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Stealth Listening Device and Global Positioning System Tracker

Prathamesh Gijare[1], Sudhanshu Jadhav[1], Shraddha Mishra[1], Savita R. Bhosale[2,*]

Abstract

The Audio Spy and GPS tracker device functions as a covert listening tool, enabling users to secretly overhear conversations through a cellular network. Additionally, it serves as an SOS (Save Our Souls) button, allowing users to send their current location via SMS with a simple press of a button. This feature also initiates a call to a designated SOS number, while the device can be tracked by sending a single SMS. In response, the board will share a Google Maps link to its present location. We have developed a robust system tailored for vehicles, employing advanced GPS and GSM technologies to deliver accurate results. In the event of theft, this system offers effective vehicle tracking, alerting the owner almost instantly after the incident occurs. Following the theft, the device will immediately start sending location coordinates to the owner and continue to do so at specified intervals. This functionality allows the owner to track the vehicle easily and seek assistance from law enforcement. Moreover, the owner can monitor the vehicle's location through SMS when it is being used by authorized individuals, such as friends or family.

Keywords: Audio Spy, GSM, GPS tracker, GPRS, mobile communication

INTRODUCTION

A GPS tracking unit harnesses the power of the GPS to accurately ascertain the location of a vehicle, person, or any valuable asset [1]. It can store this location information internally or transmit it to a central database or an internet-connected computer via cellular general packet radio service (GPRS) SMS, radio, or satellite modems integrated into the device. In contrast, a multipurpose GPS tracker is a flexible tool that leverages GPS technology to instantly identify and track the positions of different objects, vehicles, and people [2].

These trackers have become indispensable tools in various industries and for personal use, providing a wide range of functionalities beyond location tracking. These trackers are typically compact and can be attached to or concealed within objects or vehicles, making them ideal for various applications [3]. Below is a brief introduction to the key features of multipurpose GPS trackers.

***Author for Correspondence**
Savita R. Bhosale
E-mail: savita.bhosale@rait.ac.in

[1]Student, Department of Electronics Engineering, Ramrao Adik Institute of Technology (RAIT), Nerul, Navi Mumbai, Maharashtra, India
[2]Professor, Department of Electronics Engineering, Ramrao Adik Institute of Technology (RAIT), Nerul, Navi Mumbai, Maharashtra, India

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Real-time Location Tracking

Multipurpose GPS trackers provide precise real-time location data, enabling users to monitor their assets effectively. This characteristic is vital for improvement. This functionality is essential for improving safety and asset management [4]. Many GPS trackers allow users to set up geofences, which are virtual perimeters that are defined on a map. When the tracker enters or leaves a predefined area,

the user receives alerts, making it useful for keeping track of assets and ensuring the safety of loved ones. Versatile GPS trackers retain historical location information that can be retrieved and examined later.

- *Geofencing:* This information can assist users in making informed choices, monitoring the movement of items, and reviewing previous routes [5].
- *Asset and vehicle management:* Businesses can use these trackers to manage their fleets, monitor the usage of company vehicles, and optimize logistics. Asset tracking can also prevent theft and loss of valuable equipment.
- *Personal safety:* GPS trackers are valuable for ensuring the safety of children, elderly family members, or individuals with special needs. In the case of an emergency, or if a loved one wanders off, caregivers can quickly locate them [6].

Athletes and fitness aficionados utilize GPS trackers to oversee their training sessions, trace running or cycling paths, and assess performance metrics like speed, distance, and altitude [7].

- *Pet tracking:* Multipurpose GPS trackers are also used for tracking pets, preventing them from getting lost, and ensuring their safety.

Some trackers offer additional features such as activity monitoring and the ability to set virtual boundaries.

- *Outdoor adventures:* Hikers, campers, and outdoor enthusiasts benefit from GPS trackers that provide accurate location information, help them navigate, share their adventures, and request assistance during emergencies [8].
- *Theft recovery:* GPS trackers installed in valuable items such as laptops, bikes, or smartphones can aid in recovering the stolen property by pinpointing its location.
- *Personal security:* Individuals can carry [9].

