Senior Safe Tech

Empowering Elderly Well being through Mishap Detection and Reporting

BY:-

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INTRODUCTION

- The idea of such system has been inspired due to the fact that elderly people are dying and getting critically injured due to falling. Most of the elderly people are suffering from joint pain, back pain, knee pain etc. Moreover some of them are confined to bed as they are not able to walk. The falling of elderly people is more evident as their power diminishes due to ageing.
- Falls pose a serious challenge to the elderly people suffering from heart diseases. The IoT based fall detection system described in this article helps elderly people by informing their caretakers about their fall in order to draw immediate attention and to take necessary actions in order to save the injured person.

LITERATURE SURVEY

Warunsin et al.'s study (-2022)presents”Fall Detection System Using Deep Learning” an innovative fall detection wristband utilizing the MobiAct dataset, deep learning algorithms, and the ESP32 microcontroller. The system, equipped with an (a)accelerometer,(b) SOS switch,(c) LED indicator, and (d)buzzer, achieves a remarkable 96.55% accuracy. This study exemplifies how literature reviews in eHealth can identify technological advancements and evaluate their effectiveness, highlighting trends in the use of deep learning for practical applications such as fall detection.[1]

Pech et al.'s study(2021) presents ”Falls Detection and Prevention Systems in Home Care for Older Adults: Myth or Reality” an innovative fall detection system using non-invasive, low-resolution thermal sensors and advanced AI algorithms to achieve a 93% accuracy rate. This study exemplifies how literature reviews in eHealth can identify technological advancements and evaluate their effectiveness, highlighting trends in the use of AI for practical applications such as fall detection and prevention in home care settings.[2]

OBJECTIVE

- To design and create a wearable Fall Detection System for the elderly that can link wirelessly with a pre-programmed laptop computer or mobile phone.
- To alert when a fall event has occurred and save individuals life.
  Medical Alert System Affordable to everyone.
- To get Medical Assist available for elderly people.

COMPONENTS

1. GSM Module
2. Esp8266
3. ADXL345
4. GPS module
5. Piezo
6. Push Button
7. Jumper wire
8. Breadboard

GSM MODULE

A GSM module is a compact electronic device that enables communication via GSM (Global System for Mobile Communications) networks. It integrates with microcontrollers or other systems to send and receive calls, texts, and data over cellular networks, facilitating remote monitoring, control, or communication in various applications, such as IoT devices, security systems, and industrial automation.

ESP8266

- ESP8266 is a low-cost Wi-Fi module used for Internet of Things (IoT) applications.
- It integrates a microcontroller with built-in Wi-Fi capabilities.
- The module supports the ESP8266 firmware, enabling it to connect to Wi-Fi networks.
- ESP8266 can be programmed using the Arduino IDE, making it popular for DIY projects.

ADXL345

- The ADXL345 is a small, low-power, 3-axis accelerometer sensor capable of measuring acceleration in various applications.
- It communicates via I2C or SPI protocols and provides high resolution and accuracy. With its compact size and low power consumption,
- it's widely used in motion-sensing devices, inertial measurement units (IMUs), and tilt-sensing applications, offering precise motion detection and orientation tracking capabilities.

GPS Module

- GPS modules receive signals from GPS satellites for accurate location determination.
- NEO-6M is a highly regarded GPS module known for its performance.
- It features an integrated 25x25x4mm ceramic antenna for improved signal strength.
- Equipped with power and signal indicators for status monitoring.
- Used in various applications for precise positioning and navigation

Piezo

- A piezo buzzer is a small acoustic signaling device that produces sound by using the piezoelectric effect
- It contains a piezoelectric ceramic disc that vibrates when an electric voltage is applied, generating audible vibrations.
- Known for simplicity, durability, and efficiency, due to their compact size and low power consumption.
- They offer adjustable sound frequencies and volumes based on input voltage and design, making them versatile for various applications, providing reliable audible feedback in electronic devices.

