

SMART BUSPASS VERIFICATION
SYSTEM

(Smart, Safe, Seamless)

Team Name: Team Elegets

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IDEA/SOLUTION:

A **low-cost IoT Smart Bus Pass System** for **APSRTC** offering **secure, contactless verification, real-time monitoring,** and hassle-free **online recharge.**

- ❖ **RFID** Enables **seamless and tamper-resistant bus entry,** ensuring only authorized users gain access.
- ❖ The **ESP32–Firebase** setup **delivers rapid verification,** automated data entry, and ensures that **information** is always available **anytime, anywhere.**
- ❖ **GSM-enabled** emergency intelligence **Accelerating Rapid Response Through Real-Time Alerts.**
- ❖ **Digitized recharge** and **renewal** streamline the process, **cut queues and delays,** and let users manage travel access **anytime, anywhere.**

Problem Resolution :

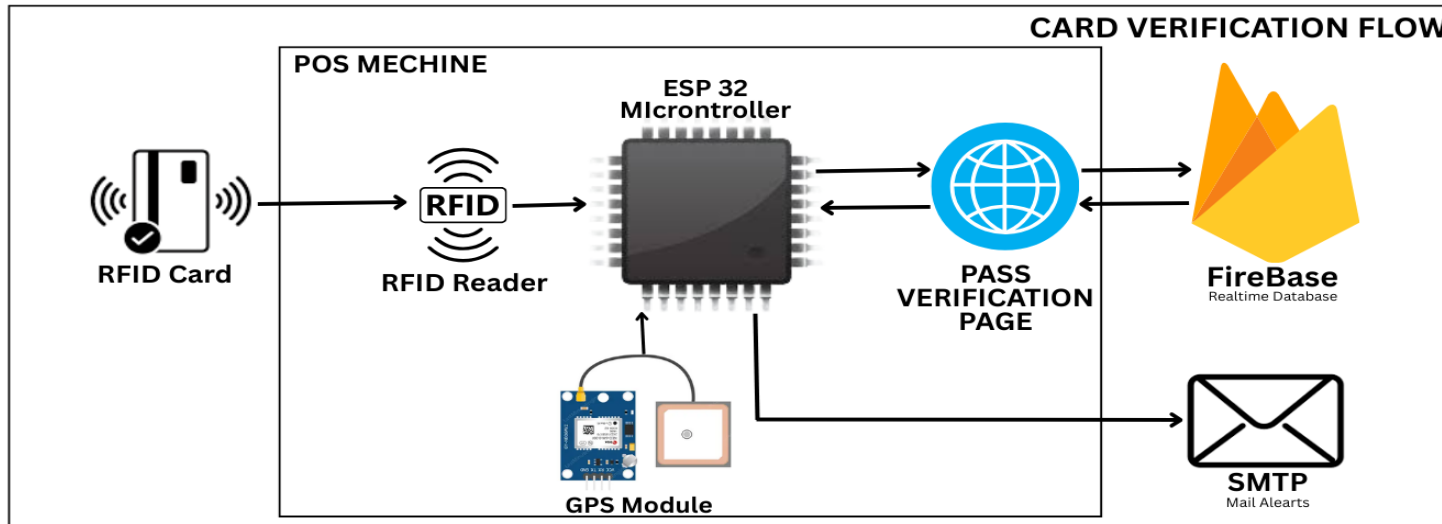
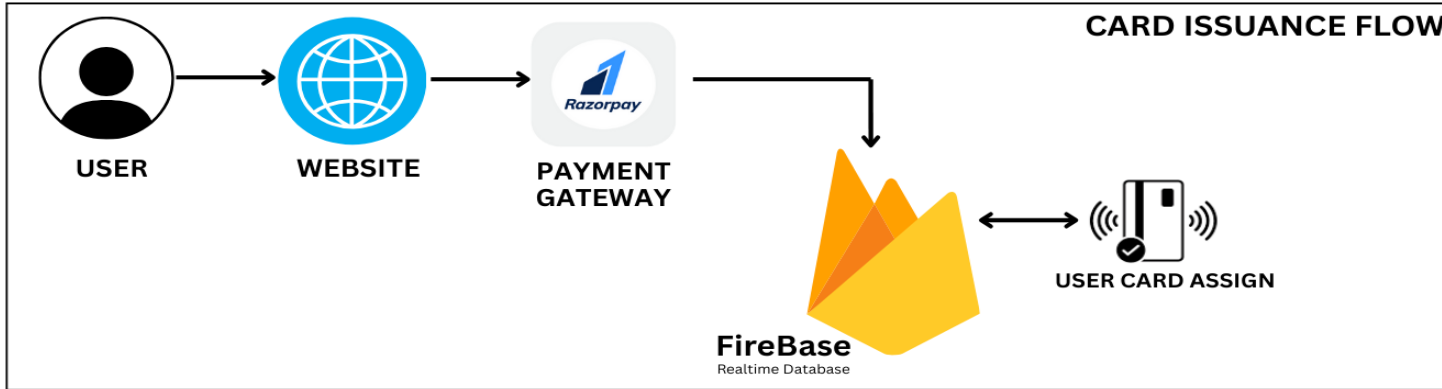
- ❖ **Reduces manual verification delays** by automating student bus pass checking.
- ❖ **Prevents unauthorized travel** with real-time **RFID** validation.
- ❖ **Simplifies administration** with **online recharge** and digital pass management.

