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Multipurpose IOT Tracker

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ABSTRACT: This paper is about a new Internet of Things (IoT) device, the Multipurpose IoT Tracker, designed to serve a myriad of applications, marking a significant advancement in smart technology. The device seamlessly integrates three key features – GPS tracking, an SOS functionality, and an innovative audio surveillance feature – to create a versatile tool applicable across diverse scenarios.

The hardware architecture encompasses an A9G board and an ESP32 microcontroller intricately assembled on a meticulously designed compact PCB, ensuring optimal performance and versatility. The GPS tracking feature provides real-time location data, offering precise tracking capabilities for assets, individuals, or vehicles. The SOS feature empowers users to swiftly communicate distress signals, triggering immediate alerts, thereby enhancing personal safety and security.

A distinctive feature of the Multipurpose IoT Tracker is its audio surveillance capability, enabling remote real-time listening. This opens up possibilities in security, surveillance, and monitoring contexts, further broadening the device's range of applications. The compact and thoughtfully engineered hardware design enhances portability, allowing the device to seamlessly integrate into various environments and situations.

Beyond its core functionalities, the Multipurpose IoT Tracker serves security, surveillance, and personal safety needs, showcasing the practicality of IoT solutions in diverse domains. Moreover, its adaptable nature encourages creative applications, making it a versatile tool for addressing unique challenges in innovative ways.

KEYWORDS: Internet of Things (IoT), A9G Module, ESP32, location tracking, SOS feature, audio tracking, Google Maps, Compact size.

I. INTRODUCTION

This project is all about creating a super useful device that can do a bunch of important things all at once. Most devices out there only do one thing well, like finding where something is or listening to sounds. But they often have problems like not working in real-time, using up a lot of power, or not being very safe.

Our idea is to put all these cool features into one small device that's easy to carry around. We're using a special A9G module and an ESP32 microcontroller on a custom-made PCB to make it happen. This way, we can make a device that's good at lots of stuff. We want it to last a long time without needing to charge, and we want it to be super safe and secure.

Our device can do some really neat things. You can find out exactly where it is by just sending a simple message. It'll send you a link on Google Maps with the right spot. You can also listen to what's going on around the device through a special secure network, which is great for keeping things safe and watching over stuff.

One of the most important parts of our device is the SOS button. When you hold it down, it does two important things. First, it sends a message with the exact location, and second, it makes a call for help. This makes it a super handy tool for all sorts of situations, like staying safe, watching over things, and getting quick help when needed. Our project is like filling a gap in the tools we have now, making a device that's ready for lots of different uses.

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II. PROBLEM STATEMENT

This project tackles the problem of not having a complete IoT device that can do different things like tracking where something is, listening to sounds around it, and sending out an SOS alert. Right now, most devices are good at only one

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of these things, and they might not be very good at doing it in real-time. They also might use a lot of power or not be very secure.

Our solution is to put all these cool features into one small device. We use a special A9G module and an ESP32 microcontroller on a custom-designed PCB to make it happen. By doing this, we hope to make a device that can do many things well. We want it to be power-efficient so the battery lasts a long time, and we want it to be really good at keeping things safe and secure.

The goal is to create a device that can be used in lots of different situations – like keeping track of valuable things, listening to what's happening around, and sending out a quick SOS if needed. We believe that by making a device that can do all these things in one, we're filling an important gap in the current tracking devices available. This way, people can have a handy and reliable tool for security, surveillance, and personal safety.

III. OBJECTIVES OF THE PROJECT

1) Integration: Integrate functionalities of a GPS Tracker, SOS alert device and calling device into a single compact device.
2) Real-time Tracking: To provide instantaneous location updates to the administrator.
3) Portability: Making a tracker that is lightweight and compact to be easily carried with.
4) Power Efficiency: Make a tracker device with minimal power consumption and long battery life.

IV. SCOPE OF PROJECT

This project encompasses the comprehensive development and implementation of an IoT Multipurpose Tracker. The key components include the design and fabrication of the tracker device's hardware, the creation of firmware responsible for communication and data processing, and the incorporation of a SIM service. The project's scope extends to diverse applications.

Firstly, we will meticulously design the form and functionality of the tracker, outlining its specifications and capabilities. Subsequently, we will undertake the development of the hardware components, crafting the necessary electronic elements for the device.

