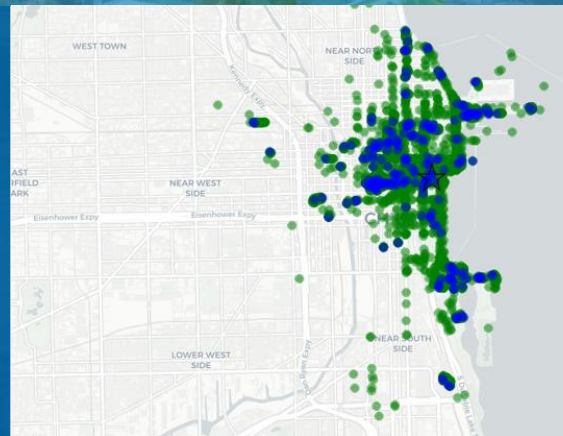


NOVEMBER 2025

# EVALUATING E-SCOOTER INTEGRATION WITH PARKING FACILITIES FOR FIRST- AND LAST-MILE MOBILITY: A CHICAGO MULTIMODAL DEPLOYMENT STUDY



NATALIA ZUNIGA, JAN CHRISTOPH ZILL, JOSHUA AULD  
*ARGONNE NATIONAL LABORATORY*

**Australasian Transport Research Forum (ATRF)  
Webinar on Micromobility and Public Transport**



Argonne National Laboratory is a  
U.S. Department of Energy laboratory  
managed by UChicago Argonne, LLC.



# SEARCHING FOR PARKING CAN SIGNIFICANTLY INCREASE THE VEHICLE MILES TRAVELED

**Average estimates of 30% of vehicles in the traffic cruising for parking**

- Users are more likely to cruise when curb parking is cheap and off-street parking is expensive
- Parking policies focus on aspects such as parking costs and curbside allocation restrictions – **multimodal integration is rarely evaluated**
- Centrally located garages have the potential to help reduce parking cruising by providing incentives to compete with curb parking – **foster transit and micromobility use**
- **Challenges:** private sector adoption of such incentives and the collaboration with cities and policymakers to provide connectivity to multimodal integration programs



# CROSS-SECTOR PARTNERS LAUNCHED AN E-SCOOTER PILOT PROGRAM IN CHICAGO

Conceived as part of a broader initiative to enhance urban mobility and reduce traffic congestion by integrating micromobility options with traditional parking facilities

- E-scooter enabled parking customers to use e-scooters to connect to destinations in downtown Chicago
- The initial fleet consisted of eight e-scooters, which was later expanded to 16 units in October 2023 to accommodate growing demand and further evaluate the program's impact



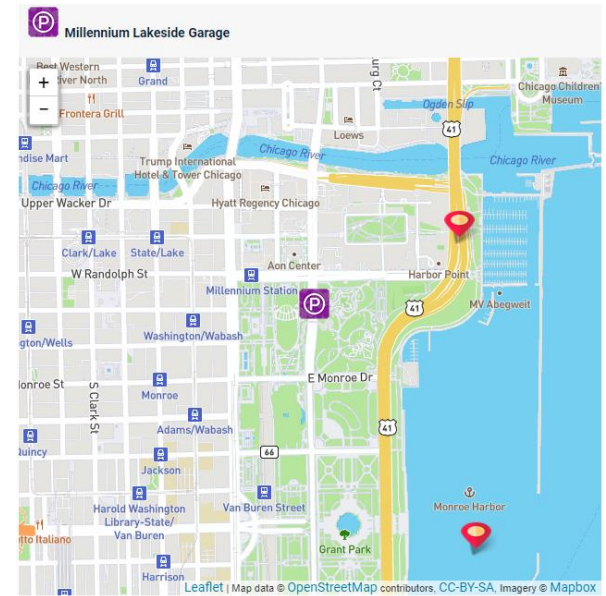


# MULTIMODAL INTEGRATION STUDY PROVIDE VALUABLE INFORMATION

Cities and parking managers could work together to provide multimodal connectivity

The main contributions of this study are:

