Matching Parking Supply to Travel Demand towards Sustainability

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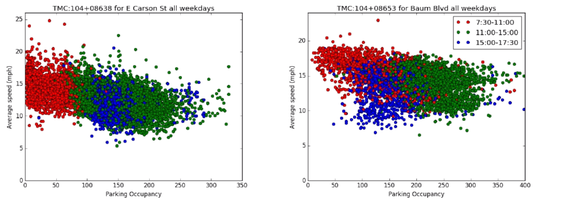
Parking vs Speed: Macroscopic Relationships

- Explore the relationship between parking features and traffic speed.
  - Use data-driven methods to analyze the correlation of parking occupancy and traffic flow at the level of granular reservoirs that divide the entire transportation network. In each reservoir, a fundamental diagram macroscopically governs the parking and traffic flow.
  - We evaluated the effectiveness of linear models on estimating on-street parking occupancy/arrival rate using traffic speed data under various scenarios.

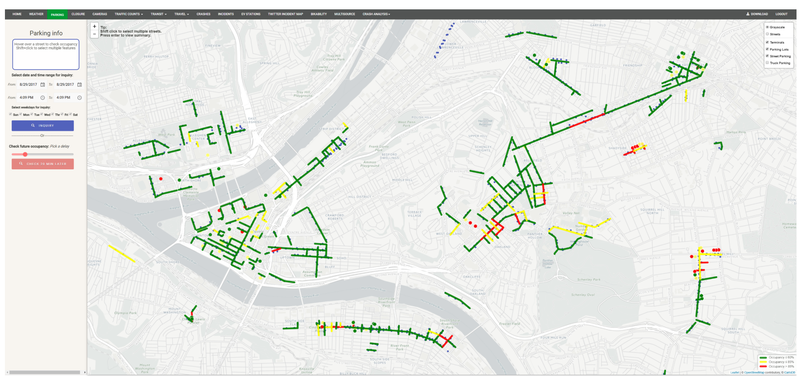


(a) Speed versus parking occupancy: East Carson St, all day

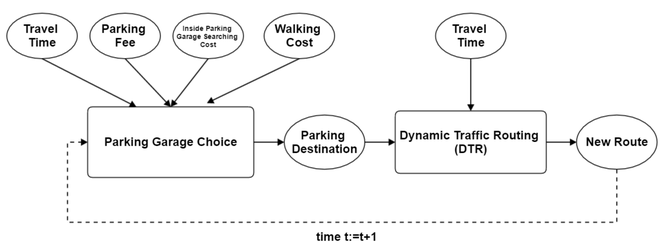
(b) Speed versus parking occupancy: East Carson St, all day

Parking information visualization

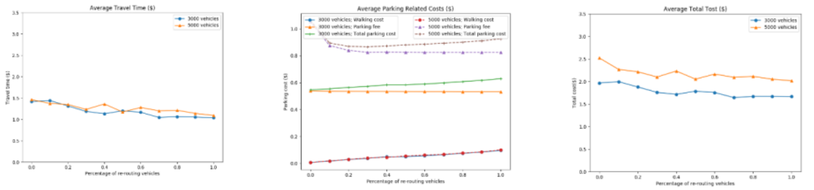
- Developed a web application to estimate/predict parking occupancy rate in high spatio-temporal resolution.
- Visualize parking prices and occupancy rate in openstreet maps.



Parking Search



Parking Search: cont.



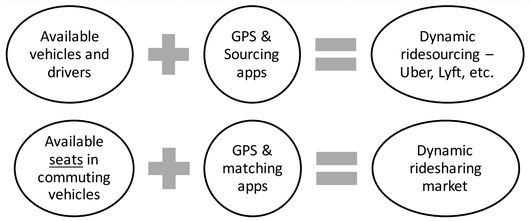
(a) Average travel time ($).

(b) Average parking related cost ($).