Push button

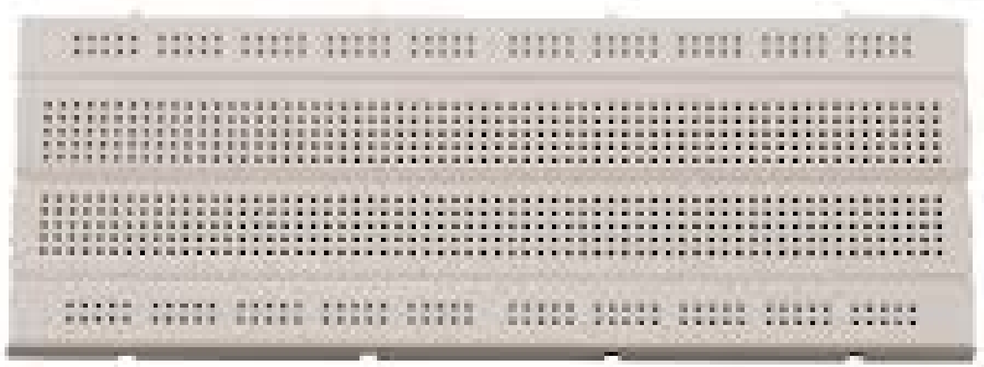
- A push button is a momentary switch that completes or interrupts an electric circuit when pressed.
- It typically consists of two contacts that close when the button is pressed, allowing current to flow.
- Push buttons are widely used in electronics for tasks such as triggering actions or input signals.

Jumper Wires

- Jumper wires have connector pins at each end for easy connections.
- They facilitate point-to-point connections without the need for soldering.
- Frequently used with breadboards and prototyping tools.
