this study has utilized the IoT-based technologies efficiently by proposing an IoT based women's safety architectural model.

Suraksha[5] is a stand-alone device which can be triggered in three ways either voice, switch, and shock/ force. Voice is the voice of victim. The device will recognize it and automatically send distress messages. Switch is a simple on/off trigger, and shock/force- whenever this device is thrown it will use force sensor to start functioning by giving the information of the location of the victim to her members of family and friends.

Poonam et al. [6] developed a safety device that uses an ATmega 328 microcontroller without any android application which makes it a stand-alone device. It uses GPS and GSM modules to track the location and then send it to the family members and friend, alerting them about the current location of the woman.

A self-defence women safety system [7] is proposed which when triggered by a switch, automatically sends the location of the victim to their concerned one. In addition, the device will also play a prerecorded message using speech circuit to alert the surroundings.

The device (FEMME) [8] proposed by the authors has an android application. Its basic functionality is to send an SOS message, record audio and video of the whole incident as evidence. It also has a module which detects hidden cameras using a radio frequency receiver, which collects/ detects electromagnetic waves that are emitted from the spy camera.

In this paper we proposed GSM and GPS smart security shoes. When victim face any problem ,then she one show to another, then hall sensor sense the signal and it send the Arduino Nano. Arduino Nano send SMS to guardian or police.

III. Proposed Design for Women Safety Device

The security device is made up of Arduino Nano, SIM800L Modem, and NEO-6m module including GPS and GSM antenna. The core part of the Security system is the microcontroller Arduino Nano. The geo location of a security device can be captured through a GPS receiver and that data will be transmitted to the web server by using GSM technology. That data will be stored in a database. For monitoring the location of the security device on the map, we developed a web application. For storing the location data, a text file had been used. We also developed a mobile application to view the location of a security device on a mobile device by using Android Studio.

The SIM800L modem is initialized to start gathering geolocation data from the satellite; device initialization is done using AT commands and includes GPS and GSM module; to turn on the GPS, first, it is powered on and put in reset mode. Then the module becomes ready for receiving coordinates from the satellite. The GPRS is next turned on; the process includes GPRS power on, setting APN of service provider, initiating HTTP protocol, and setting protocol method (Get method). The device initialization process may take up to 1 minute to worm up and calculate the accurate position. In case of network unavailability, the acquisition GPS coordinates and other data such as time and speed are stored temporarily until the network returns back to service then the stored coordinates are sent with their time stamp and speed. SIM900L requires a 2A peak current. So, an external power supply like a 4.2V-2A battery is used to provide the power.

GPS antenna and GSM antenna are connected to the port of the SIM800L modem. The module and Arduino have a common ground. We uploaded the program into the Arduino microcontroller which program is written in C programming language. Uploading the program into Arduino is done by using Arduino IDE software.
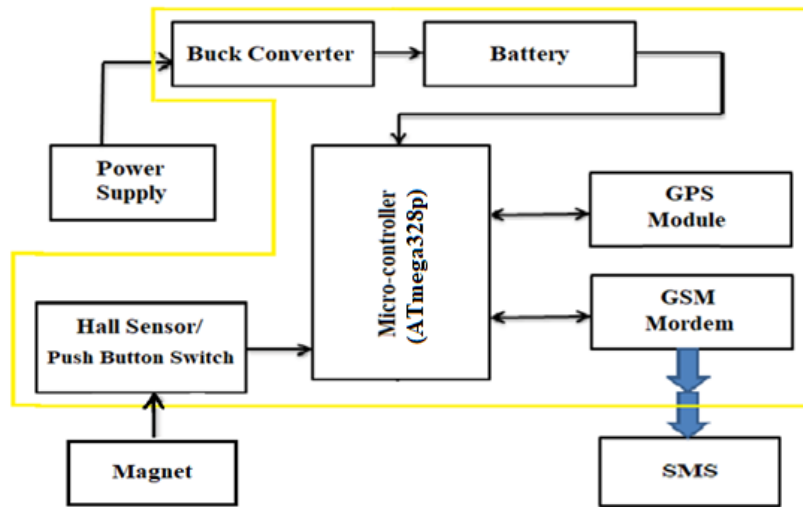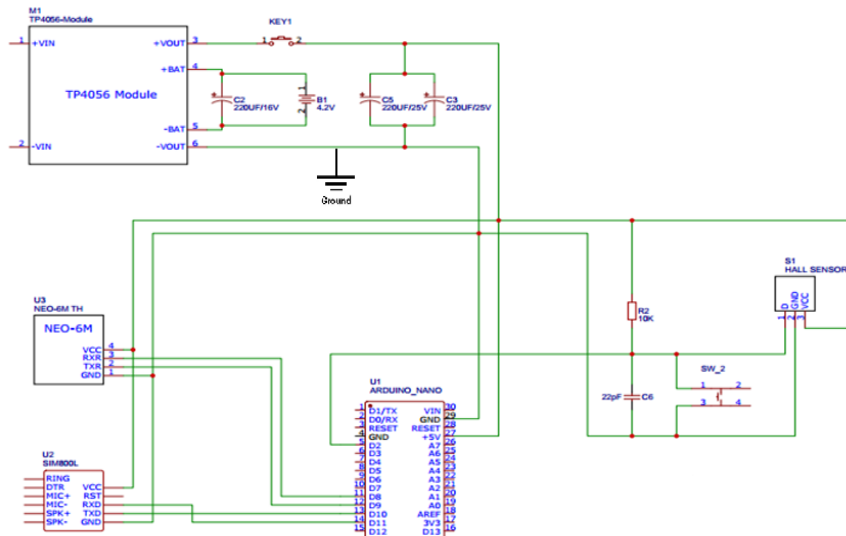

