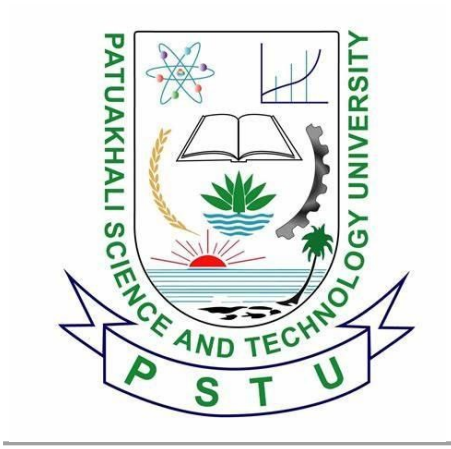

PATUAKHALI SCIENCE AND TECHNOLOGY UNIVERSITY

COURSE CODE EEE-212
Electrical Technology Sessional

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Date of submission:
Project title: **Metro Recharge Point**

Metro Recharge Point

Description

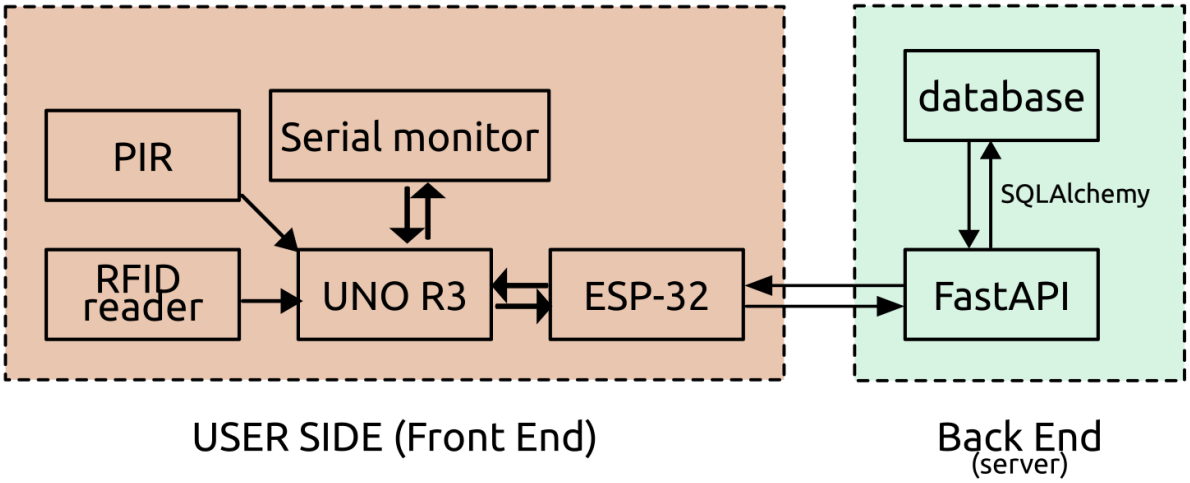
Metro rail card's self recharging utility with mobile banking ability. Where users can scan their card and access their accounts with simple clicks.

History

In general in a metro rail system, whenever a user wants to travel, he has to go to the ticket counter and form a query, in order to collect the ticket, which makes the whole entire process more time-consuming. To solve this issue, we can implement a backend server for database and API, and use our system as frontend.

Objectives

1. Developing an Arduino-based system with RFID readers for identifying metro cards.
2. Integrate a secure mobile banking platform for users to recharge their metro cards on the go. Where user can use mobile banking/ any specific hardware to recharge cards.



3. Implement a backend system to track user balances, recharge, and discharge transactions using **FastAPI** and **SQLAlchemy**.
4. Ensure seamless communication between hardware components (Arduino, RFID reader) and backend services via HTTP requests.

Scope

- **Hardware Integration**: Utilize components such as RFID Readers, ESP32, PIR sensors, and buzzers for card detection and system feedback.
- **Backend Development**: Develop a FastAPI-based RESTful API to handle user balance management, including recharge, discharge, and user creation functionalities.
- **Mobile Banking Integration**: Enable secure mobile banking transactions for recharging metro cards.
- **Real-time Data Processing**: Ensure real-time updates to user balances via cloud-hosted services.

Benefits

- **User Convenience**: Quick and easy metro card recharges from any location using mobile banking or specific machines.
- **Real-time Updates**: Users can track balances and manage their metro cards through a user-friendly interface. Or, they can also use an interface hosted on web to quickly access.
- **Scalability**: Designed to handle large volumes of users and transactions efficiently. Besides it can be integrated into other systems, as well as handling multiple purposes.

Backend Server

- Python FastAPI
- SQLAlchemy
- SQLite/MySQL (for database)
- Python
- Uvicorn (for ASGI server)
- Pydantic (for data validation)
- HTTP/HTTPS

Frontend Budget

Equipments Name	**Approx. Price**
PIR (Passive infrared sensor)	110
Arduino UNO R3 SMD	574
Cable	55
Breadboard	150
Buzzer	15
RFID Reader	195
RFID Cards	70
Resistor	30
ESP 32	470

Estimated Timeline

- **Phase 1**: Hardware integration and system setup (2 weeks)
- **Phase 2**: Backend development and database integration (3 weeks)
- **Phase 3**: Mobile banking integration and testing (3 weeks)
- **Phase 4**: Final testing, deployment, and user feedback (2 weeks)