

ScooterLab – Initial findings from the San Antonio testbed

Dr. Greg Griffin, AICP
Research Coordinator, Oregon DOT
scooterlab.utsa.edu

Shared Mobility: Results to Guide Equity and Resilience
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Acknowledgements



Investigators & Students



Murtuza Jadliwala
(overall lead)

Sushil Prasad

Raveen Wijewickrama

Buddhi Ashan Mallika

Kankanamalage

Greg Griffin

Nico Molina



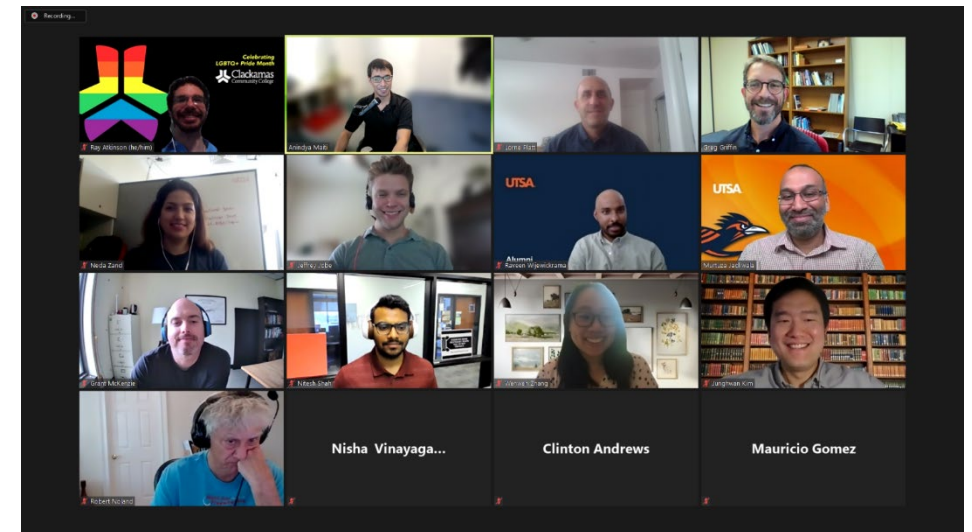
The UNIVERSITY of OKLAHOMA

Anindya Maiti

Khoi Trinh



Research Collaborators

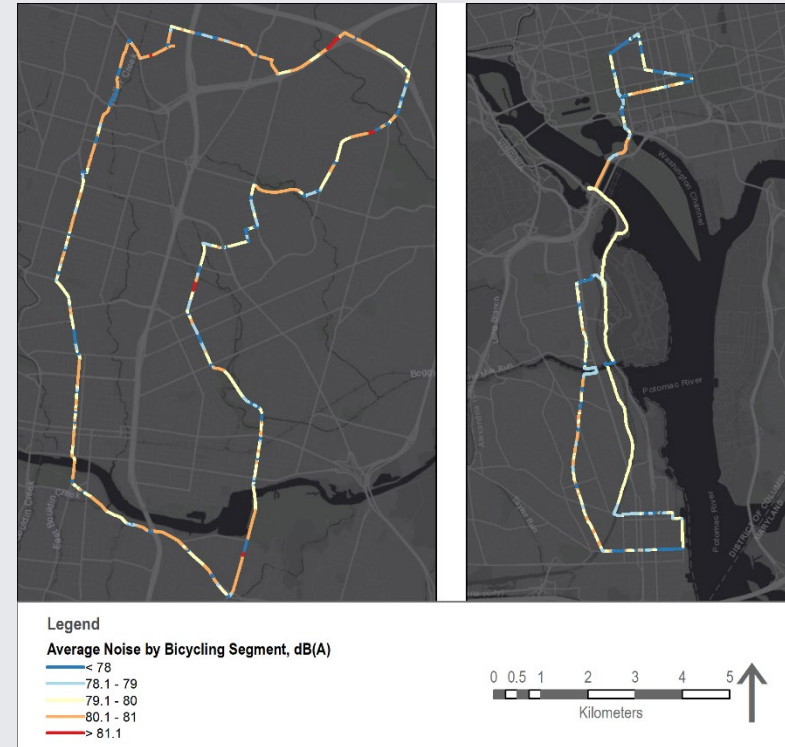


Overview

- ▶▶ Origin and **Vision** of ScooterLab as an instrument for research communities
- ▶▶ **Steps** in building and operating ScooterLab
- ▶▶ **News** on how you can participate
- ▶▶ **Contributing** a collaborative urban sensing platform for improving cities