Figure.1: Block Diagram.

Figure.2: Schematics Diagram.

Most people are familiar with the phrase GPS tracking device and what its main purpose is. However, not many people know what are the main principles of GPS tracking device. Therefore, we give you a short introduction to the main principles of GPS tracking device. Power Supply 5v output for buck converter. Buck converter convert 5v to 4.2v for Battery recharge. Battery also powered Micro-controller, GPS module, GSM modem and Hall sensor. Micro-controller is main unit and this unit operate full system when Micro-controller through the GPS signal GSM communicate another Mobile. GPS module send longitude and latitude data in Micro-controller. When the magnet comes to the Hall sensor or Push-button press, signal input Micro-controller and then SMS or Call guardian or Police. The block diagram and symmetric diagram are shown in figure 1 and figure 2.
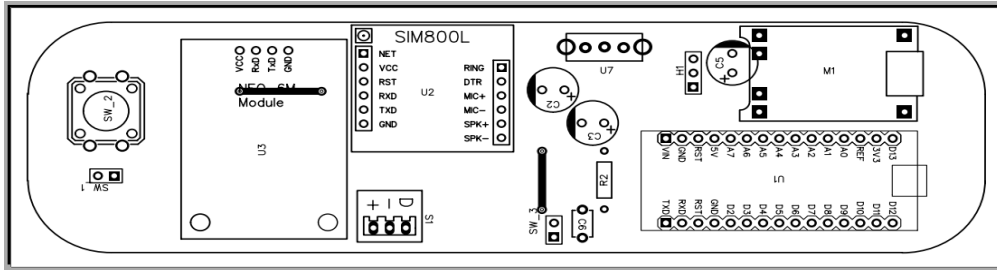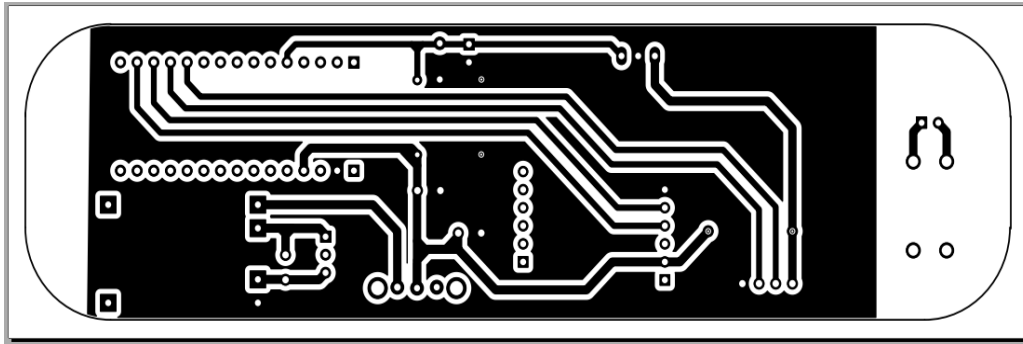
Figure.3: PCB Design (Top Silk).
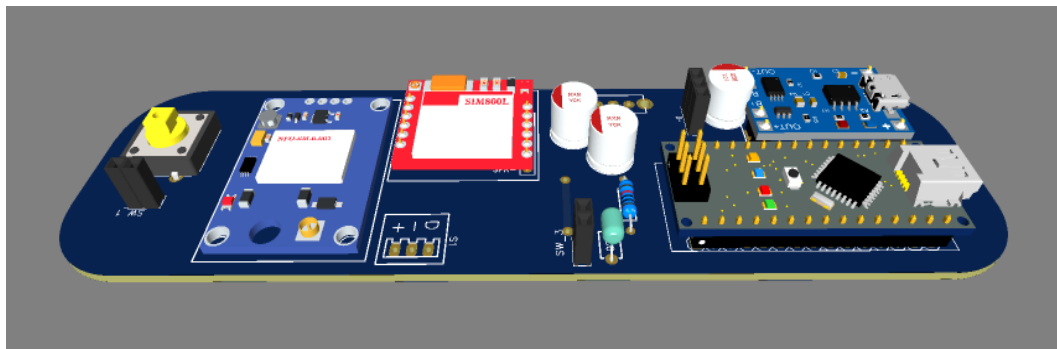