LITERATURE SURVEY

In recent times, there have been major advancements in tracking systems that extend ahead of monitoring vehicle locations on a map. These systems also enable tracking of the movements of individuals. The need to track a person's mobility has become increasingly important, whether for keeping tabs on a suspected criminal, aiding a detective in solving a case, or serving various other practical purposes [2].

GPS Tracking System (Amany El Gouhary et al.)—This work aims to design and implement a handy wireless GPS tracking device that can be tracked using the internet [10].

A GPS safety-tracking device (Sarah Yun Tiong et al.)—This project aimed to create a device that monitors real-time locations through a mobile application utilizing GPS technology. The main aim was to make people's lives easier by gaining attachment and locating their belongings within seconds [11].

An electronic device was developed that can be installed in a vehicle for accurate vehicle tracking. The study implemented a complete vehicle tracking system that was built using the concepts of modern GPS and GSM technologies [12]. Using this system, one can easily monitor and check the status of the target vehicle in demand [13].

With the advancement of location tracking systems using SMS based on GPS Unblox Neo-6m and SIM 800l modules, the focus of this work was to design a location tracking system according to the requirements of society [14].

HARDWARE IMPLEMENTATION

Components

Seed Studio XIAO ESP32C3 is a development board with an ESpressif32-C3 Wi-Fi/Bluetooth dual-mode chip. ESP32-C3 is a 32-bit RISC-V CPU. It supports IEEE 802.11b/g/n Wi-Fi and the Bluetooth 5 (LE) protocol [15]. Seeed Studio is shown in Figure 1.

Figure 1. Seed Studio XIAO ESP32C3.

A9G GPRS+GSM Module

A9G is an all-in-one quad-band GSM/GPRS+GPS module built on the RDA8955 chip. They can be used in various applications [7]. In addition, the module features 29 GPIOs and an integrated SDK that can significantly ease custom development [16]. The A9G GPRS+GSM Module image is shown in Figure 2. The Schematic diagram and hardware device image of the audio Spy and GPS tracker devices are illustrated in Figures 3 and 4.

SOFTWARE IMPLEMENTATION

To program the XIAO ESP32C3 using Arduino requirement

- Arduino IDE
- XIAO ESP32C3 board
- USB cable
- Software setup

Open the Arduino IDE and move to the board and manager. In the search box, type “ESP32” and select the latest version of ESP32 [17]. Click Install. Once the ESP32 board is installed, go to the tools board and select the ESP32 Arduino XIAO ESP32 C3. The XIAO ESP32C3 board was connected to the computer using a USB cable.

Navigate to the tools menu and then choose the serial port corresponding to the connected XIAO ESP32C3 [12]. To use the A9G module commands using Arduino, the module needs to connect the A9G module to the Arduino board using a serial connection. Once the two devices are connected, the serial library in Arduino can be used to send and receive commands to and from the A9G module [18].

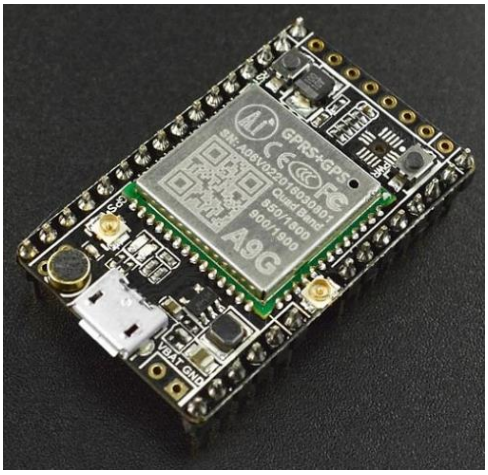

Figure 2. A9G GPRS+GSM module.