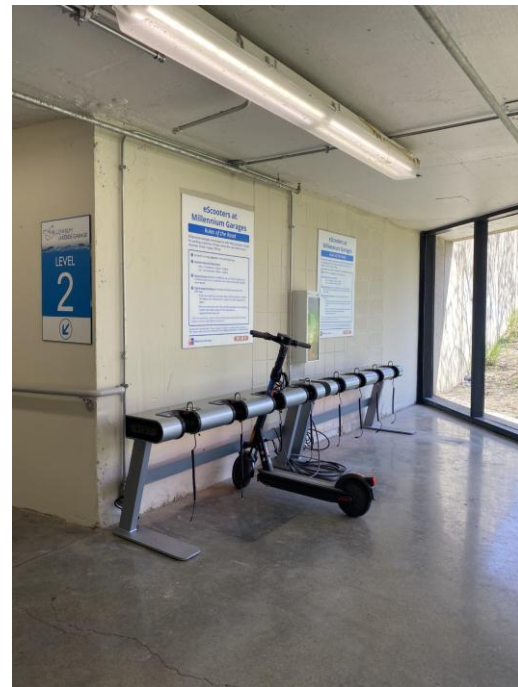
- a) An overview of a pilot program is provided as an example of the partnerships that can be developed in similar areas
- b) Analysis of the usages of the e-scooters in terms of increased coverage area
- c) A market potential analysis is developed using the Chicago household travel survey and an agent-based simulation framework for routing comparison



# INTEGRATING MICROMOBILITY WITH TRADITIONAL PARKING INFRASTRUCTURES

Program aimed to set a precedent for integrating micromobility with traditional parking infrastructures

- Partners include Civic Infrastructure Collaborative (CINCO), Argonne National Laboratory, Millennium Parking Garages (MPG), and Ridy
- Advertised through direct email, on the MPG website, in-garage signage, and on the partner parking platforms Spothero and Parkwhiz
- Users can start using e-scooters by completing a brief sign-up form, downloading a cellphone application, and setting up an account
- Restricted to MPG users



# KEY OBJECTIVES AND INSIGHTS FROM THE E-SCOOTER PILOT

- **Multi-Modal Integration**

- Integrated micromobility with existing transport and parking networks

- **Customer Convenience and Adoption**

- Enhanced urban travel convenience for parking customers
- Installed strategically placed e-scooter docks with clear signage and wayfinding aids
- Partnered with Spothero and Parkwhiz for online e-scooter promotion
- Sent direct email notifications to increase awareness

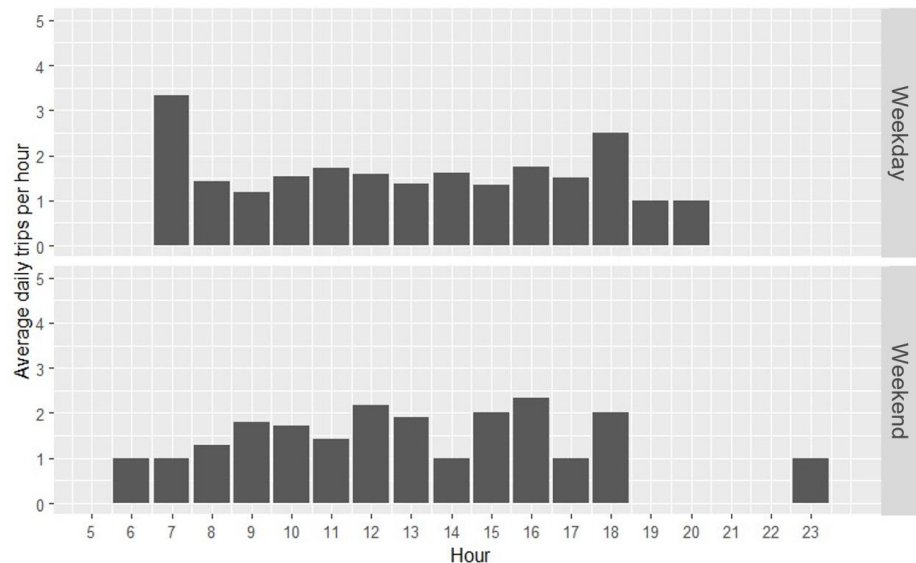
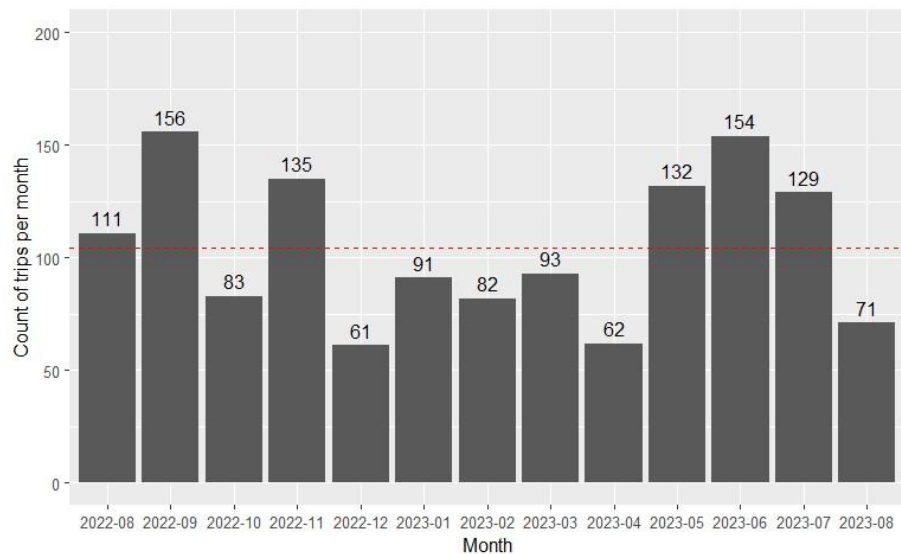
- **Private Sector Adoption and Scalability**

