SMART LUGGAGE SYSTEM

Project Reference No.: *48S_BE_4095*

College : T. John Institute Of Technology, Bengaluru
Branch : Department Of Computer Science Engineering
Guide(S) : Dr. Prabha.R
Dr. Jerald Prasath George
Student(S): Ms. Sreelakshmi D
Ms. Pooja G
Ms. Poongothai A
Ms. Mohana Priya S

Keywords:

Smart Luggage, IOT, RFID, GPS Tracking, Luggage Security

Introduction:

This paper presents the plan and execution of an IOT-based Brilliant Baggage The executives and Global positioning framework (SLMTS) utilizing the ESP32 microcontroller, a flexible and cost-productive stage. The framework coordinates cutting edge innovations like RFID, GPS, GSM, and whirligig sensors to handle predominant difficulties in baggage dealing with, including burglary, removal, and misusing. RFID innovation is utilized for secure recognizable proof and proprietorship confirmation, limiting the dangers of robbery and blunders.GPS empowers exact constant area following, permitting clients to screen their baggage from a distance. Furthermore, a gyrator sensor identifies misusing or unexpected changes in direction, setting off quick cautions. Notices in regards to the gear's area and status are shipped off the client's cell phone by means of GSM for consistent updates. An coordinated LCD show gives continuous updates, further developing ease of use and client communication. Intended for applications in air terminals, shopping centers, coordinated factors, and individual travel, this framework offers an exhaustive answer for baggage the board. By joining security, robotization, and ongoing following, the

proposed Brilliant Gear The board and Global positioning framework improves travel effectiveness and security, tending to the impediments of customary strategies.

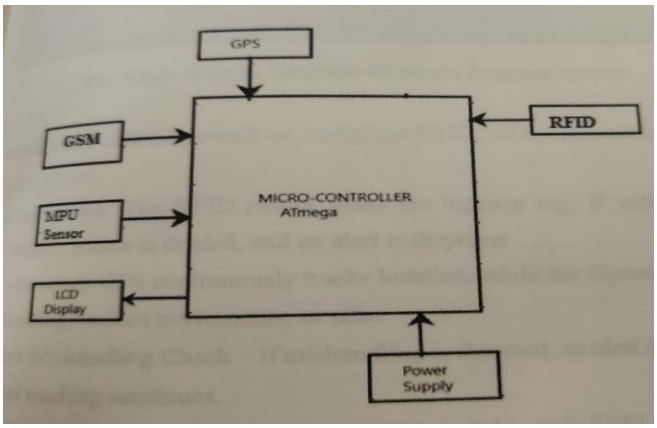


Figure 1: Data flow diagram of smart luggage system

Objectives:

- **Productivity:** The combination of RFID for secure ID, GPS for exact following, and a whirligig sensor for misusing discovery guaranteed smooth activity and decreased the gamble of gear removal or robbery.
- **Continuous Correspondence*:*** The GSM module gave moment notices to clients about their baggage's area and taking care of status, guaranteeing opportune updates and speedy reaction to likely issues.
- **Client Fulfillment:** Highlights like continuous notices on a LCD show, proprietorship confirmation, and misusing alarms improved client comfort and trust in baggage security
- **Security*:*** The framework really distinguished unapproved access, misusing, or robbery endeavors, setting off quick cautions and notices to guarantee a brief reaction and further developed gear insurance

Methodology:

A. System Design:-The Brilliant Baggage The executives and Global positioning framework (SLMTS) frames the useful and non-utilitarian prerequisites, enumerating the framework's capacities and giving an establishment to approval. Created through

cooperation among clients and the improvement group, the SRS incorporates elements like brilliant locking instruments, global positioning frameworks, weight sensors, and mechanization controls. It additionally addresses plan imperatives like power proficiency and versatility. This record guarantees clear correspondence to accumulate all fundamental necessities for the effective turn of events and arrangement of the Brilliant Baggage Framework.

B. Key Modules

1) Real-Time Tracking: The system employs GPS and GSM modules for continuous location tracking, ensuring users can pinpoint their luggage accurately at any time .

2) Security Enhancements: RFID technology provides secure ownership verification, while gyroscope sensors detect mishandling or theft, triggering instant alerts to the user.

3) User Notifications:The GSM module sends real-time notifications to users' mobile devices, keeping them informed about the luggage's location and status for added convenience.

4) Data Display: A user-friendly LCD screen offers on-the-spot updates, ensuring seamless operation and enhancing the overall user experience

5) Scalability and Integration: The modular design supports future enhancements, such as AI-driven analytics for theft and mishandling predictions, along with cloud storage for data management .

C. Development Workflow

1) Hardware Integration: RFID, GPS, GSM, and gyroscope sensors were integrated with the ESP32 microcontroller to monitor location, handling, and ownership

2) Frontend Development: User-friendly interfaces with clear process status updates were designed for easy interaction and monitoring.