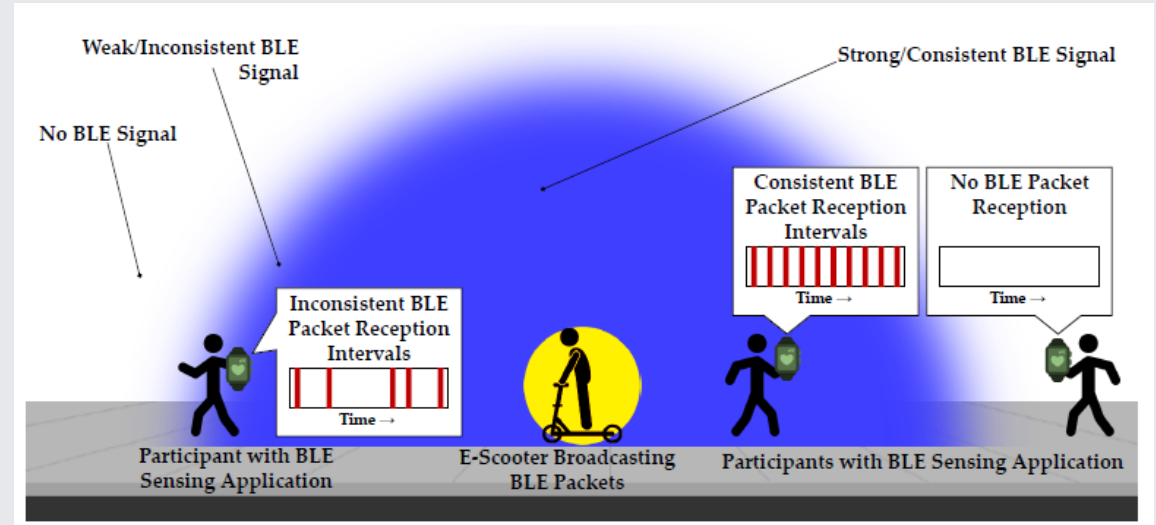
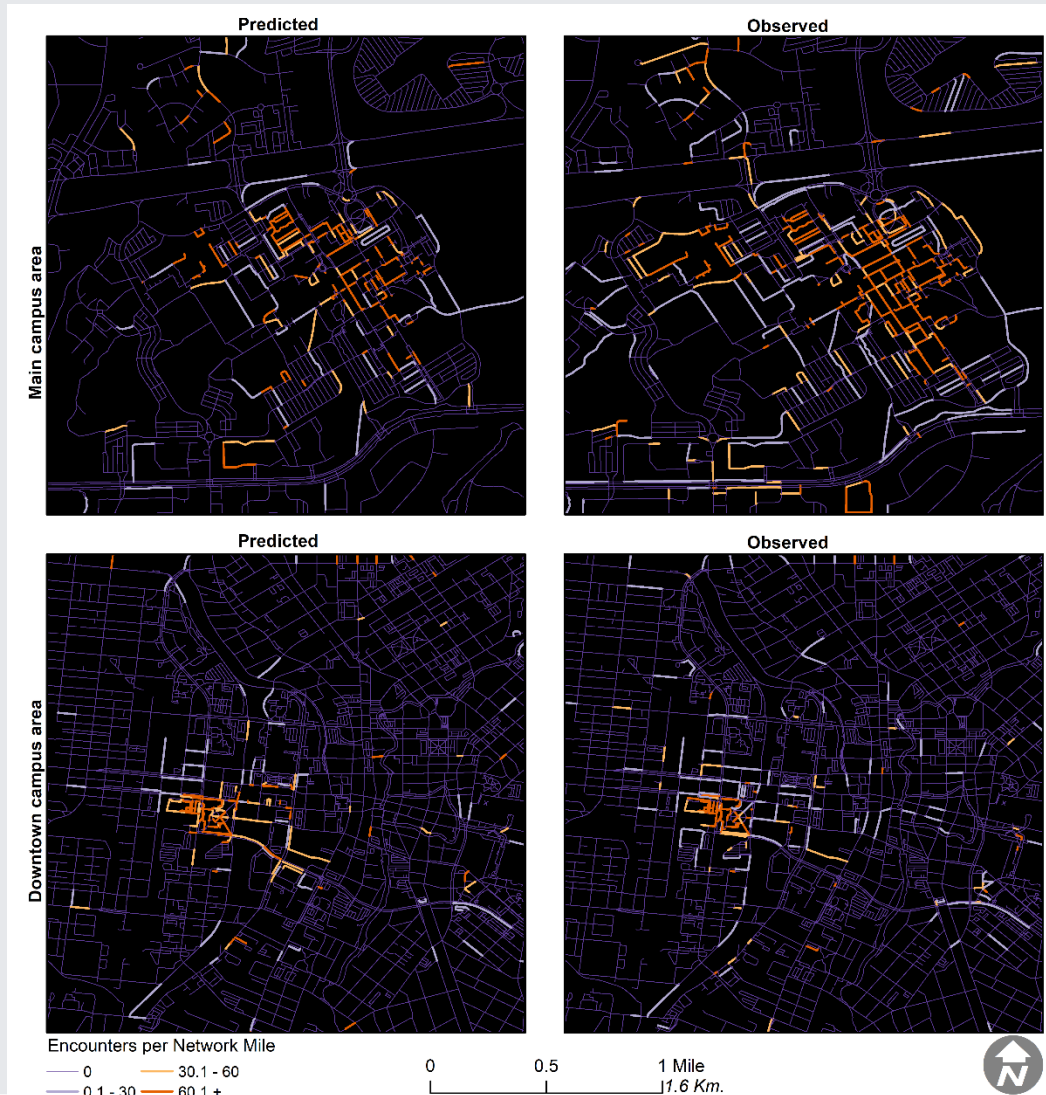