- Created a replicable model to attract private sector interest
- Demonstrated success through robust data and operational insights
- Encouraged scalability across urban centers



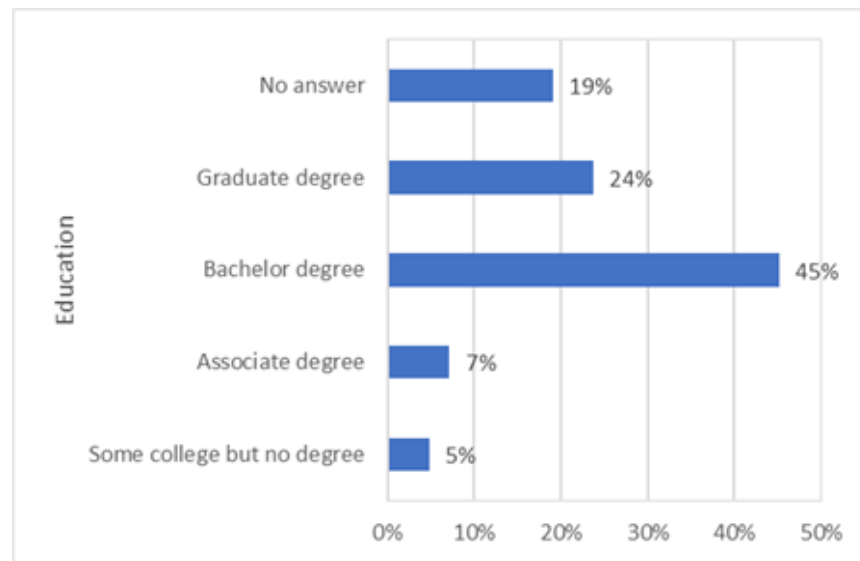
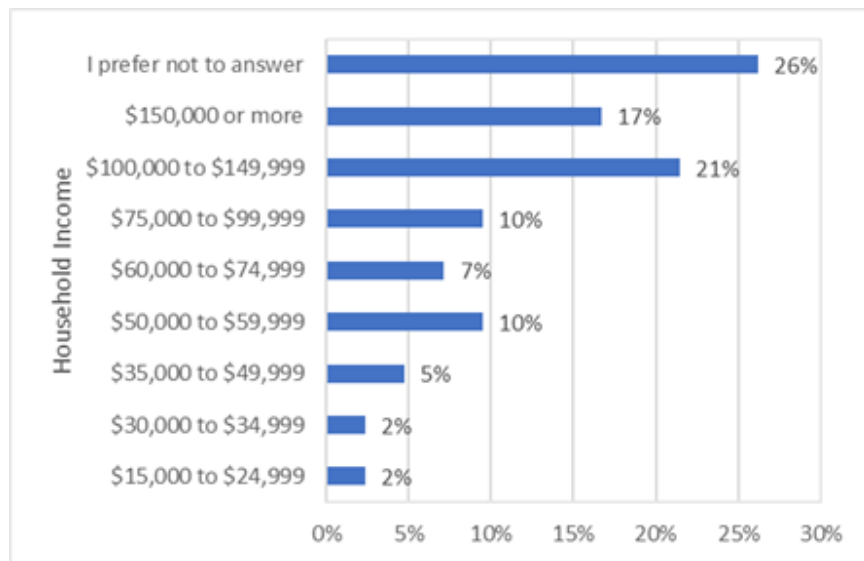
# THE HIGHEST DEMAND PEAKS ARE WEEKDAYS AT 7 AM AND 6 PM – COMMUTE TIMES

