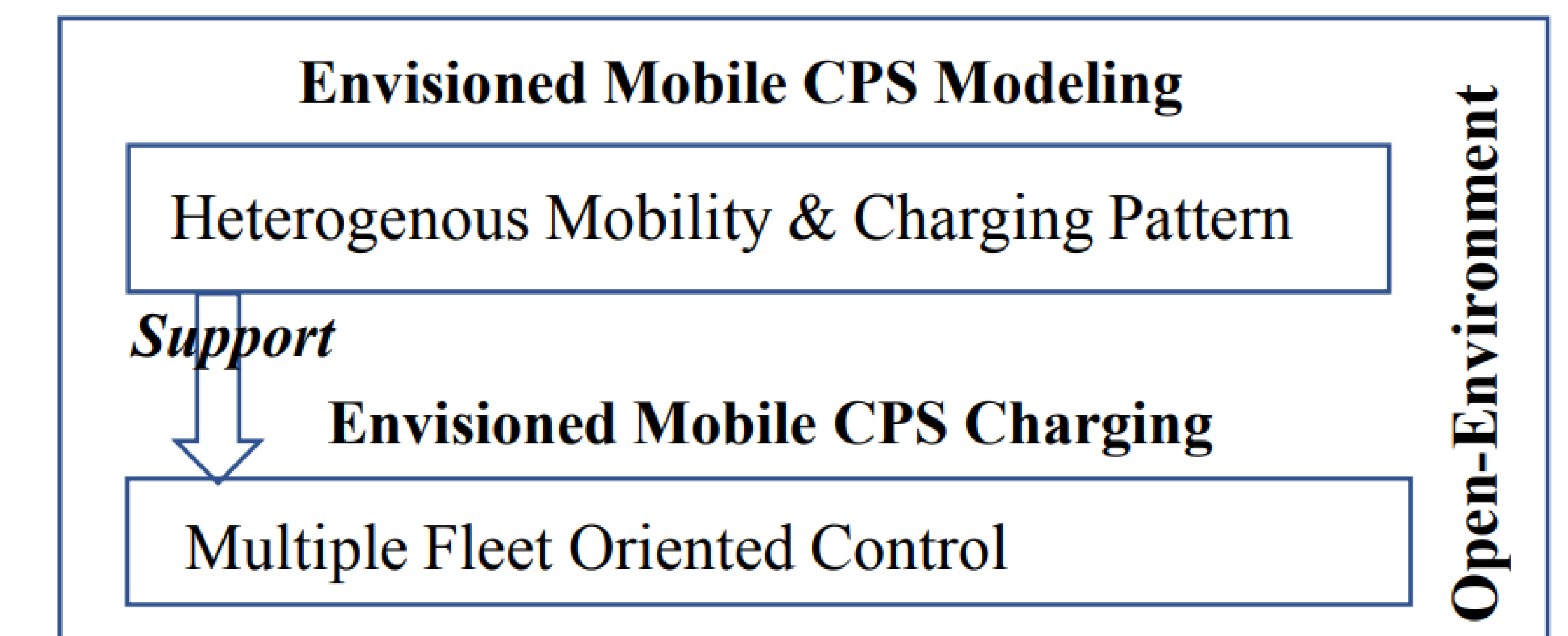
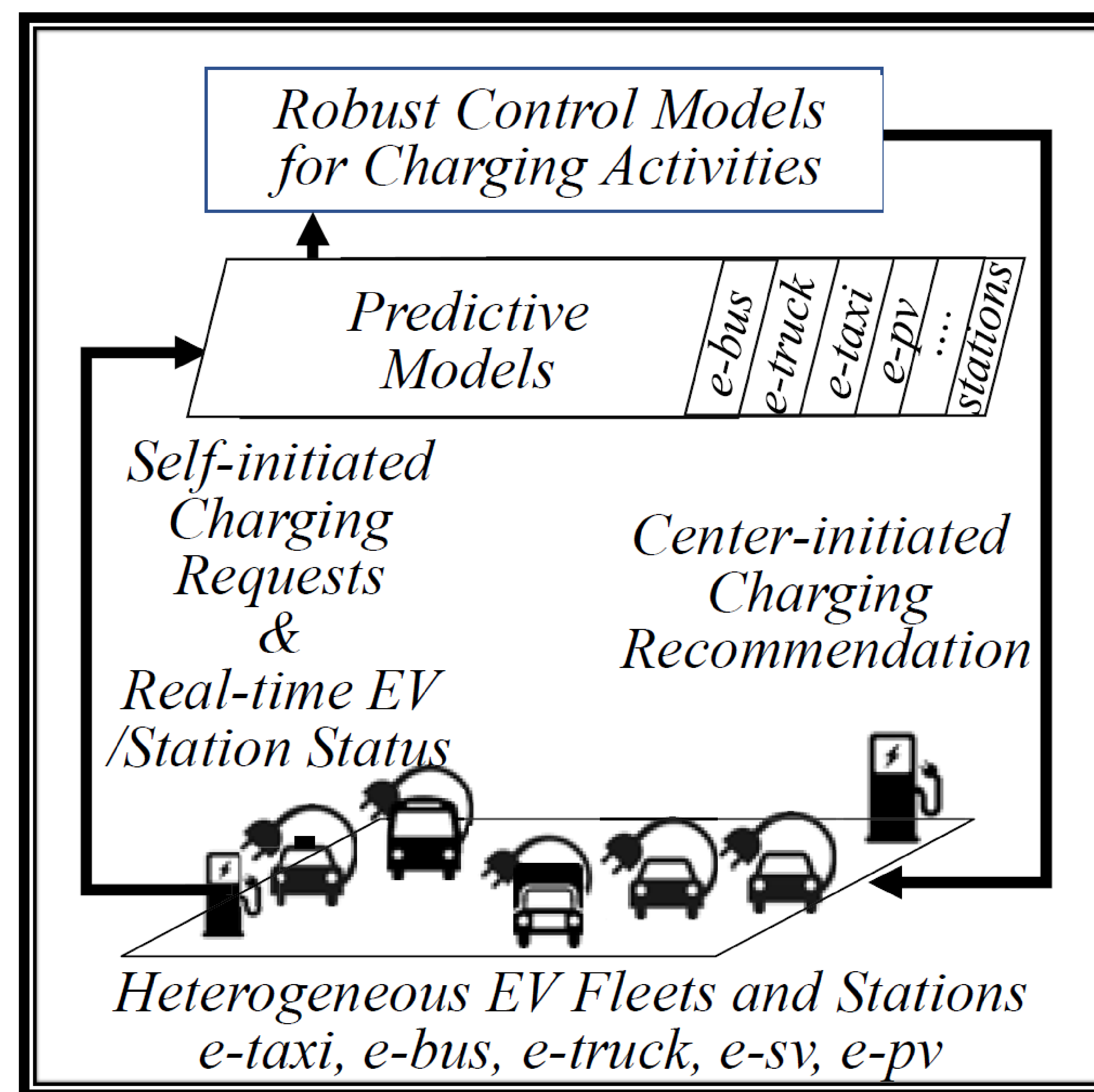