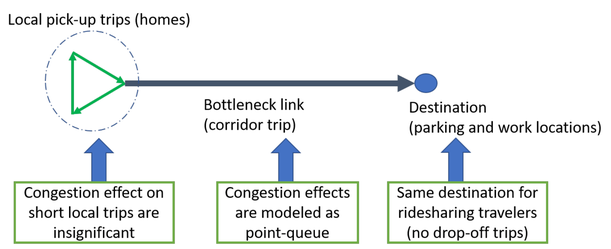
(c) Average total cost for individual travelers ($).

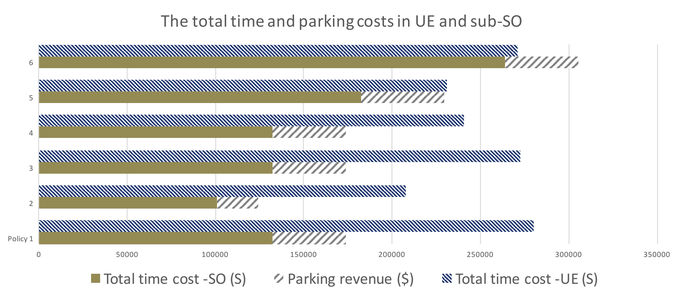
Results: Comparison of average costs over different penetration rates

Shared Parking Ridesharing Payment Policies for Heterogeneous Dynamic Ridesharing



- Formulate a continuous-time **dynamic ridesharing problem** for a single bottleneck in the morning commute scenario;
- Investigate how travelers behave at the equilibrium of departure-time and ridesharing mode choices as **heterogeneous groups** with different values of time;
- Calculate the **parking pricing** that eliminates the queuing congestion in the morning commute.

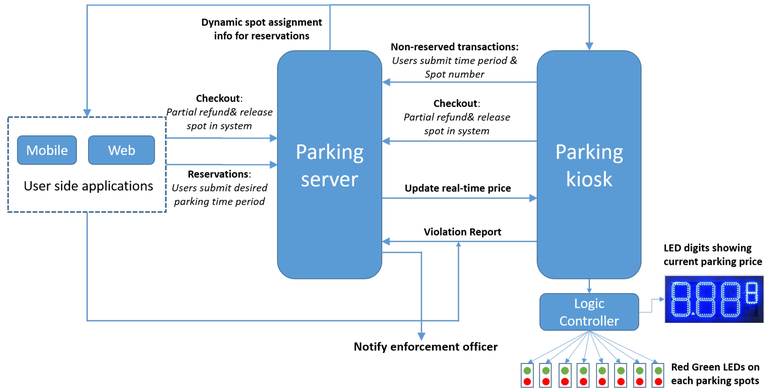




Numerical results :Group-specific base payments

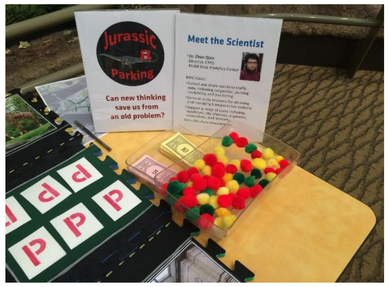
Non-sensor based parking management system

- Developed a non-sensor solution for effective and inexpensive parking management system:
  - Providing better estimates for real-time parking occupancy without deploying sensors;
  - Applying dynamic parking rates based on demand/supply.
  - Offering online parking reservations via mobile or web; Enabling convenience and flexible parking payments.
  - Implement an incentive-based violation reporting scheme. Allowing cheap and efficient parking enforcement.
  - Featuring real-time smart spot allocation to maximize the expected availability of parking resources.



System framework and information flow chart of the system

Broder impacts



- Left: Carnegie Museum of Natural History educators are designing models and games to illustrate the science and impact of sensing driven parking.
- Right: Museum educators developed a hands-on activity called "Jurassic Parking". Players work through scenarios to show how data influences their choices.