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ScooterLab

A Programmable and Participatory Sensing Testbed using Micromobility Vehicles

Murtuza Jadliwala (PI), Sushil K. Prasad (Co-PI), Greg P. Griffin (Co-PI), Anindya Maiti (Co-PI)
Nico Molina, Raveen Wijewickrama, Buddhi Ashan M.K., Khoi V. Trinh, Nima Najafian
scooterlab.utsa.edu

Connect with ScooterLab!

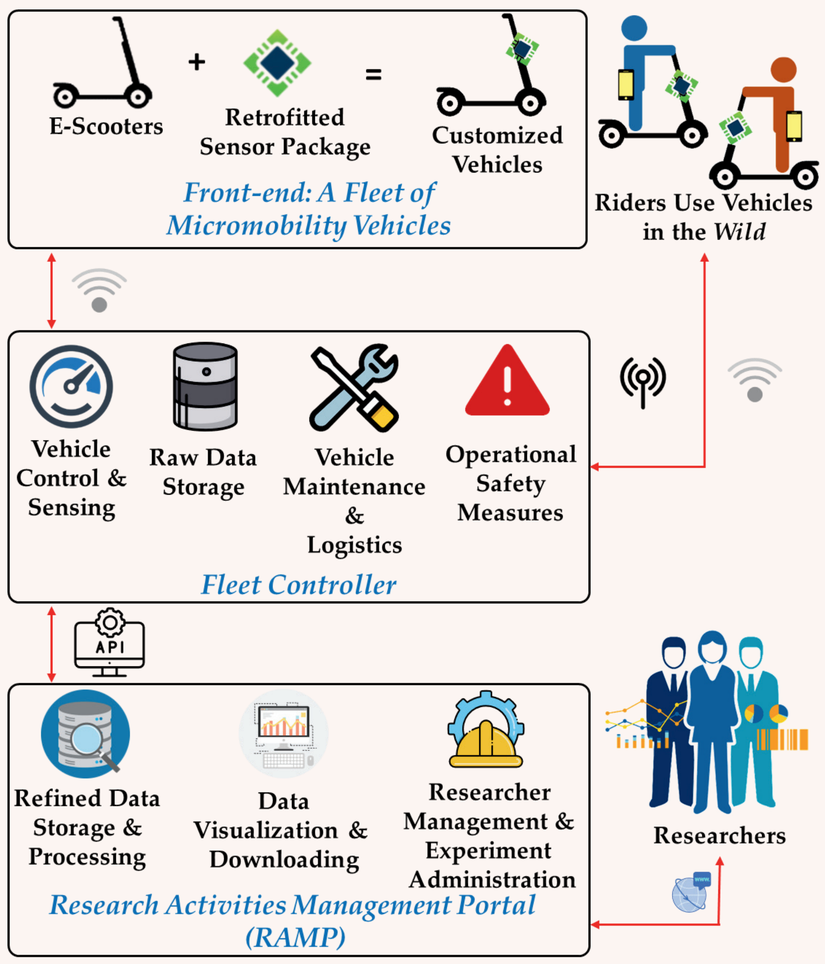
What is ScooterLab?
An NSF funded community research infrastructure initiative, currently under development at UTSA. This publicly-available micromobility testbed and crowd-sensing/crowd-sourcing infrastructure will provide researchers access to a community of riders and a fully operational fleet of customizable dockless e-scooters.

Issues & challenges in micromobility

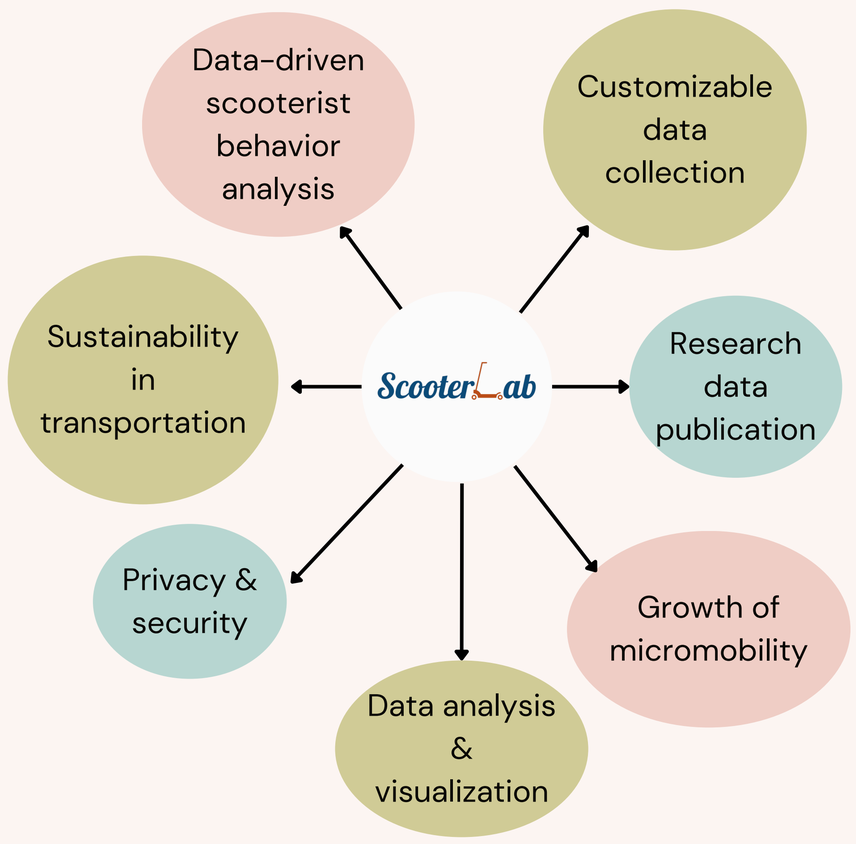
Why ScooterLab?
- Provides space for researchers to address multidisciplinary challenges
- Bypasses commercial service providers who may be unwilling to share data for research
- Offers more customizable sensors
- Creates infrastructure necessary to collect diverse rider, mobility, and contextual data in realistic settings