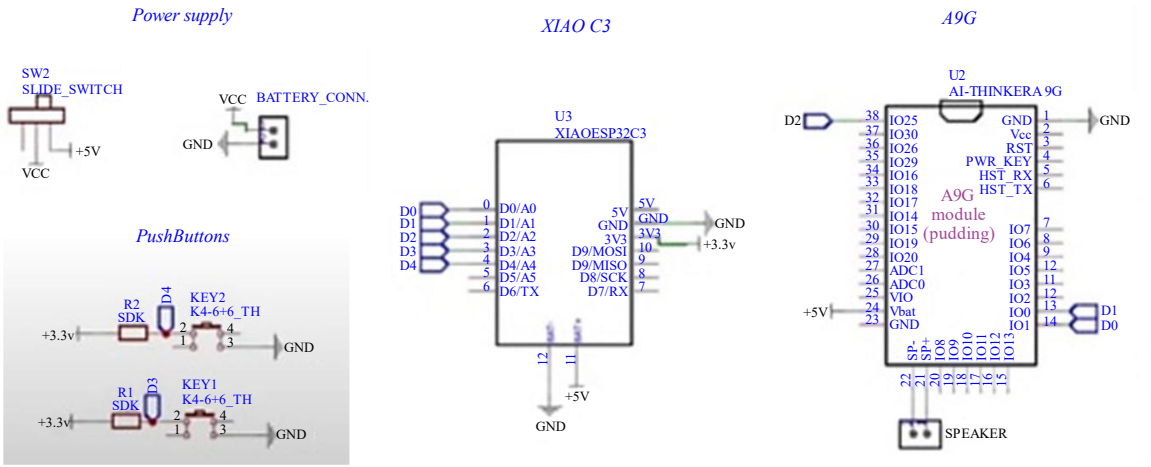

Figure 3. Schematic diagram.

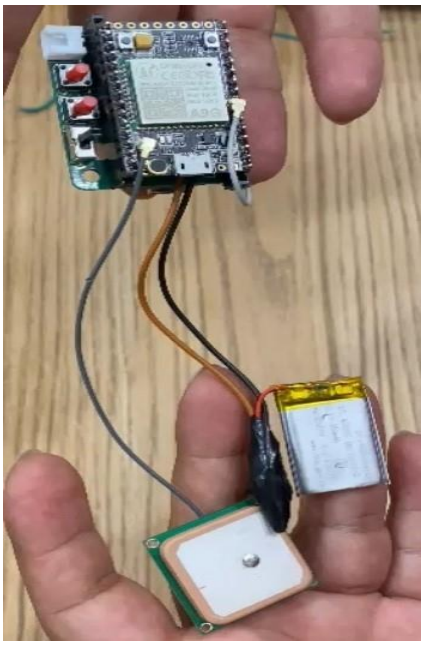

Figure 4. Audio spy and GPS tracker device.

These devices can be discreetly activated to send distress signals or location updates to trusted contacts and authorities. Multipurpose GPS trackers have revolutionized the monitoring, safeguarding, and management of various assets and individuals [19]. Their diverse range of applications continues to expand as technology evolves, making them invaluable tools for both personal and professional use [20].

RESULTS AND DISCUSSION

- The code was compiled on the Arduino IDE and XIAO ESP32 C3 development boards. The audio spray and GPS tracker device were placed in an outdoor area for testing, and the mobile phone was taken a bit far from the tracking device to ensure proper results.
- As the phone messages “Send Location” on the SIM card’s number which is placed inside the device after 5 to 10 seconds the SIM card which is in the tracker device sends the message “I AM HERE” with the longitudinal and latitudinal coordinates with the Google map’s link with it.
- Thus, the location of the device was tracked by clicking on the link provided by the tracker.
- If the phone and tracking device are nearby, or if there is some error, then it messages the phone numbers as “unable to detect the location. Please try again”.

Figure 5. GPS location tracking.

Figure 6. GPS coordinates.

Figure 7. Audio spy.

- If we call the number whose SIM card is placed inside the tracking device, the call is answered, and it acts like an audio spy device as we can hear the voices surrounding the tracking device; thus, it can also be used as an audio spy device.
- The results of GPS location tracking, GPS coordinates with Google Maps link, and audio spy are illustrated in Figures 5–7, respectively.

CONCLUSION

The project successfully created a functional audio spray and GPS tracker device. It offers audio recording and real-time GPS tracking. The proposed system provides effective tracking of vehicle and children's safety. Battery optimization extends the device's operation. Thus, real-time monitoring is convenient. Ongoing improvements are based on user inputs and evolving needs.

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