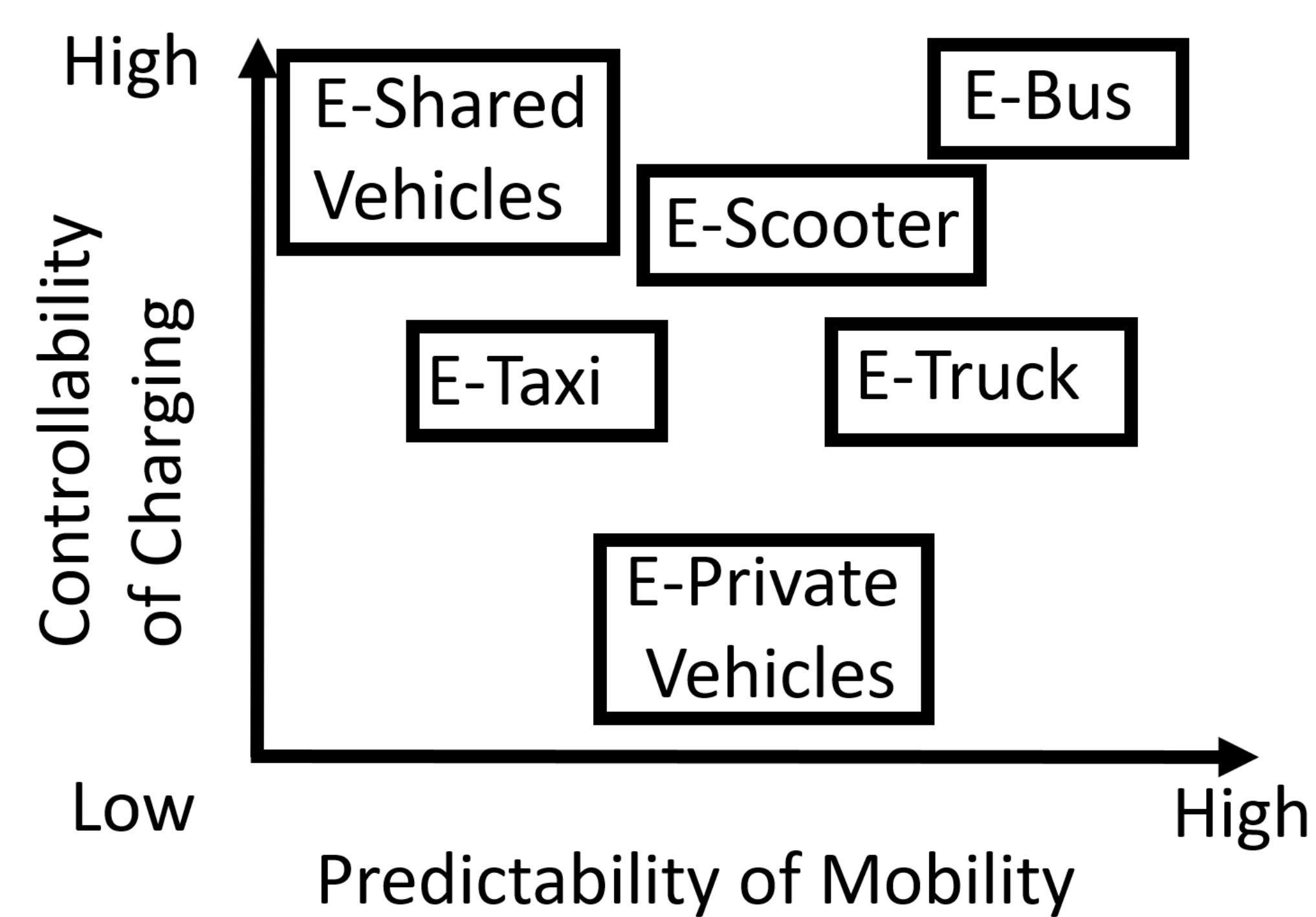