Figure.4: PCB Design (Bottom).
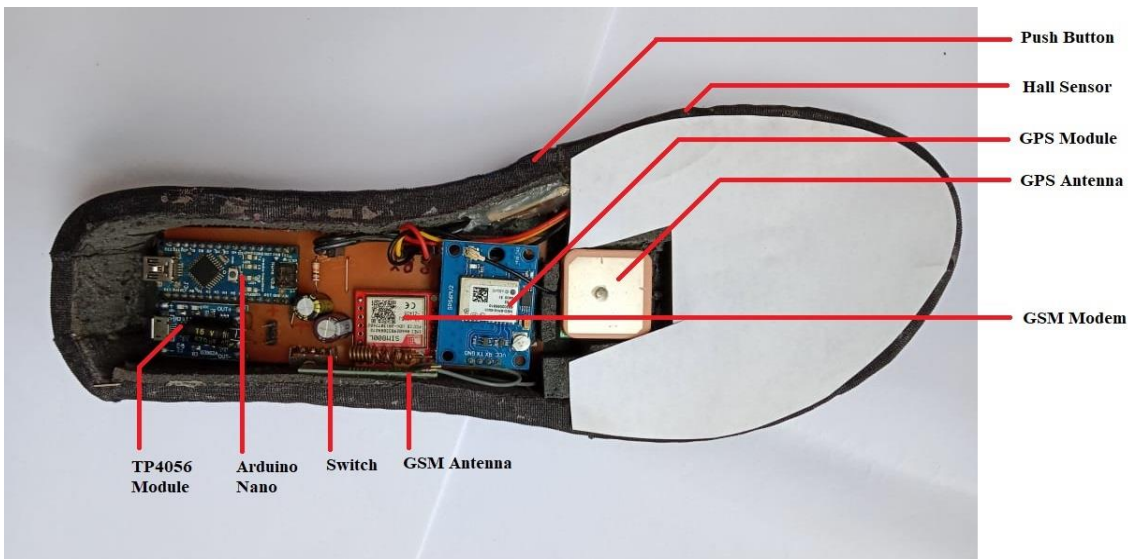

Figure.5: 3D design of PCB.

Figure.6: Real picture of Shoes (Right leg).

Figure.7: Real picture of Shoes (left leg).

Figure.8: Real picture of Shoes.