Unique Value Propositions (UVP) :

- ❖ **IoT-secured system** with **real-time reliability** .
- ❖ Anywhere, anytime **one-tap digital top-up** .
- ❖ **One-tap SOS GPS-Alert:** Instantly sends live bus location and reported issue for immediate assistance
- ❖ **Modular,** future-ready solution scaling from schools to city transport.

TECHNICAL APPROACH

PROCESS FLOW ARCHITECTURE:



Technology stack:

IOT AND HARDWARE:-



CLOUD AND DATABASE:-



APPLICATION LAYER:

FRONTEND:-



BACKEND:-



PAYMENT & SECURITY:-



APPLICATION PAGE:- https://pavan-1522.github.io/apsrtc_project/

VIDEO LINK :- <https://youtu.be/JIYc5PRbaSM>

FEASIBILITY:

- ❖ **Technical:**
RFID + ESP32 + Firebase enable real-time verification. Scalable IoT design.
- ❖ **Financial:**
Low-cost hardware (RFID, ESP32, GSM). Affordable(<900).
- ❖ **Market:**
Growing need for **secure, digital** student transport systems across **schools** and **universities**.
- ❖ **Operational:**
Easy to install, **modular, integrates** with **existing bus systems**. Recharge system adds usability.

Challenges

- ❖ **Network downtime** (Wi-Fi/GSM), hardware malfunctions.
- ❖ **Limited budgets** in smaller institutions.
- ❖ **Resistance** from **manual bus** management, adoption hesitation.

Strategies to Overcome

- ❖ Offline data caching, **GSM backup for connectivity**, scheduled hardware maintenance.
- ❖ **Bulk procurement**, partnerships with institutions, leverage CSR & **government funding**.
- ❖ On-ground awareness drives, **strong focus on student safety + fraud reduction**, pilot programs to build trust.

Potential Impact on Target Audience:

❖ Students / Youth:-

- Enables fast, **contactless**, and **secure** bus entry through **RFID-based verification**.
- Fosters **discipline and time management**.

❖ Bus Operators & Transport Staff:-

- **Accelerated verification process**, ensuring smooth boarding and minimizing entry delays.
- **Automated, error-free data capture** powered by cloud integration for seamless record-keeping.

❖ Government & Transport Authorities:-

- Acts as a **catalyst for digital transformation** in public and educational transport systems.
- Provides a **scalable, future-ready framework** that aligns with broader Smart City and mobility initiatives.

Benefits of the Solution:



Social:-

- **Inclusive Mobility** : Seamless travel for students, workers, and seniors.
- **Passenger Safety** : Real-time GPS & instant alerts for secure journeys.
- **Transparency** : Eliminates pass misuse, building public trust.



Economical:-

- **Cost Efficiency** : Reduced staffing & administrative overhead.
- **Revenue Protection** : Prevents fake/duplicate passes.
- **Scalable Growth** : Expandable to, railways, and smart cities.

- ***Bus Pass Validation System Using RFID (IJRASET, 2024)*** – RFID + centralized DB for real-time student bus pass verification.
👉 [IJRASET](#)
- ***Smart Bus Pass System (ResearchGate, 2022)*** – QR code, DB, online renewal via payment gateway & user notifications.
👉 [ResearchGate](#)
- ***Bus Fare Collection with RFID & GPS (ResearchGate, 2023)*** – RFID + GPS for automatic fare deduction and trip logging.
👉 [ResearchGate](#)
- ***Digital Bus Fare Management (IJIREEICE, 2025)*** – ESP32 + Firebase + RFID for cashless real-time fare transactions.
👉 [IJIREEICE PDF](#)