Origin—Street Noise & Bicycling Safety Correlated in Washington, D.C., but not in Austin



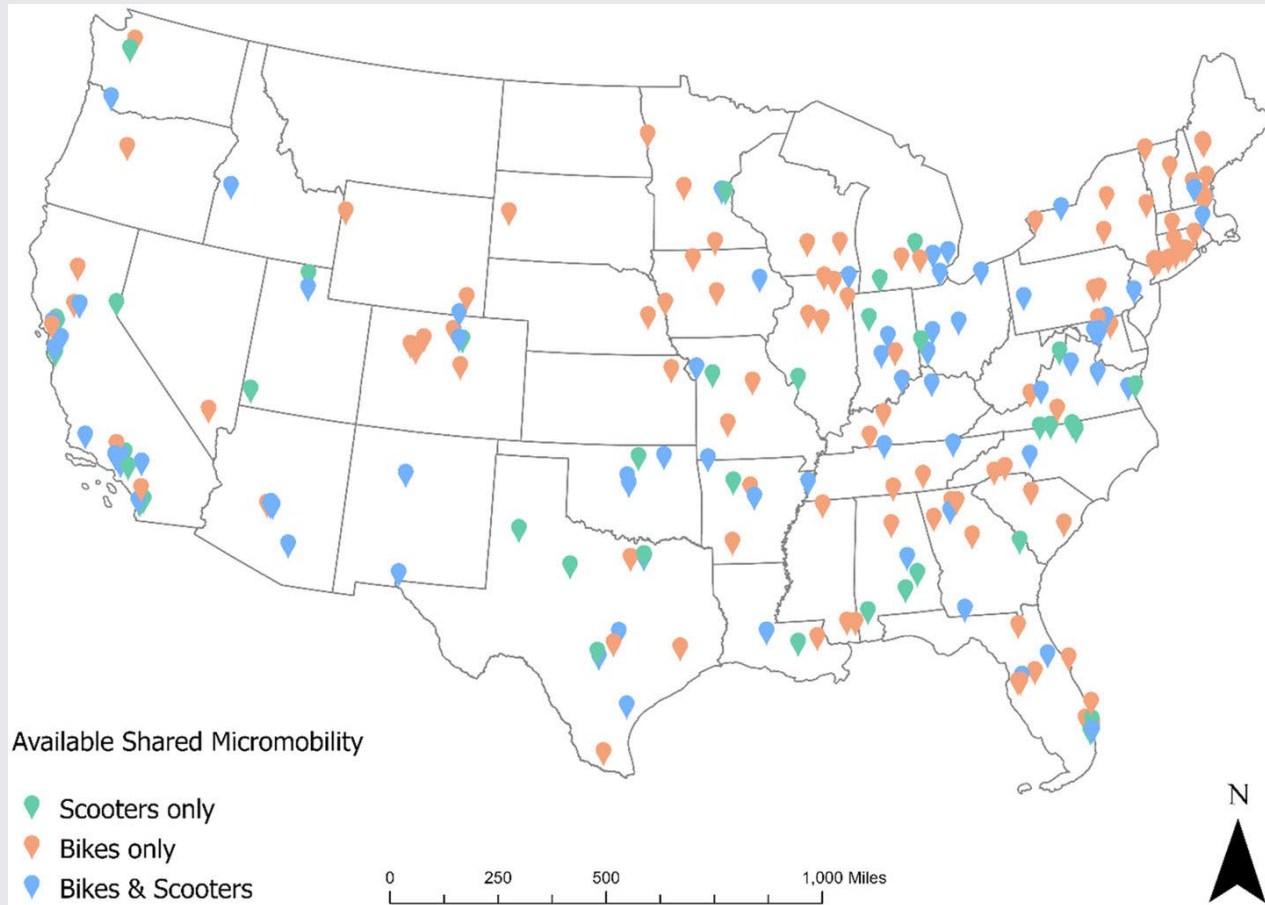
Griffin, G. P., Hankey, S., Buehler, R., Dai, B., Le, H. T., & Simek, C. (2019). [*Exploring Street Noise and Bicycle Safety: Initial Evidence from Austin, TX and the Washington, DC Capital Area*](#) (TRB #19-03944).

Origin—Crowdsensing Pedestrian Safety and E-scooters



Maiti, A., Vinayaga-Sureshkanth, N., Jadliwala, M., Wijewickrama, R., & Griffin, G. (2022, March). [Impact of e-scooters on pedestrian safety: A field study using pedestrian crowd-sensing](#). In *PerCom Workshops* (pp. 799-805). IEEE.