IV. Result and Discussion

This section presents the results of the experiments conducted with the proposed hardware design and the android application. Initially, the GSM module is verified whether it is properly connected, verified and configured as shown in Fig 8. When victim face any problem she teach his one shoe to another shoe, then using GSM the location of victim send to gradient or police as SMS. When gradient type G and send SMS to the victim shoes number then GPS and GSM system send the victim location of gradient phone as SMS as shown in figure 9 and figure 10.
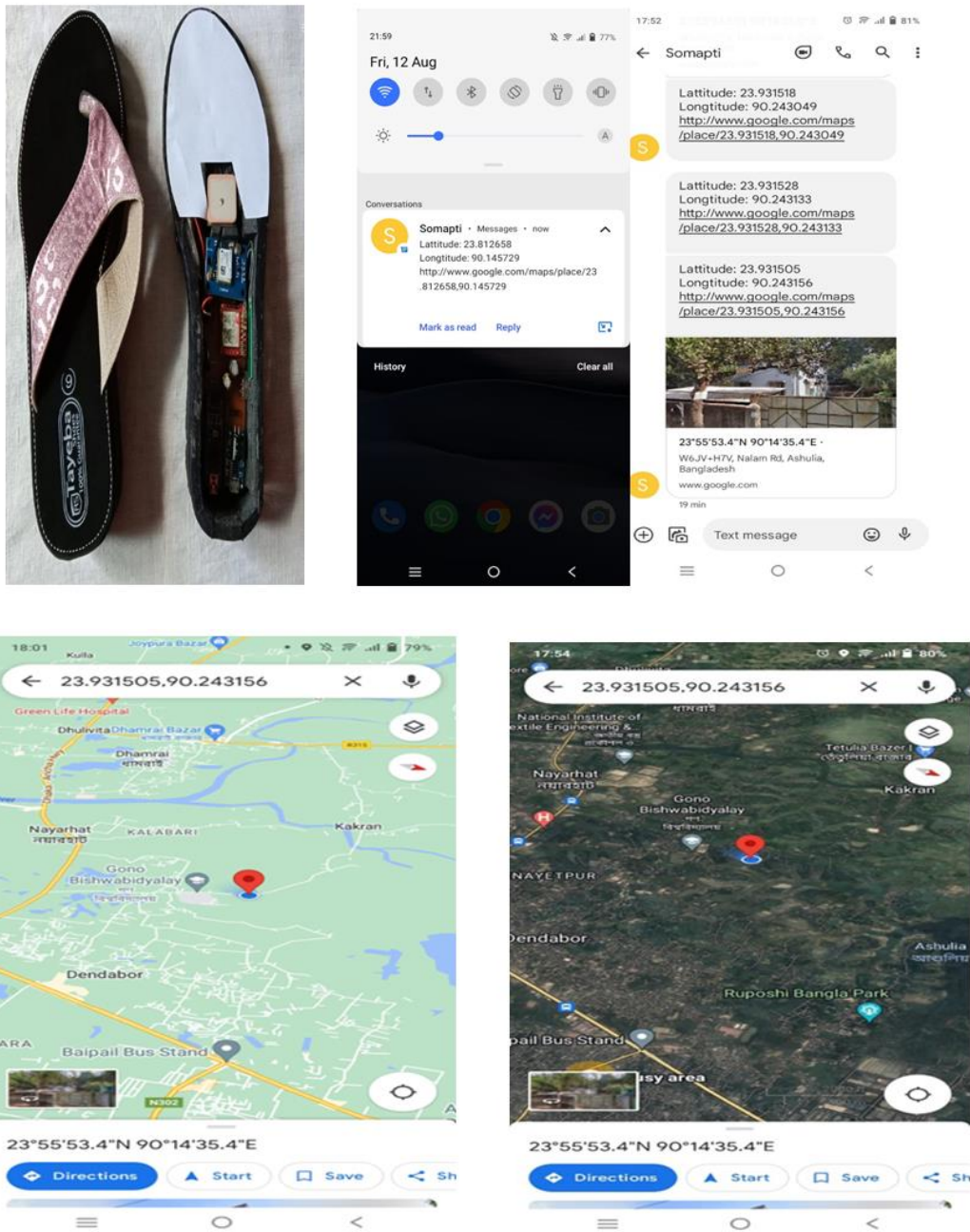
User to guardians or Police

Figure.9: User to guardians or Police.