3) Backend Integration: Secure data management and notification handling were

implemented using cloud-based solutions for reliability and scalability.

4) Automation and Control: Logic was developed to automate alerts and notifications based on sensor data, ensuring real-time responses to mishandling or theft .

5) Testing and Validation: Comprehensive unit, integration, and user acceptance testing were conducted to ensure system reliability and usability .

6) Deployment and Monitoring: The system was deployed with real-time monitoring capabilities, offering remote access for ongoing performance tracking and maintenance.

Result and Conclusion:

In conclusion, The Smart Luggage System was deployed and evaluated in a controlled environment to assess its performance and usability. The results were highly encouraging

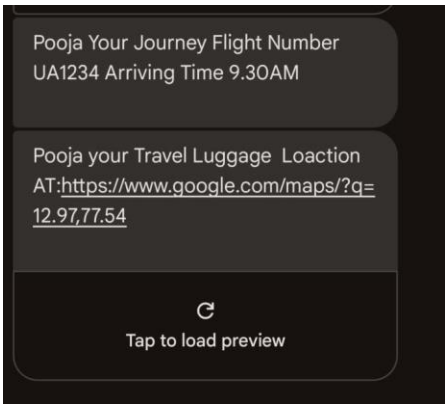
- **Details of Luggage & Customer*:*** Displays the owner's and luggage's details, ensuring secure identification and reducing the risk of misplacement**.**

- **Fall Detection**: Highlights the detection of sudden falls or impacts using gyroscope sensors to prevent mishandling**.**

- **Latitude & Longitude:** Shows the real-time geographical coordinates of the luggage for precise location tracking.

- **Live Location:** Demonstrates the live tracking interface that updates the luggage's location in real time.

- **Alert Message**: Depicts the notification sent to the user during unauthorized access or mishandling.



Future Scope:

The future scope of this project includes:

It has huge potential for future upgrades, driven by headways in IoT and the developing requirement for effective and secure travel arrangements. Impending advancements could zero in on coordinating cutting edge innovations like man-

made brainpower, distributed computing, and further developed sensor organizations to improve usefulness and adaptability.

1. Computer based intelligence Driven Investigation Integrating man-made intelligence can empower prescient experiences for distinguishing robbery or misusing designs and upgrading baggage the executives.
2. Upgraded Versatility Future cycles could incorporate measured moves up to coordinate highlights like savvy weight sensors, sealed locks, and biometric validation frameworks for added security.
3. Cloud-Based Information Stockpiling Putting away information on cloud stages can furnish clients with authentic following data and backing consistent access across gadgets.
4. Battery Advancement High level energy the board arrangements can expand battery duration, guaranteeing continuous activity during long excursions.
5. Worldwide Network Improved similarity with global IOT stages and organizations can work with consistent utilization across nations and advance more extensive reception.

Further developed Safety efforts Incorporating progressed encryption and multifaceted confirmation can defend client information and improve framework dependability against digital dangers.

Project Outcome & Industry Relevance:-

The Smart Luggage System successfully enhances luggage security, tracking, and management by integrating GPS, RFID, GSM, and gyroscope sensors. Key outcomes include:

1. Improved Efficiency: Real-time tracking and ownership verification reduce risks like theft and misplacement.
2. Continuous Communication: Instant notifications via GSM keep users informed about their luggage's status.
3. User Satisfaction: Features such as misuse detection and instant alerts increase trust and convenience for user.
4. Enhanced Security: The system effectively detects unauthorized access, theft,

or mishandling, triggering timely alert

The system holds significant relevance in the travel and logistics industries, addressing critical challenges like luggage theft and misplacement. In the airline industry, it reduces lost luggage incidents, while in airport security, it streamlines baggage handling. Personal travel benefits from enhanced security, and the system could also extend to logistics and retail for real-time tracking of goods. With its ability to improve efficiency, security, and customer satisfaction, SLMTS has broad potential for adoption in sectors involving transportation, security, and personal travel.

Working Model :-

The Smart Luggage Management and Tracking System is a physical working model. It integrates hardware components like ESP32, RFID, GPS, GSM, and gyroscope sensors to provide real-time tracking, secure ownership verification, and misuse detection. The system has been tested and validated through hands-on use, ensuring reliable operation in real-world conditions. While simulations were used for early design validation and algorithm refinement, the primary focus was on creating a functional, physical prototype

Project Outcomes and Learnings:

The Smart Luggage Management and Tracking System successfully integrated ESP32, RFID, GPS, GSM, and gyroscope sensors for real-time tracking, secure ownership verification, and misuse detection. The system provided reliable location updates and instant alerts via GSM and LCD display. Real-world testing validated the system's robustness, including battery life and signal reliability. The project involved hands-on experience with sensor integration, microcontroller programming, and system design. Simulation tools helped refine algorithms, while modular design and user-centric interfaces ensured scalability and usability. Troubleshooting and thorough testing ensured reliable performance and a functional final product**.**