There were 1,360 trips during first part of the pilot program between August 2022 and August 2023, with an average of 104 monthly trips



# USERS TEND TO BE YOUNG AND HIGHLY EDUCATED WITH STABLE HIGH-PAID JOBS

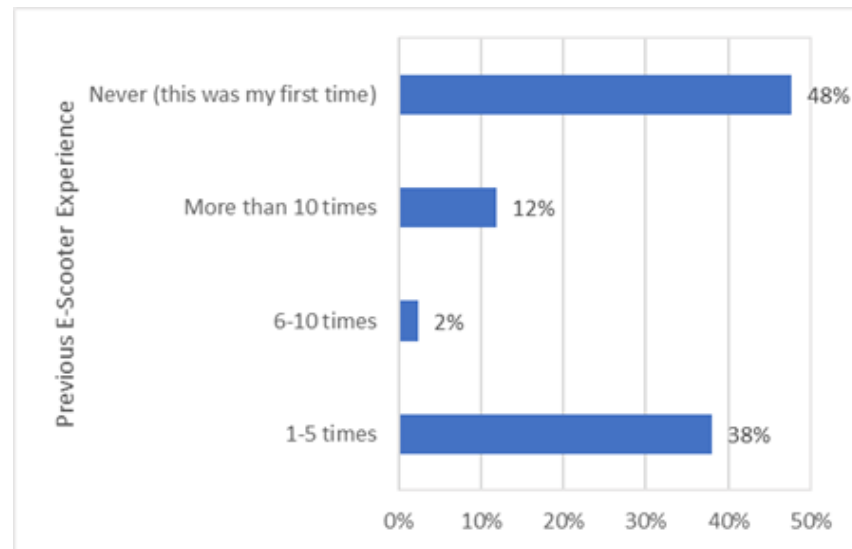
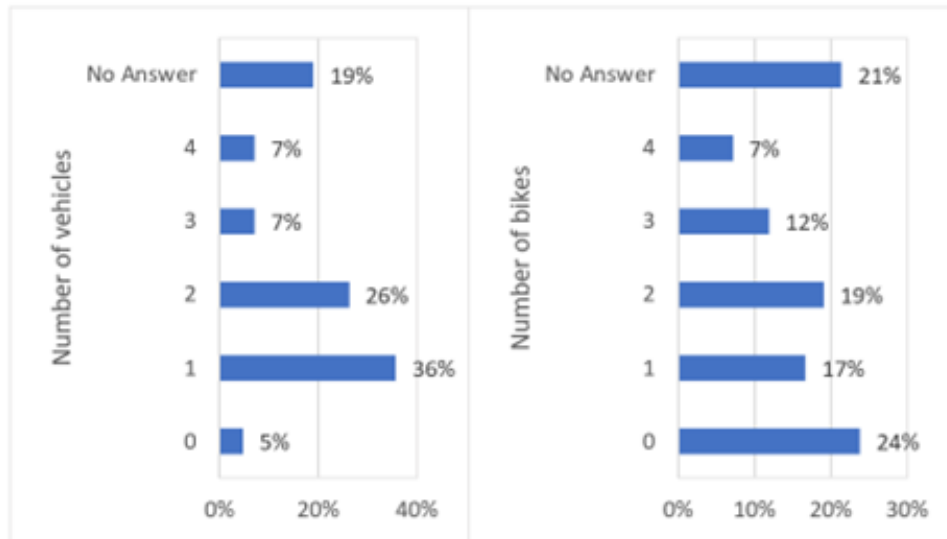
Their household income is higher than the regional average