Following hardware development, we will focus on creating the firmware, the intelligent software that facilitates communication and efficient processing of data within the tracker. This firmware is integral to ensuring the smooth operation of the device.

In addition to the hardware and firmware components, a SIM service will be implemented. This service functions as the tracker's unique identifier, enabling seamless communication and data transmission to designated destinations.

Importantly, the scope of this project is not limited to a singular purpose but extends to a variety of applications. The goal is to create an IoT Multipurpose Tracker, offering versatility and adaptability for a range of functionalities. This project aims to deliver a sophisticated and versatile solution that meets the requirements of diverse use cases.

V. EXISTING SYSTEM

Presently, numerous tracking systems are available, each tailored for specific needs. However, a noticeable gap exists in the market for a versatile, all-encompassing tracker. The prevailing systems often exhibit a proprietary nature, restricting their adaptability to various domains. They may encounter challenges such as limited real-time tracking capabilities or larger physical dimensions. Moreover, certain systems exhibit suboptimal power efficiency, necessitating frequent battery replacements, thereby impacting their overall reliability and cost-effectiveness. The absence of a unified, multipurpose tracker contributes to the current limitations and highlights the need for a solution that transcends the constraints of existing systems, offering adaptability, real-time tracking, and enhanced power efficiency.

LIMITATIONS OF THE EXISTING SYSTEM:

1) Specialized Functionality: Many existing trackers are designed for a specific purpose, limiting their application in other domains.
2) Limited Real-time Capability: Existing trackers might not provide real-time tracking, causing delays in data updates.
3) Power Consumption: Inefficiencies in power management can lead to frequent battery replacements, reducing the reliability of the tracking system.

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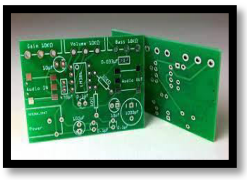
4) Security Concerns: Some systems may have vulnerabilities, exposing sensitive data to potential breaches.

VI. PROPOSED SYSTEM

Our proposed system aims to address the limitations by developing a versatile IoT Multipurpose Tracker. The system consists of a compact, power-efficient tracker device equipped with GPS and other relevant sensors. The firmware will ensure secure communication, real-time data transmission to the administrator.

COMPONENTS USED:



1. **A9G Module:** The A9G module is a compact and versatile IoT module that integrates GSM, GPS, and other functionalities. It serves as the core component of the GPS tracker project, providing communication and location capabilities.

2. **Custom-Designed PCBs:** Custom-designed printed circuit boards (PCBs) are used to create a compact and tailored hardware layout for the project. They facilitate the proper connection of components and optimize the device's form factor. PCB manufacturing services like JLC PCB can be used for designing and ordering custom PCBs.

3. **Microcontroller (ESP32):** The ESP32 is a versatile microcontroller module known for its powerful processing capabilities, built-in Wi-Fi and Bluetooth connectivity, and wide range of applications in the field of electronics and IoT. It serves as the central processing unit for the project, facilitating control, data processing, and communication with other components.

4. **Rechargeable Battery:** A rechargeable battery is used to provide the required power supply to the device. The choice of battery depends on the project's power requirements and desired battery life. It allows the GPS tracker to operate independently without the need for a continuous external power source.

5. **Connectors and Cables:** Connectors and cables are essential for establishing electrical connections between various hardware components. They ensure secure and reliable connections between the microcontroller, sensors, antennas, and other parts of the project. Proper connectors and cables help maintain signal integrity and reduce interference.

6. **Micro USB and Type-C Cables:** Micro USB and Type-C cables are used for multiple purposes in the project. They are employed for battery charging, which keeps the device powered and operational. Additionally, these cables are useful for debugging and programming tasks, allowing you to connect the microcontroller to a computer or programming interface for code development and testing.

7. **Arduino IDE:** The Arduino Integrated Development Environment (IDE) is an open-source software platform designed for programming and developing applications for Arduino microcontroller boards. It provides a user-friendly interface and a set of tools that simplify the process of writing, compiling, and uploading code to Arduino-based hardware.

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VII. CONCLUSION

In conclusion, the proposed IoT Multipurpose Tracker addresses the existing gaps in tracking systems by offering a versatile, real-time, and secure solution. By focusing on scalability and power efficiency, the system aims to become a reliable choice across various industries. This project aligns with the growing demand for flexible tracking solutions that can adapt to evolving requirements in coordination, healthcare, and personal asset management.

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