Origin—Shared Micromobility Can Reduce Vehicle Traffic, but not e-scooters alone



Choi, K., Park, H. J., & Griffin, G. P. (2023). [Can shared micromobility replace auto travel? Evidence from the US urbanized areas between 2012 and 2019.](#) *International Journal of Sustainable Transportation*, 1-9.

Origin—Build on success of single studies and testbeds



<https://bloustein.rutgers.edu/micromobility/>

Noland, Robert B. "Scootin? in the rain: Does weather affect micromobility?" *Transportation Research Part A: Policy and Practice*, v.149 , 2021 <https://doi.org/10.1016/j.tra.2021.05.003>

How can **user privacy** be improved?

Can **machine learning** support urban policy making?

How can we **manage big urban data** from scooters?

What type of **street-level features** may increase e-scooter **crash risks**?



Can urban mobile data be **secured and usable**?

Can micromobility answers in San Antonio **scale to other cities**?

Do e-scooter **rental term lengths** change travel patterns?

How do we address **parking**?

Are urban sensors on scooters **reliable**?

How is ScooterLab different?

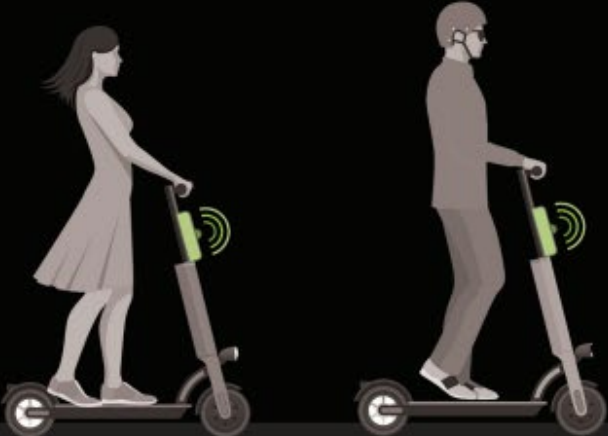
- ▶▶ The ScooterLab testbed is envisioned as **an instrument for the entire research community**—not just local teams.
- ▶▶ **Downtown + suburban** contexts
- ▶▶ No private company data agreements
- ▶▶ **Community data privacy and sharing platform**