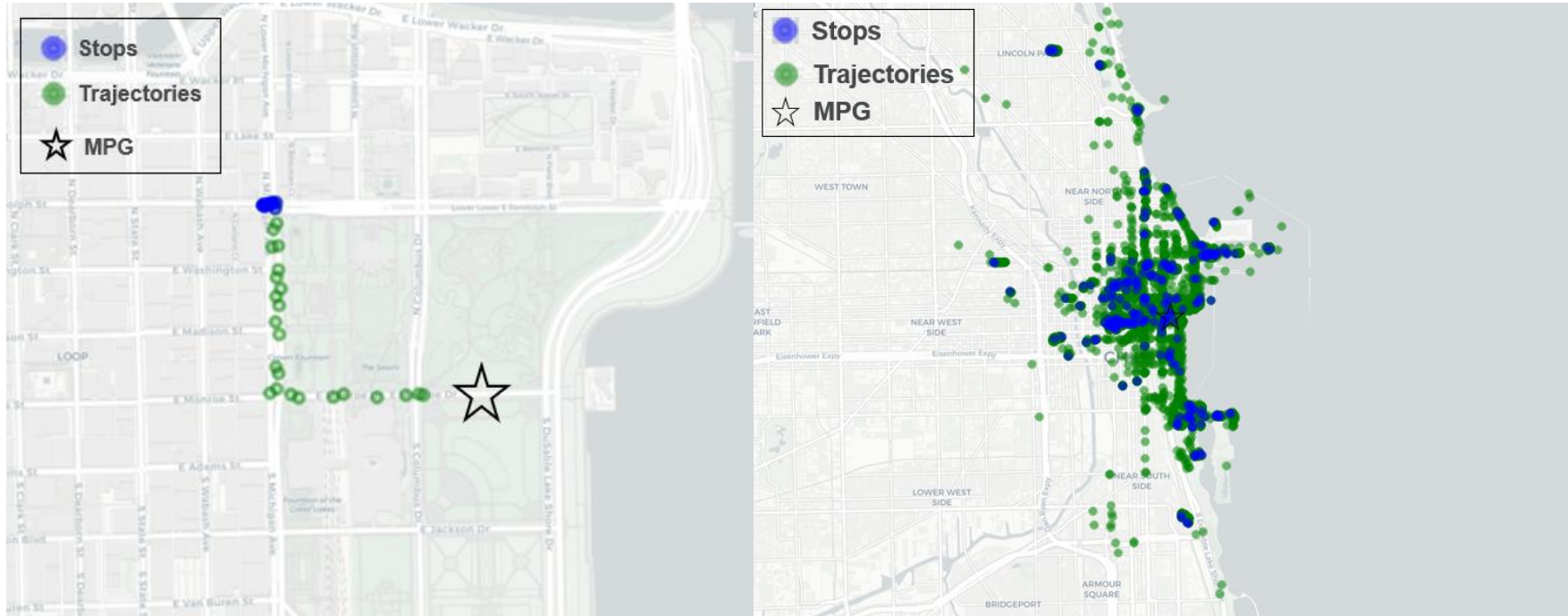
# NEARLY HALF OF THE USERS DIDN'T HAVE EXPERIENCE WITH E-SCOOTERS IN THE PAST