- Ideal for quickly modifying and adjusting circuits during experimentation and development.

Breadboard

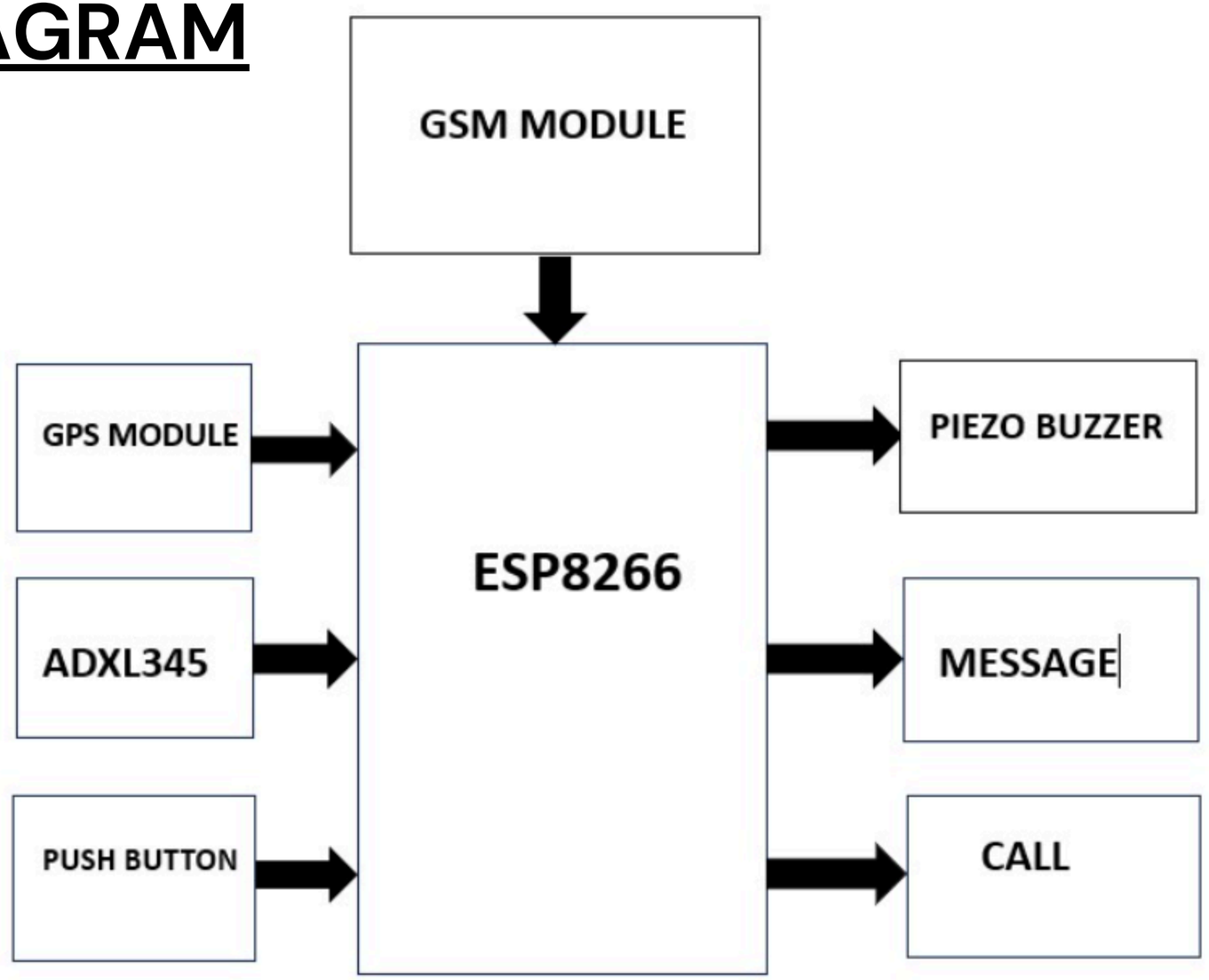
- **1.** A breadboard is a solderless device used for prototyping electronic circuits.
- 2. It consists of a grid of interconnected metal clips for component placement.
- 3. Components like resistors, LEDs, and wires can be easily inserted into the holes.
- 4. Breadboards allow for quick and temporary circuit construction and testing.
- 5. They are widely used in electronics education and prototyping.