Vision

Escooters pick up
Access through Smartphone Application



Escooters are retrofitted with
WSBC and Sensors



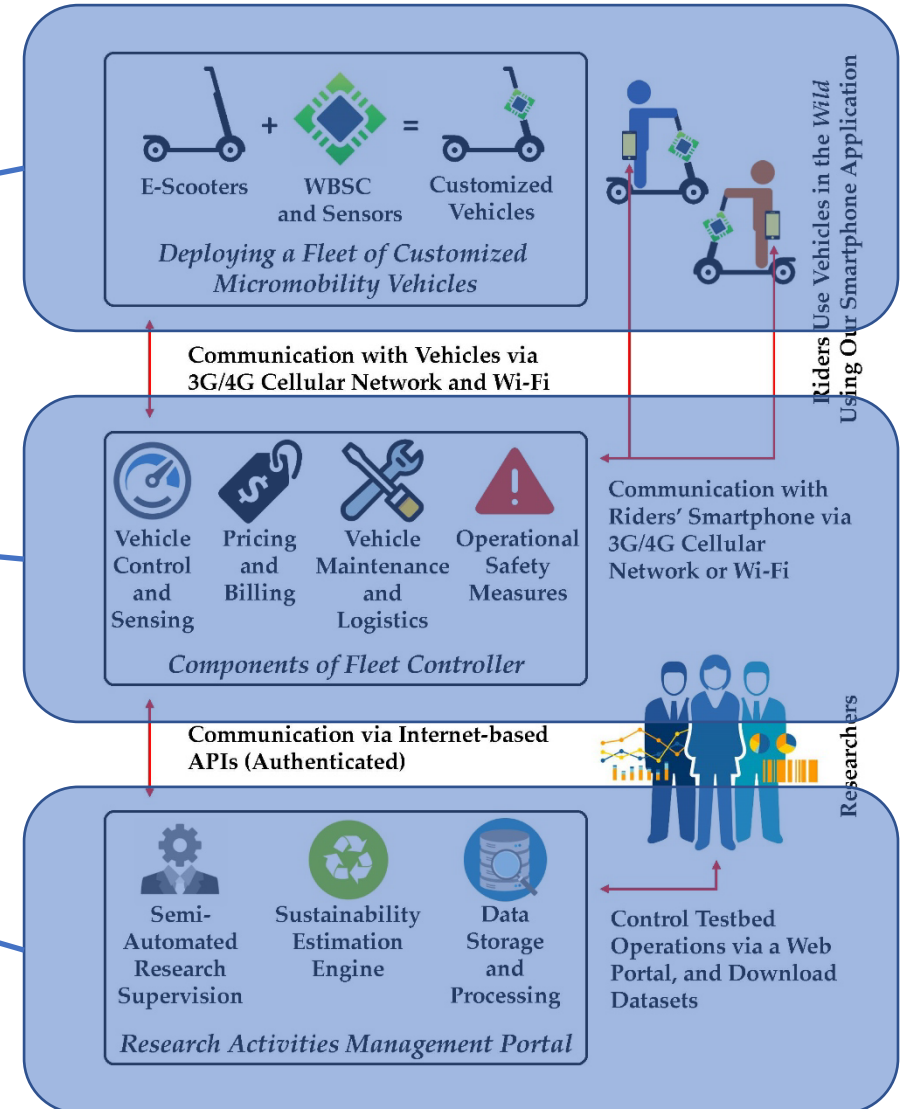
Scooter Lab Data Storage and Processing

The ScooterLab Architecture

- Vehicles

- Fleet Controller

- Research Activities Management Portal (RAMP)



Steps in building and operating ScooterLab

1. Testbed Development (nearing completion)

- Community outreach
- Prototyping equipment
- Designing and implementing RAMP & fleet controller
- Data ownership and retention plan
- Scaling equipment



Default Datasets

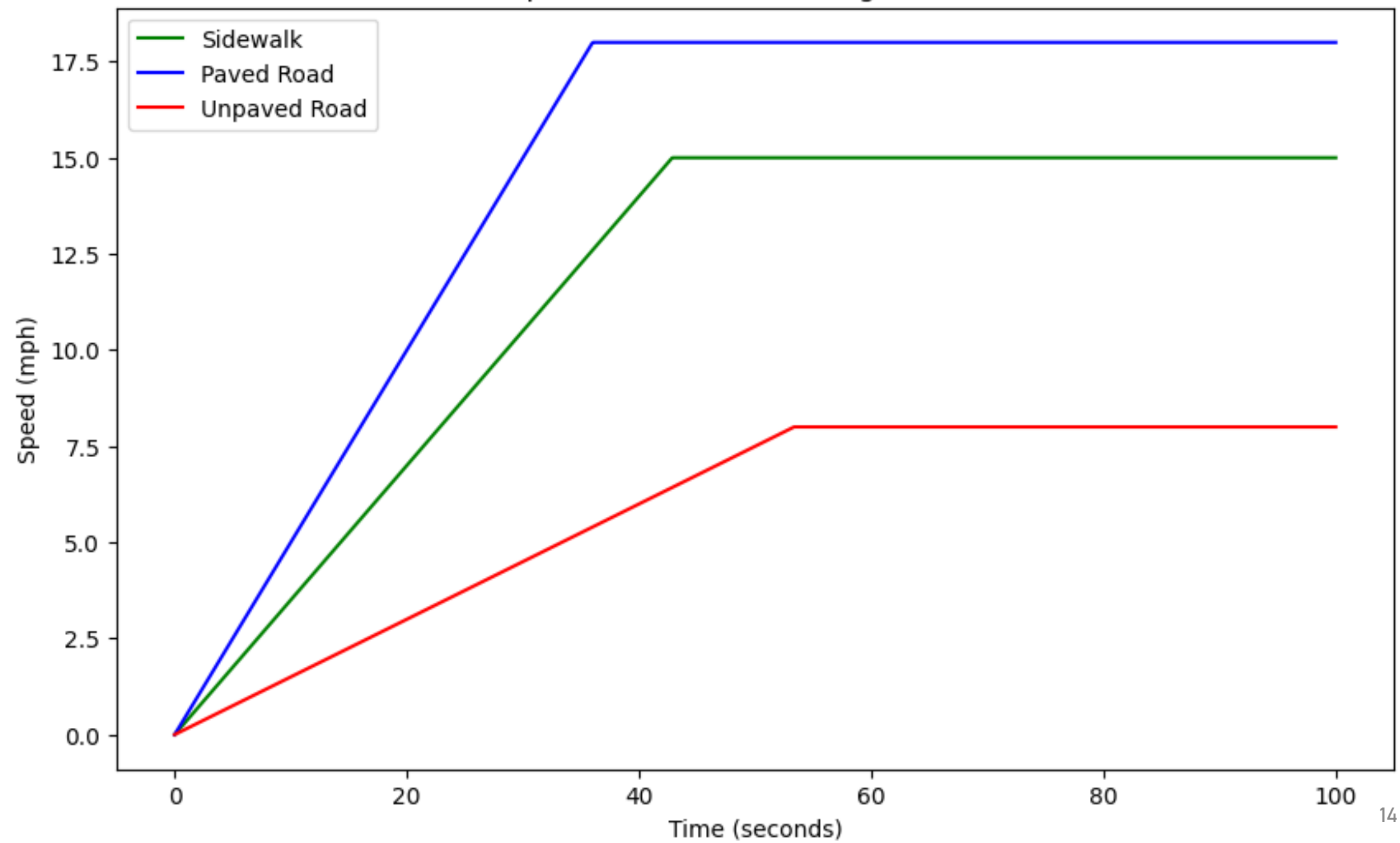
- Pre-scooter travel behavior survey
- GPS
- Accelerometer
- Light—lux
- E-scooter travel behavior survey