They own one or two vehicles, and the majority own bikes



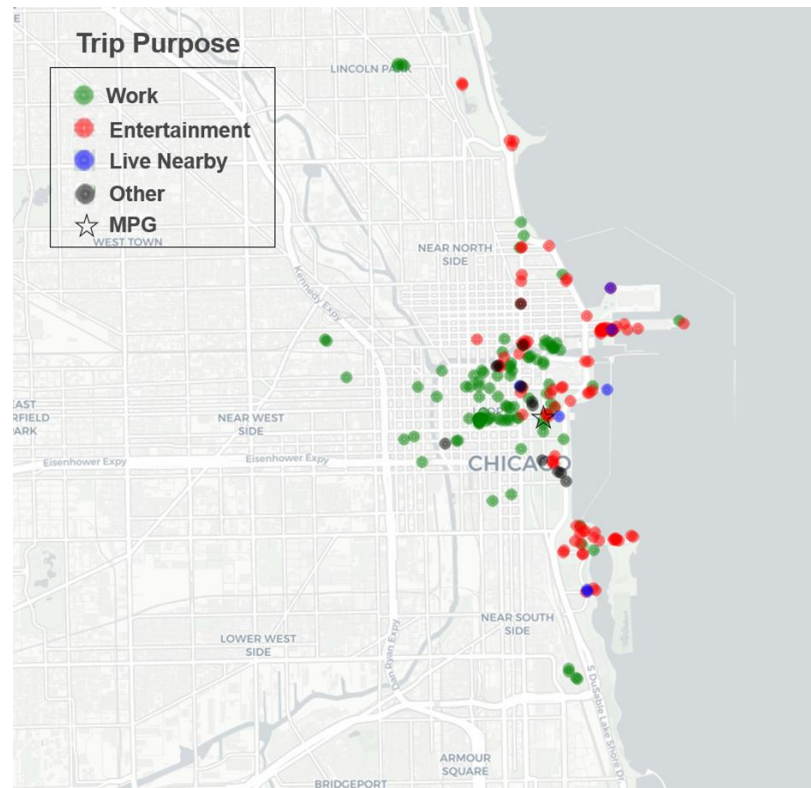
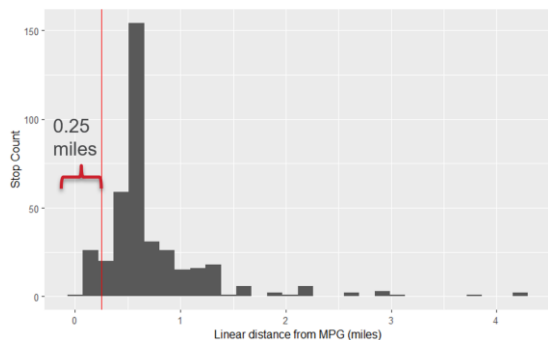
# AN ALGORITHM WAS IMPLEMENTED TO CLASSIFY AND DETECT STOPS

Vehicle trajectory obtained and processed



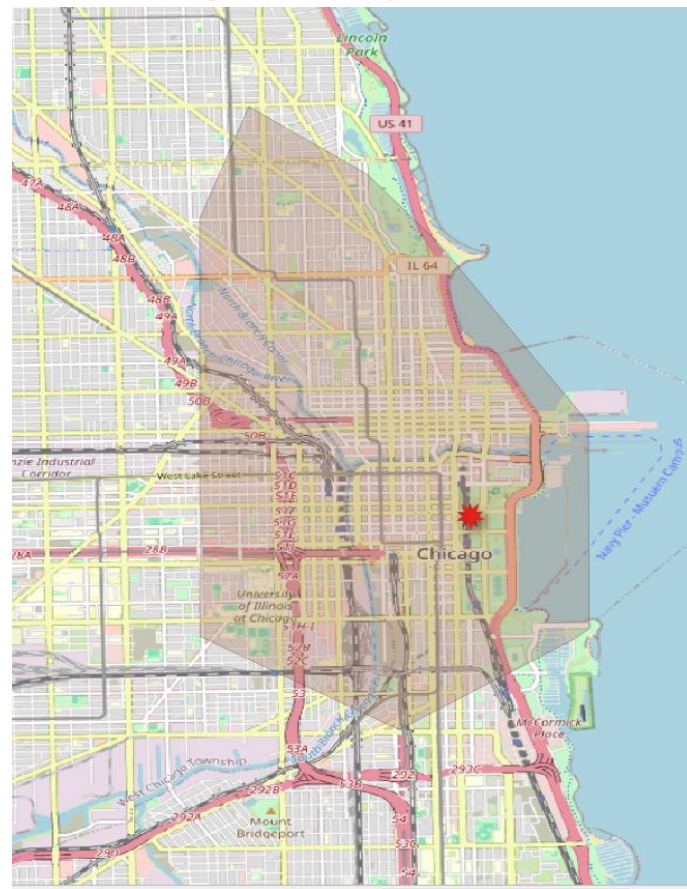
# SERVICE EXPANDED COVERAGE AREAS FOR PARKING USERS

- Average trip distance: 0.72 mi (1.2 km); max distance: 5 mi (8 km)
- Over 90% of stops exceeded typical walking range (0.25 mi/400 m)
- **The program could help reducing the need to search for parking near destinations**



