

Major Project 2

Mid-Term Report

On

SafeSpot – A Smart Tracking Device

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Chapter 1: Introduction

The world we live in is constantly on the move, demanding an ever-increasing reliance on mobile technology and location-based services. Whether navigating bustling city streets, venturing into the great outdoors, or simply ensuring the safety of loved ones, the need for reliable and accessible real-time location tracking has become paramount. However, existing solutions often fall short, lacking crucial features that could prove invaluable in critical moments.

Safespot emerges as a revolutionary force in the tracking device landscape, transcending basic functionalities to offer a comprehensive and user-friendly solution specifically designed for enhanced personal safety and asset security. Inspired by the convenience of devices like the Apple AirTag, Safespot goes beyond passive tracking by seamlessly integrating an intuitive and potentially life-saving emergency response system. This unique feature empowers users with the ability to instantly trigger an SOS alert in critical situations, automatically sending pre-configured danger messages containing the device's live location to designated contacts. This ensures prompt assistance and potentially saves lives when immediate action is most needed [1].

Beyond emergency response, Safespot prioritizes accessibility and simplicity. The device eliminates the need for complex applications or dedicated interfaces by offering effortless location retrieval through a simple message-based communication system [2]. This intuitive approach ensures that anyone, regardless of their technical background, can easily access and utilize the device's functionalities.

In this project, we delve into the technical aspects of Safespot's design and development, showcasing its hardware and software components, functionalities, and operational principles. However, our focus extends beyond the technical specifications. We explore the broader significance and potential impact of this innovative solution, highlighting its ability to address the limitations of existing tracking devices and offer a feature-rich, user-friendly, and cost-effective alternative. By providing a comprehensive overview of the problem statement, objectives, and unique features, this introduction aims to not only inform but also inspire, showcasing Safespot's potential to revolutionize the tracking device landscape and contribute to a safer, more secure future for all.



Chapter 2: Problem Statement

While tracking devices have become increasingly common, they often fall short in key areas, especially when personal safety is at stake. Many lack integrated emergency response systems, leaving users without crucial help in critical moments. Additionally, complex user interfaces reliant on dedicated apps or web platforms can create barriers for less tech-savvy users, hindering accessibility. Furthermore, bulky designs and power-hungry components often translate to higher costs and shorter battery life, limiting practicality and portability. Finally, the lack of customization options restricts users from tailoring the device to their specific needs and preferences, compromising optimal functionality.

This project aims to bridge this gap by developing Safespot, a smart tracking device meticulously designed to address these issues and revolutionize the tracking landscape. At its core, Safespot prioritizes user safety and accessibility. It integrates an intuitive SOS alert system that triggers immediate action upon button press, automatically sending pre-configured danger messages with the device's live location to designated contacts. This ensures a prompt response in emergencies, potentially saving lives in critical situations.

Beyond safety, Safespot emphasizes user-friendliness. It eliminates the need for complex applications by offering effortless location retrieval through a simple message-based communication system. This intuitive approach guarantees that anyone, regardless of their technical background, can easily utilize the device's functionalities.

By meticulously addressing the limitations of existing solutions, Safespot sets itself apart as a feature-rich, user-friendly, and cost-effective alternative. It caters to a diverse range of use cases, offering enhanced personal safety, asset security, and peace of mind for individuals and organizations alike. Whether navigating unfamiliar environments, ensuring the safety of loved ones, or safeguarding valuable assets, Safespot serves as a reliable and adaptable companion, empowering users with real-time location awareness, immediate emergency response, and the invaluable knowledge that help is always just a message away.



Chapter 3: Objectives

1. Develop a compact and portable tracking device: Enable easy attachment to personal belongings, pets, or assets for diverse use cases.
2. Integrate an intuitive SOS alert system: Trigger immediate emergency response upon button press, sending pre-configured danger messages with live location to designated contacts.
3. Offer user-friendly message-based location access: Simplify location retrieval through SMS communication, eliminating the need for dedicated applications.
4. Optimize for low power consumption: Implement hardware and software optimizations to maximize battery life for extended operation.
5. Provide customization options: Empower users to configure alert recipients, message content, operational settings, and notification preferences for personalized functionality.
6. Ensure data security and privacy: Implement robust security measures to protect user data and location information.
7. Maintain affordability: Develop a cost-effective solution accessible to a wide range of users.
8. Explore potential for integration with existing platforms: Investigate seamless integration with relevant platforms for enhanced functionality and user experience.
9. Conduct thorough testing and validation: Ensure device reliability, performance, and user-friendliness through rigorous testing procedures.



Chapter 4: Literature

Explore existing research on wearables, tracking devices, and emergency response systems focused on personal safety. Analyze their functionalities, limitations, and user adoption patterns [1]. Examine academic literature on the development and usage of location-based services, focusing on privacy concerns, ethical considerations, and data security [2].



Chapter 5: Methodology

Process Flow:

When you press the SOS button on SafeSpot, several processes occur in sync. The Neo-6M GPS module instantly grabs your location, and the Arduino Nano, the device's brain, processes it. The GSM module, your cellular connection, then transmits a pre-configured message containing your live location to your designated emergency contacts.