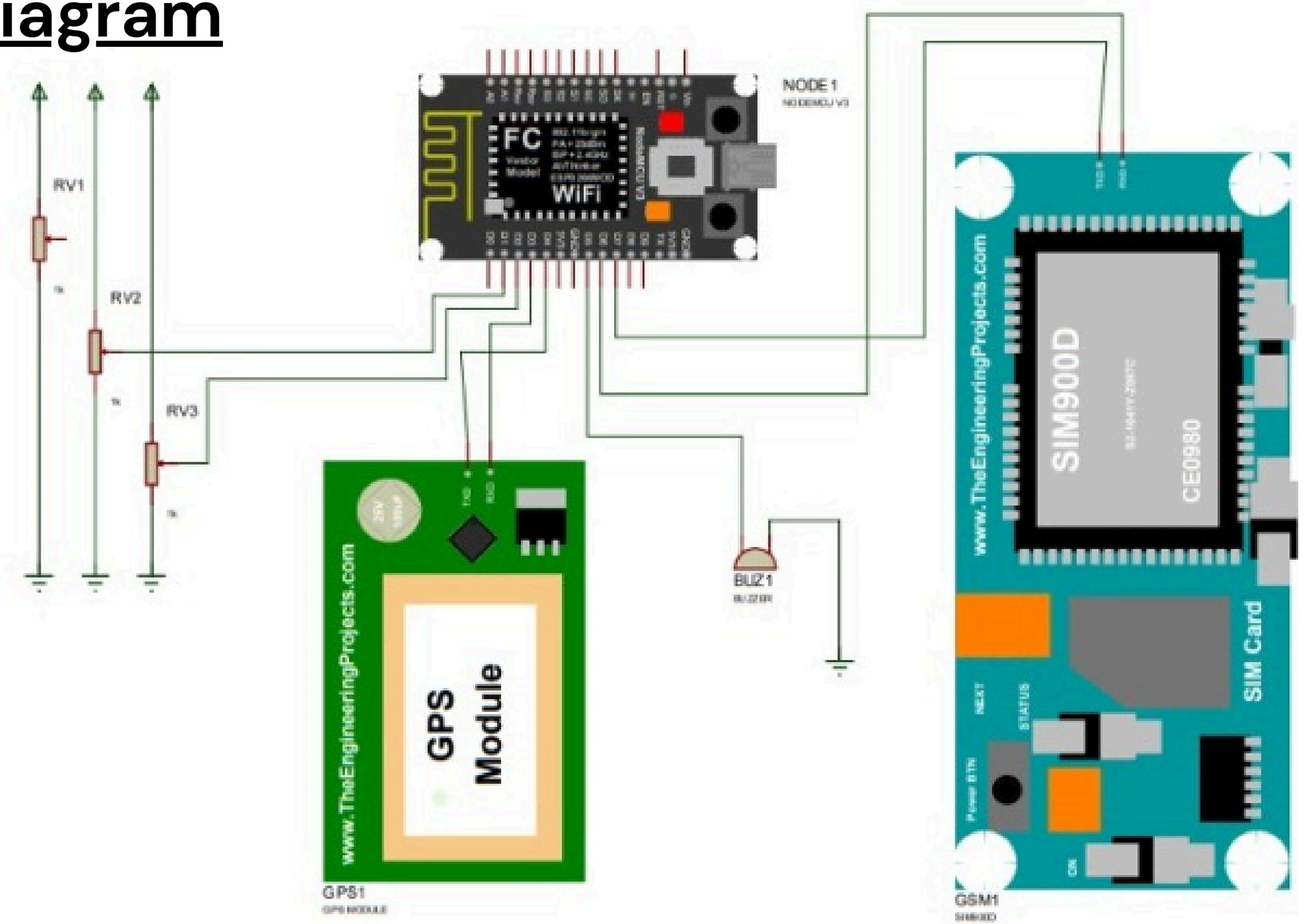
Working

- The Senior Safe Tech system utilizes an ESP8266 Fall Detection Device, integrating an ESP8266 development board with ADXL345 sensors for fall detection, a Piezo buzzer for audible alerts, and a GPS module for real-time location tracking.
- Gsm module integrates calling the respective person assigned for assitance of senior citizen
- Leveraging built-in WiFi, the system sends SMS alerts for emergencies.
- The integration of an event cancellation button allows for manual intervention.
- The device undergoes rigorous assembly, calibration, and testing processes to ensure accurate fall detection, underscoring its reliability in enhancing user safety.