# MARKET POTENTIAL ESTIMATE BASED ON CHICAGO TRAVEL PATTERNS

- Analyze the market potential of the MPG e-scooter program using daily travel patterns in Chicago
- Recreate daily tours with household travel survey data and agent-based simulation
- Routing based on trips origin-destinations
- **Potential Tours:** 97,398 daily tours identified in the service area
- Estimated maximum potential shift if all users saving travel time switched to e-scooters



# USER DEMOGRAPHICS AND PROGRAM DEMAND ESTIMATE

## ▪ Users' characteristics

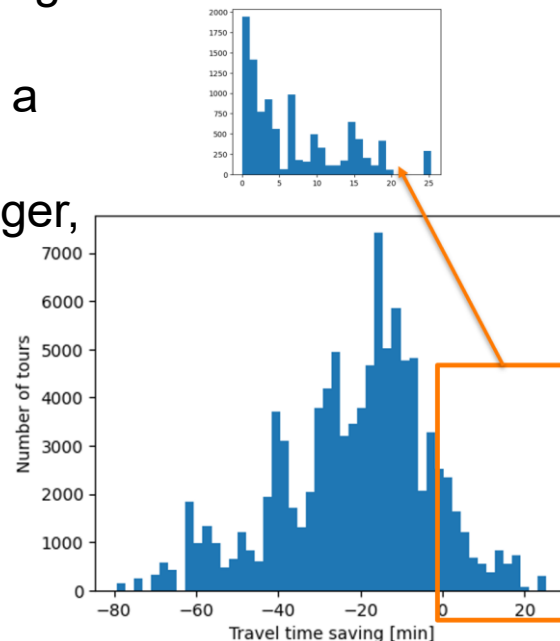
- 10k+ potential users identified from travel time savings analysis
- Majority (52%) of users are over 40 years old, with a lower adoption rate for e-scooters in this group
- Current Program Users: 80% are 40 years or younger, strong adoption potential in this group.

## ▪ Adjusted Potential Demand

- Estimated 5k potential users based on realistic adoption rates

## ▪ Implications for Expansion

- Insights to guide program scaling
- Supports parking manager's planning for future program expansion.





# PILOT PROGRAMS COULD INFORM OPPORTUNITIES FOR IMPROVING MOBILITY & CONNECTIVITY IN DENSE URBAN AREAS

- **Collaboration Opportunities**
  - Privately owned programs enable partnerships with cities, researchers, and policymakers
  - Enhance urban mobility and reduce congestion
- **Research Insights**
  - Data on e-scooter user behavior, travel patterns, and adopter profiles
- **Parking Management Applications**
  - Identifies expansion opportunities and quantifies market potential
- **Urban Impact**
  - Provides strategies to boost multimodal mobility



# SUMMARY AND CONCLUSIONS

E-scooter pilot program offered a promising solution for improving urban mobility, reducing congestion, and supporting mobility improvements goals

## ■ Study Overview

- Examined e-scooter use as a first-mile, last-mile solution to parking cruising in downtown areas
- Analysis included user behavior, trip data, and market potential for program scalability

## ■ Program Impact

- Promoted alternative mobility, integrated solutions, and high customer adoption
- Demonstrated strong demand and successful pilot metrics

## ■ Future Work

- Quantify broader regional benefits
- Evaluation of potential economic and health benefits





QUESTIONS?  
[NZUNIGA@ANL.GOV](mailto:NZUNIGA@ANL.GOV)



U.S. DEPARTMENT OF  
**ENERGY**

Argonne National Laboratory is a  
U.S. Department of Energy laboratory  
managed by UChicago Argonne, LLC.

Argonne   
NATIONAL LABORATORY

# ACKNOWLEDGMENTS

Vehicle Technologies Office (VTO) under the Systems and Modeling for Accelerated Research in Transportation (SMART) Mobility Laboratory Consortium, an initiative of the Energy Efficient Mobility Systems (EEMS) Program. The following DOE manager played important roles in establishing the project concept, advancing implementation, and providing guidance: Erin Boyd.

The submitted manuscript has been created by the UChicago Argonne, LLC, Operator of Argonne National Laboratory (Argonne). Argonne, a U.S. Department of Energy Office of Science laboratory, is operated under Contract No. DE-AC02-06CH11357. The U.S. Government retains for itself, and others acting on its behalf, a paid-up nonexclusive, irrevocable worldwide license in said article to reproduce, prepare derivative works, distribute copies to the public, and perform publicly and display publicly, by or on behalf of the Government.