CPS: Small: Collaborative Research: Improving Efficiency of Electric Vehicle Fleets: A Data-Driven Control Framework for Heterogeneous Mobile CPS

Lead PI: Desheng Zhang, Rutgers University; PI: Fei Miao, University of Connecticut: CPS 1932223 & 1932250/2019-2022

Challenge:
Managing Heterogeneous Mobile CPS for Charging and Dispatching



	State of the Art	Research Approach	Outcomes (Deliverables)
Fleet Prediction	<ul style="list-style-type: none"> Homogeneous Fleet Based Lacking Correlation 	<ul style="list-style-type: none"> Graph Convolutional Network Multimodel LSTM Multitask Learning 	<ul style="list-style-type: none"> Heterogenous Fleet Based Spatiotemporal Fleet Correlat.
	<ul style="list-style-type: none"> Model-Driven Offline Homogeneous Setting 	<ul style="list-style-type: none"> SUMO-based Validation Multi-Fleet Data Consolidation 	<ul style="list-style-type: none"> Large-Trace-Driven Online Heterogeneous Setting
Fleet Control	<ul style="list-style-type: none"> Optimal Control for Hybrid Sys. Homogeneous Uncertainty Set 	<ul style="list-style-type: none"> Data-Driven Hierarchical Control Computationally Tractable Algo. 	<ul style="list-style-type: none"> DROHS (Distributionally Robust Optim. for Hybrid Sys.) Heterogeneous Uncertainty Set
	<ul style="list-style-type: none"> Trace-Driven Simulation Closed Environment 	<ul style="list-style-type: none"> EV Platform Access Multi-Source Data Consolidation 	<ul style="list-style-type: none"> Small-Scale Field Study Open Environment

Stakeholder Engagement

- Working with EV Managers of Rutgers EV Fleet
- Collaborating with Scooter Company Veo in NJ for Potential Technology Transfer

Education and Outreach

- K-12: Two High School Students
- Female: Support One Female PHD
- Minority: 2 REU Students

Research Impact for Community

- Releasing 5 GB of EV Data and Models
- Publishing 10 Research Papers
- Best Paper Nomination (ICCPs'21)