Broader impact:
- Rider/pedestrian safety
- Urban routing & infrastructure planning
- Public policy
- Transportation engineering
- Data privacy

The ScooterLab Architecture



A Collaborative Data Science Research Agenda



Vehicle & Front-End Development

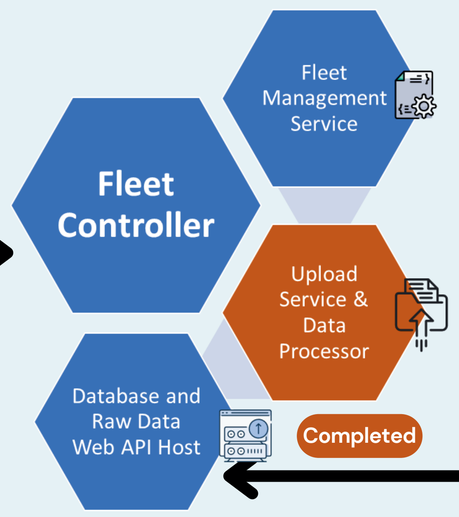
Progress

- Initial Prototype E-Scooter (SLP1)
- Refinement & robust enhancement of the sensor unit
- Prototype E-Scooter (SLP2)
- Rigorous testing under realistic conditions

Features:
- E-scooter on/off via smartphone app
- Sensing: Temperature, Humidity, Pressure, Accelerometer, Gyroscope, Orientation, Magnetometer, GPS, Camera
- Future/Customizations: Light, Acoustic, Lidar, IR Camera etc.

Testing:
- Weather resistance
- Waterproofness
- Heat dissipation
- Riding terrains
- Riding times
- Portability

Fleet Controller

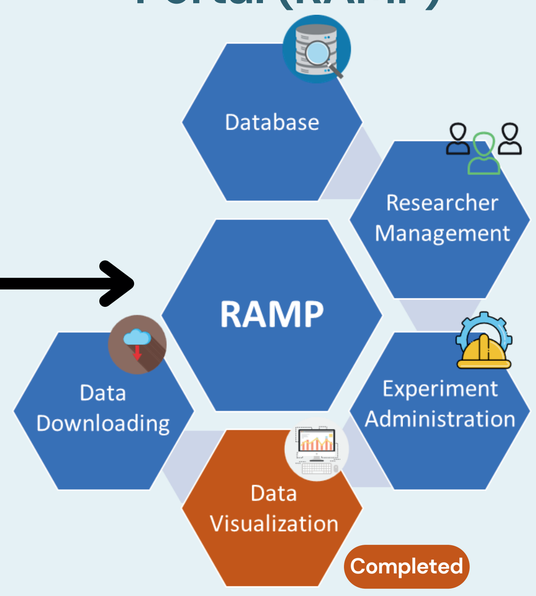


Fleet Controller Server Acquisition
- 24-Core
- 512GB Memory
- 720TB Storage

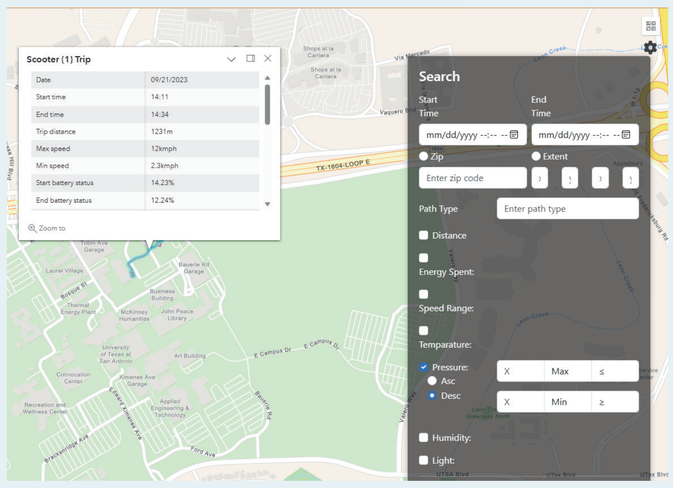
Scooter - Fleet Management Service Communication
- Config file prototyping
- Local data queuing
- Fault tolerant uploading

Upload Service & Data Processor
- External Data Collector: Traffic & weather data
- Data processing & queuing
- Database entry drive

Research Activities Management Portal (RAMP)



Data Visualization
- Visualize trip data & sensor data on a base map
- Display statistical data
- Data filtering
- Heatmap generation



Next Steps

- Partial fleet deployment — **End of Fall 2023**
- Final refinements based on partial deployment feedback
- Full fleet deployment — **Summer 2024**

Fleet Management Service
- Reconfiguration Service
- Authentication Service
- Maintenance & operational safety

Database & Raw Data Web API Host
- APIs for experiment based data queries

Researcher Management
- Secure connections to RAMP & data downloading

Experiment Administration
- Allow users to check research experiment progress & manage relevant data

Data Downloading
- File formats: TXT,SHP,CSV,GPX,JSON, GeoJSON