Custom Sensors

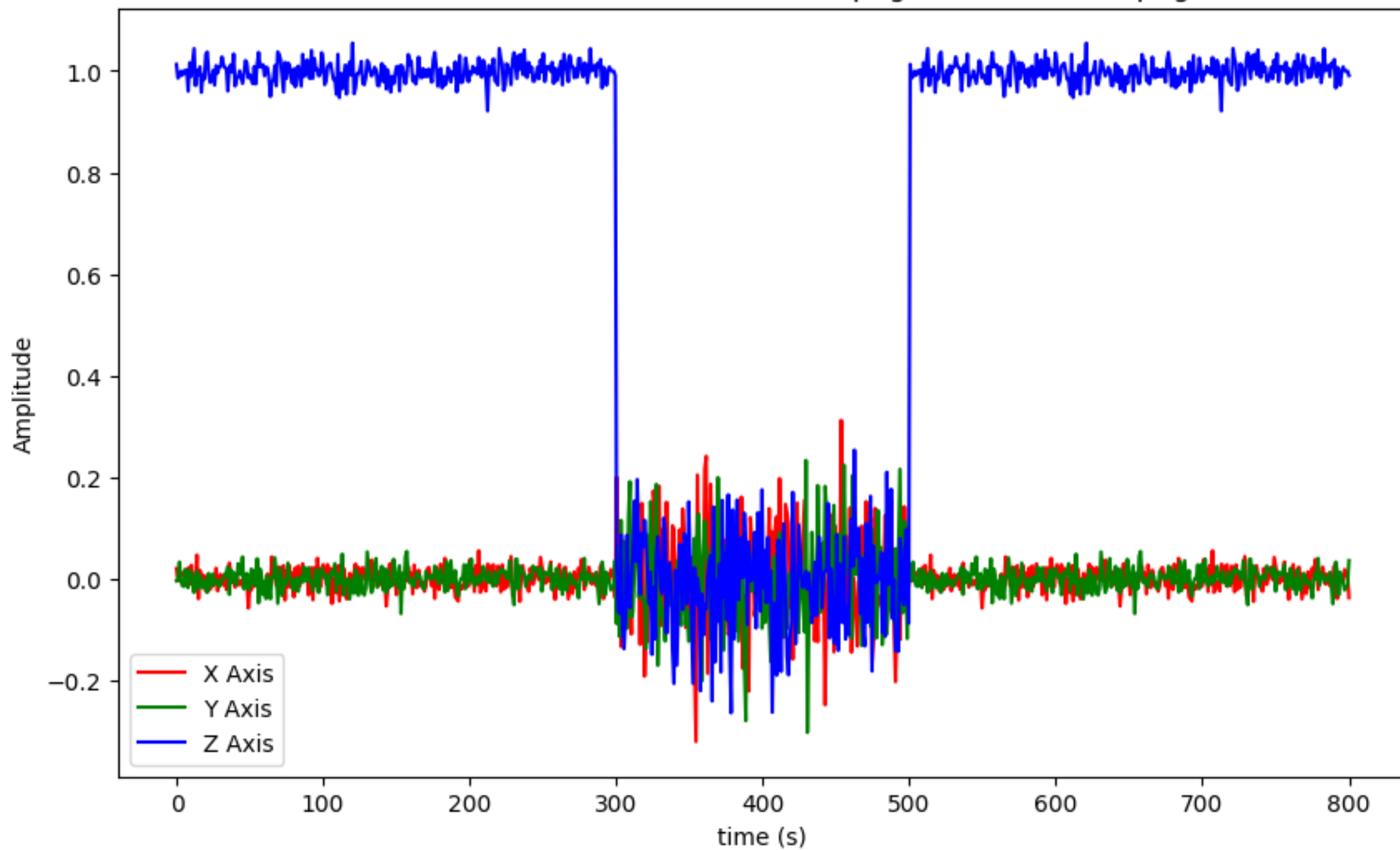
- Noise—db(A)
- Video
- **Your needs**



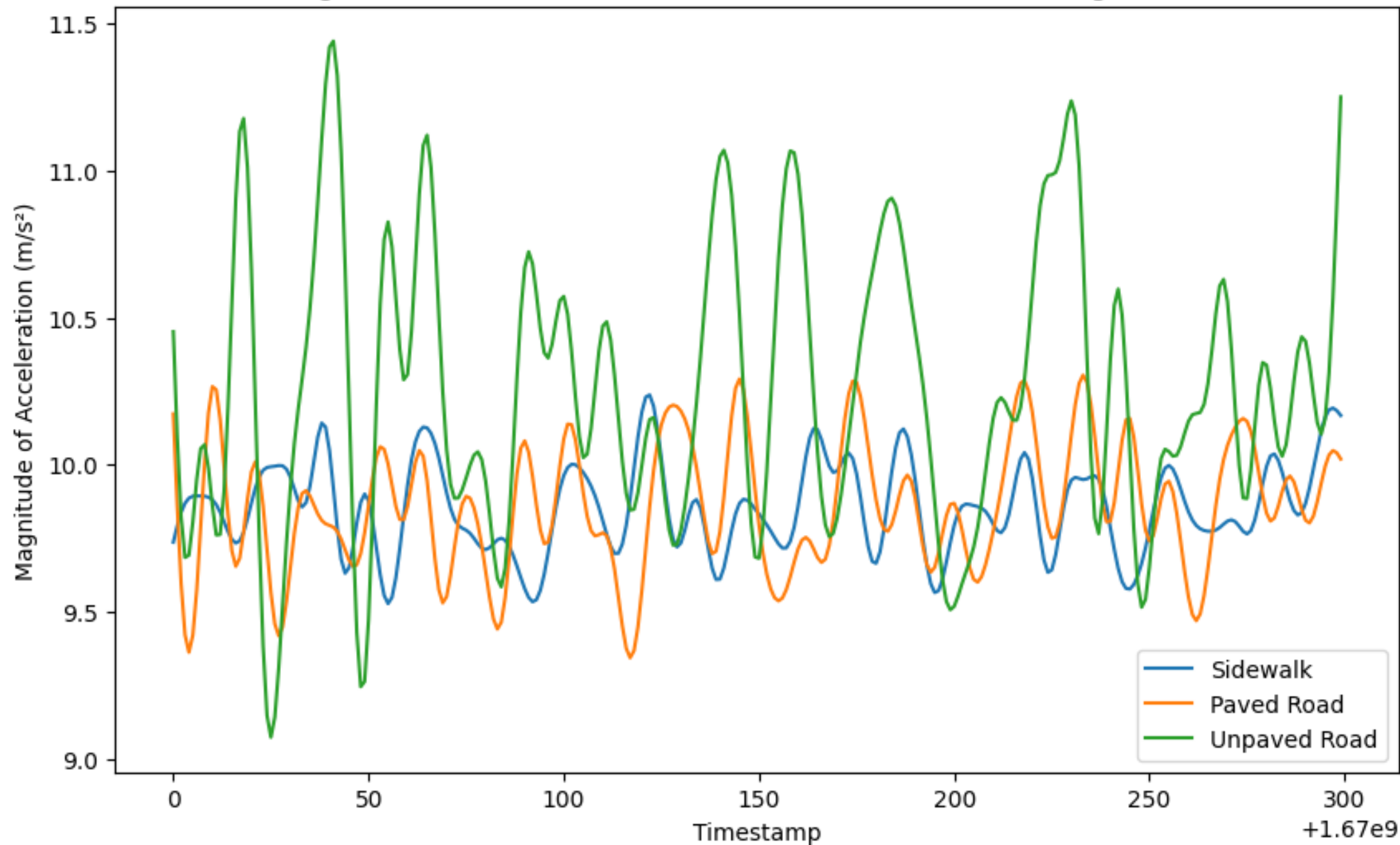
Speeds on Different Riding Surfaces



Accelerometer Data for an E-Scooter: Upright -> Fallen -> Upright



Magnitude of Accelerometer Feedback Over Different Riding Surfaces