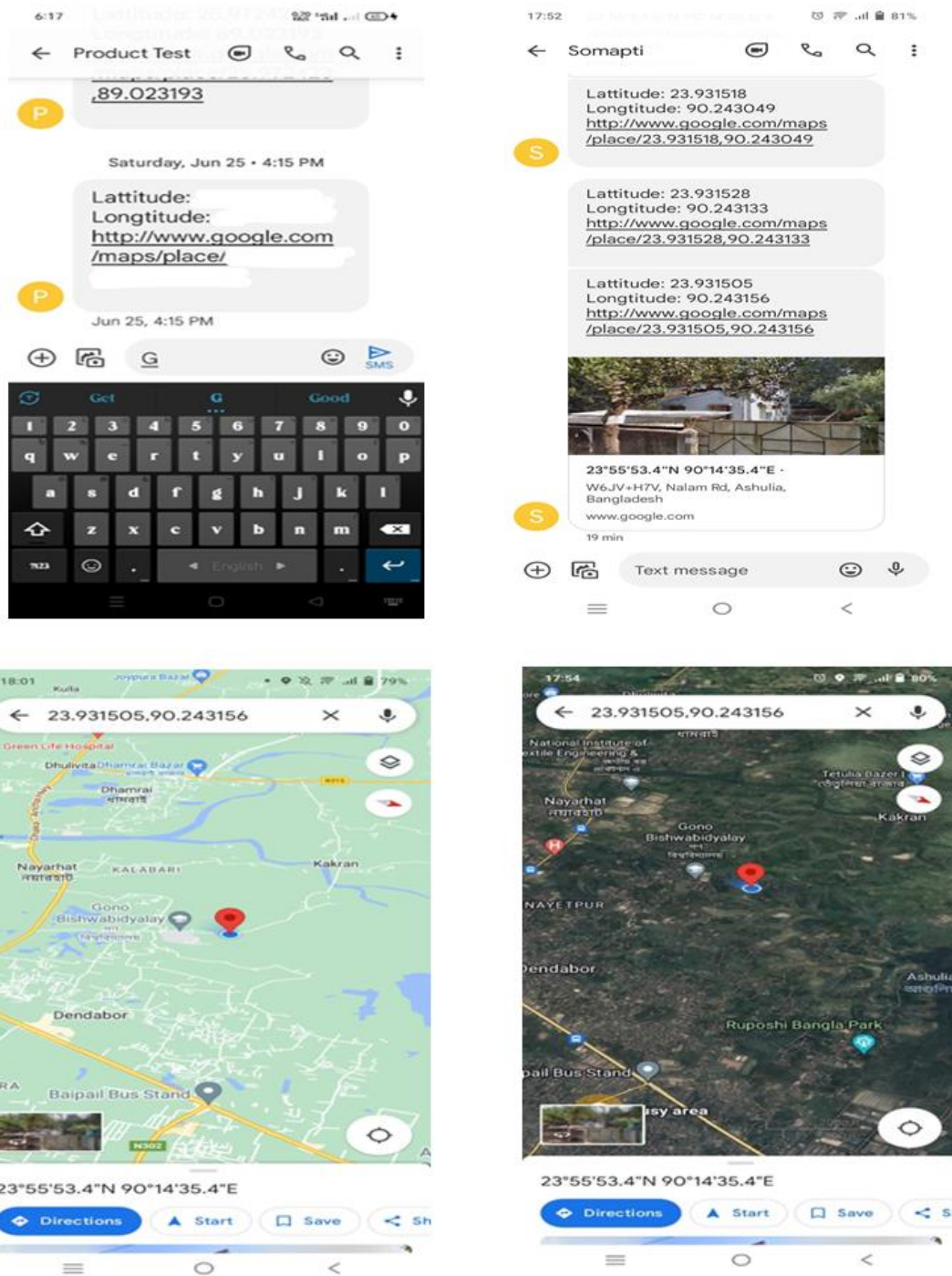**Guardians to guardians or Police to Police**

Figure.10: Guardians to guardians.

V.   Conclusion

The request has been made for a new woman safety system. GPS and GSM technology has successfully developed, planned and tested a smart women's security solution. The concept proposed deal with significant issues facing women in the near past and allow them to unravel the principles and technically sound equipment. This program should resolve the fear that every woman in the country is alarmed about her security. Improves the new design that places the location of the consumer in danger through the use of the smartphone application (Bluetooth electronics). The location Message of the client sent to the predefined contact (police, family and companions). Therefore, they can arrive in the client to assist quickly by getting the location co-ordinates by accessing Google Maps. This advanced design has a high impact on society by helping women to

overcome their fear and can wander unreservedly and total their works.

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