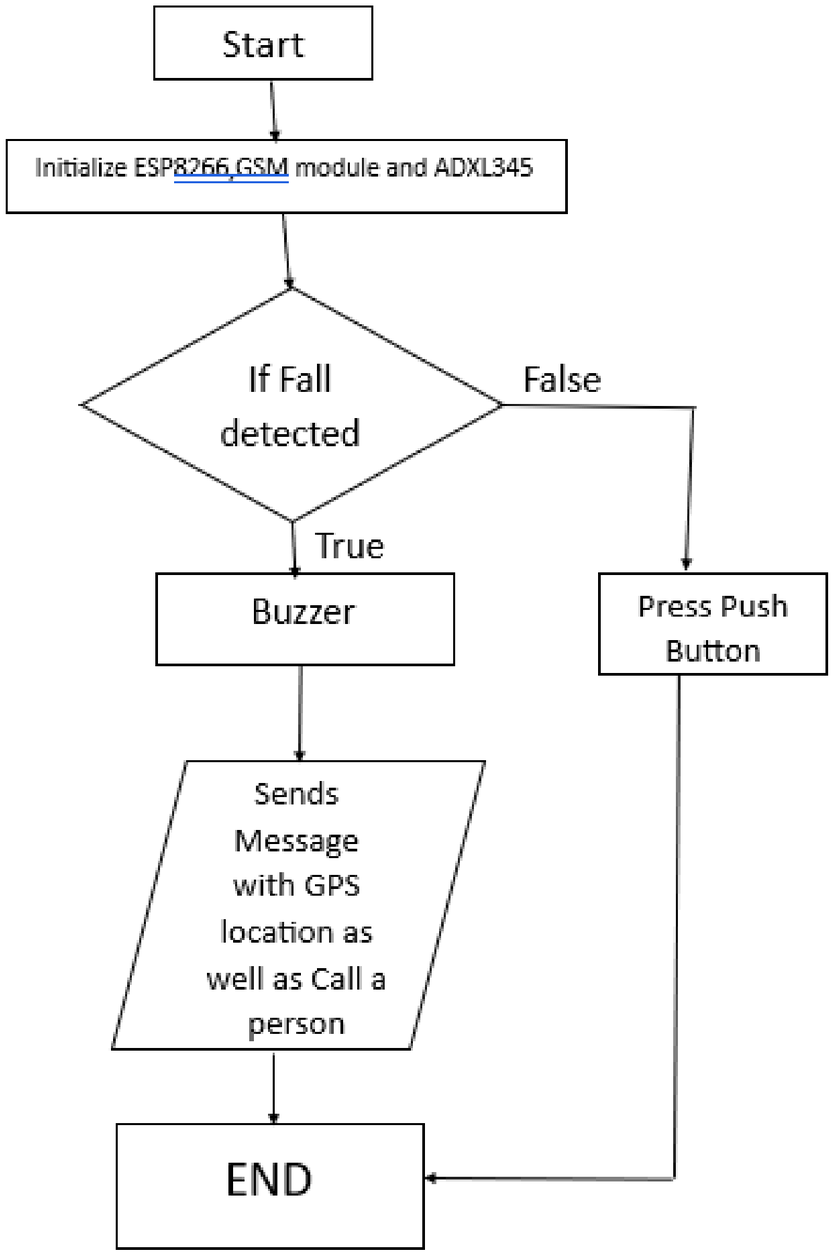
BLOCK DIAGRAM



Circuit Diagram



Flowchart


Start
Initialize ESP8266,GSM module and ADXL345
If Fall detected
False
True
Buzzer
Press Push Button
Sends Message with GPS location as well as Call a person
END

ADVANTAGES

- The system reduces number of deaths of elderly people.
- The system relieves tension of caretakers of the elderly people.
- Moreover the caretakers need not have to be present 24 x 7 with the elderly people and hence it saves time.
- The system does not cost much due to availability of cheaper components.
- The system provides immediate first aid by alerting caretakers immediately

APPLICATION

1.**Elderly Care Facilities**: Alerts caregivers to falls for quick response.
2. **Home Healthcare**: Remotely monitors patients and alerts caregivers or family to falls.
3. **Independent Living for Seniors**: Acts as a safety net for seniors living alone, providing peace of mind.
4. **Assisted Living Technology**: Integrates with smart home systems to trigger helpful actions during falls.
5. **Remote Monitoring and Telemedicine**- Enables healthcare professionals to remotely monitor and respond to patient falls.
6. **Emergency Response Services:** Alerts responders to falls, reducing response times and improving outcomes.
7. **Workplace Safety**- Provides immediate assistance to workers in high-risk industries after falls.

RESULT

The implementation of Senior Safe Tech has proven transformative in safeguarding elderly well-being, particularly through its innovative fall detection approach. This solution combines advanced hardware and software to ensure rapid response and assistance in the event of a fall, significantly enhancing seniors' safety and security. By leveraging state-of-the-art sensors and algorithms, the system accurately identifies falls and promptly notifies caregivers or emergency contacts with precise GPS coordinates, ensuring swift and efficient assistance.