Steps in building and operating ScooterLab

2. Testbed Deployment (2024-2025)

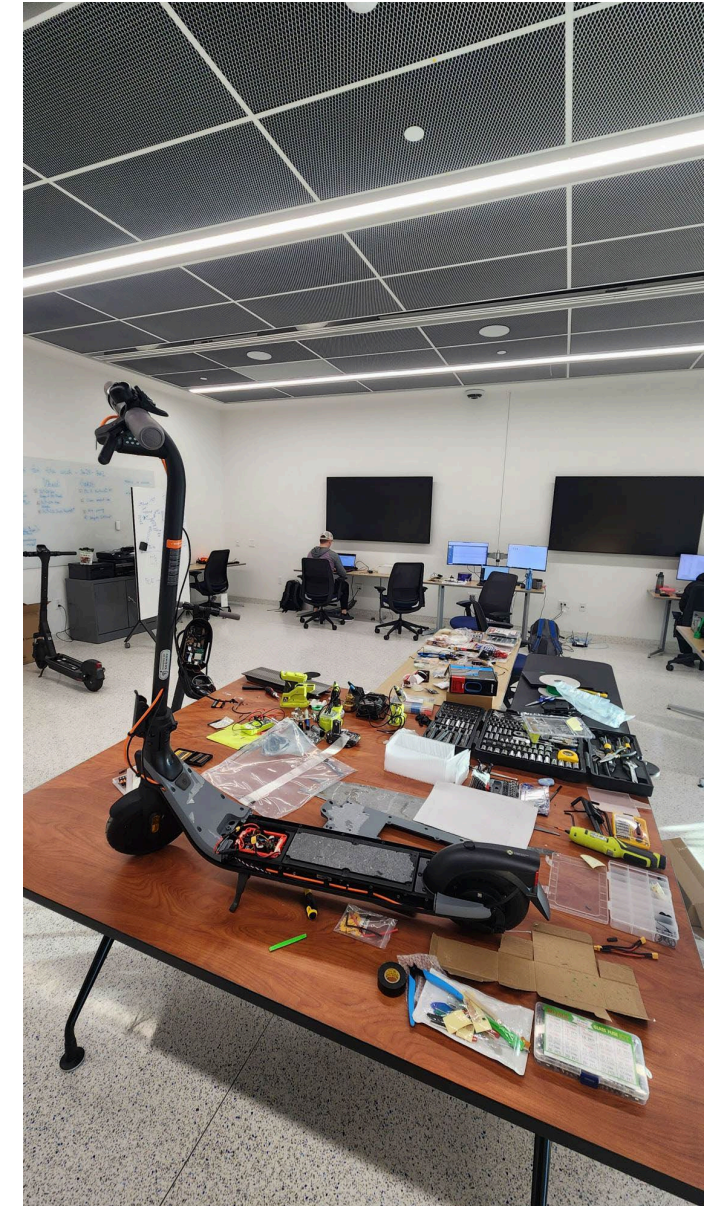
- Deploy 20 e-scooters in April 2024
- Coordinate studies with research community (you!)
- Deploy 100 e-scooters Summer 2024
- Store and manage data on RAMP
- Maintain scooter fleet