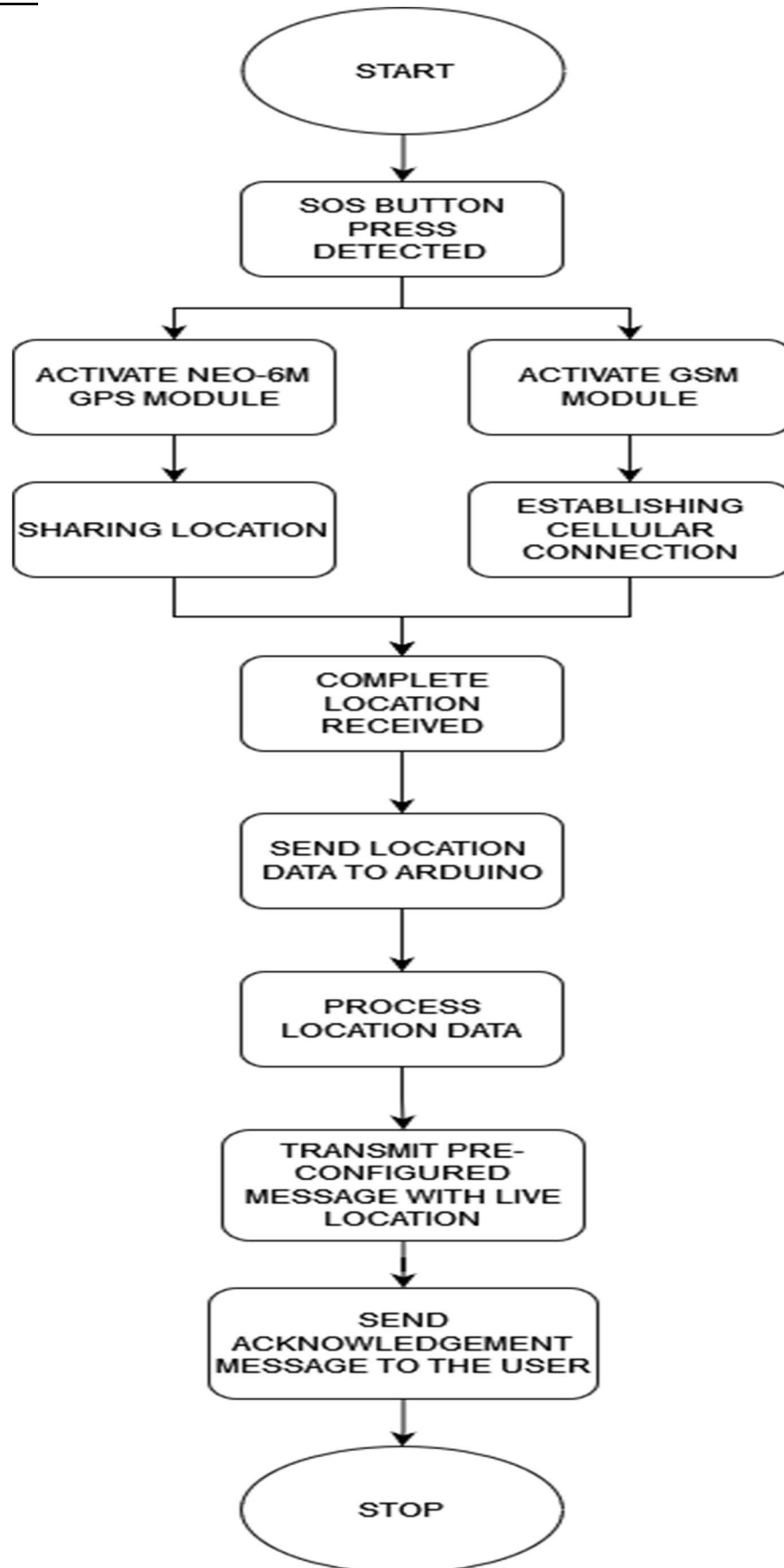
Simultaneously, the device acknowledges your action through a simple message-based system, ensuring you know help is on the way. This intuitive design prioritizes both your safety and ease of use, offering peace of mind with every press.

Components used in the Project:

- Arduino Nano
- SIM 800L GSM Module
- NEO-6M GPS Module
- Push Button
- LED
- 3.7v 2600mAH Li-Po Battery



Flow Chart:





References:

- [1] A. Falcon-Caro and S. Sanei, "Cooperative Networking Approach to Assisting Blinds in a Crowd Using Air Trackers," 2022 4th International Conference on Emerging Trends in Electrical, Electronic and Communications Engineering (ELECOM), Mauritius, 2022, pp. 1-5, doi: 10.1109/ELECOM54934.2022.9965262.
- [2] T. Roth, F. Freyer, M. Hollick and J. Classen, "AirTag of the Clones: Shenanigans with Liberated Item Finders," 2022 *IEEE Security and Privacy Workshops (SPW)*, San Francisco, CA, USA, 2022, pp. 301-311, doi: 10.1109/SPW54247.2022.983388