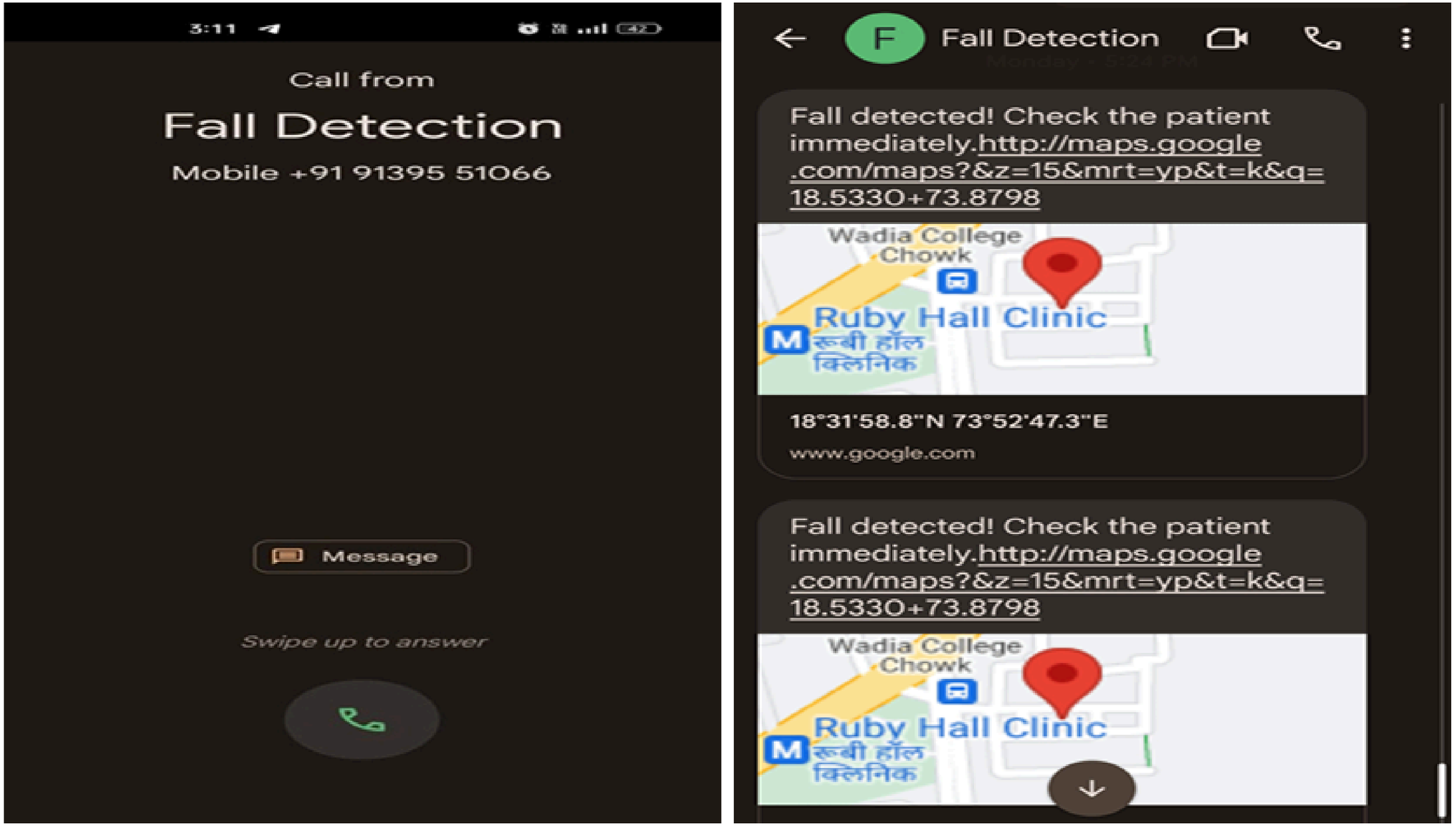


Figure 9.1: Call and Message send to the caretaker

CONCLUSION

We can conclude that

- Elderly fall detection system uses IoT tech.
- Enhances care, reduces response time, saves lives.
- IoT enables data collection and real-time alerts.
- Ethical concerns managed; scalability is vital.
- Continuous improvement ensures system effectiveness.

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THANK YOU