Steps in building and operating ScooterLab

Testbed Deployment

Challenges	Solutions
Admin —changing university purchasing policies	Add time
Risk Mgt. —university insurance definition of ‘vehicle’	Meetings + Power
Suppliers —reluctance to deal with university policies	Explain project goals and importance
Technical —computer enclosure waterproofness	Design & 3-D printing in-house



Steps in building and operating ScooterLab

3. Advancement (2026+)

- Explore new vehicle types and sensors
- Seek continuing funding NSF+
- Consider adding sites



News on how you can participate

Deploy a Study in San Antonio!

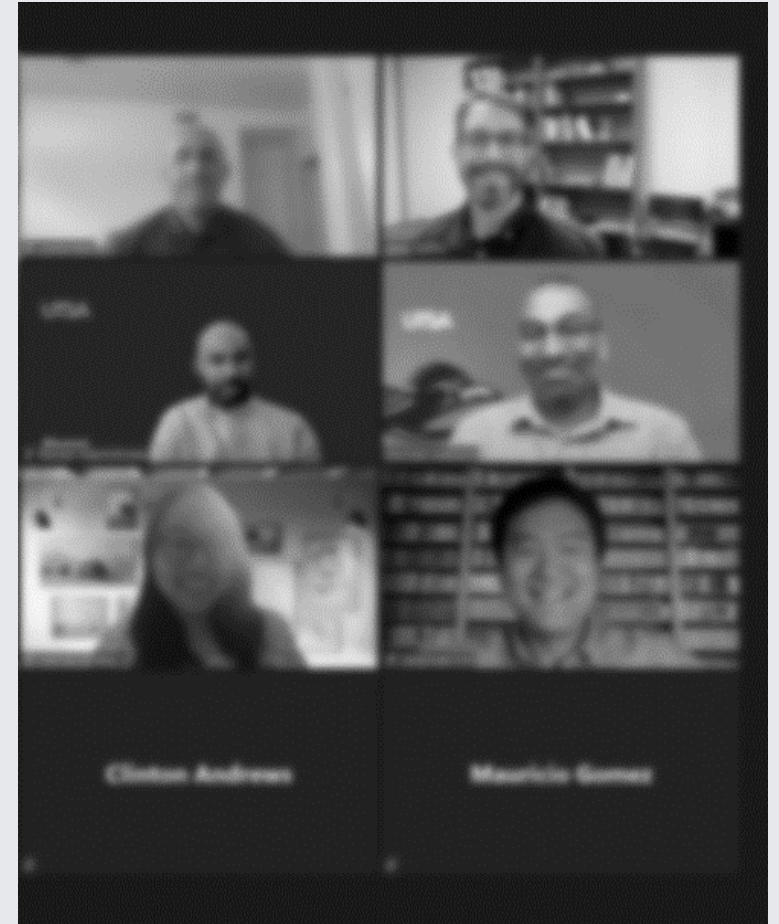
- **Naturalistic** – measuring student travel choices (volunteer default of 1 week equipment loan for trips)
- **Controlled** – direct human actions to measure another variable (may require student employees)
- Population, geography, time, sensors, etc.



News on how you can participate

Volunteer for Community Advisory Board

- Oversee **development and deployment** of ScooterLab
- Recommend **modifications and enhancements**
- Ensure fair and efficient **use of resources**



CONTRIBUTION

ScooterLab is building a collaborative urban sensing platform for improving cities.

Multi-disciplinary challenges require collaboration and sharing.

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ScooterLab Research Interest Questionnaire:

