iCity Park – Game Based Parking Choice Data Collection

Bo Wang, Mehdi Nourinejad, Matt Roorda

University of Toronto

UNIVERSITY OF TORONTO
FACULTY OF APPLIED SCIENCE & ENGINEERING
Transportation Research Institute

UTTRI

iCity Park

1. Parking policy significance

- Parking policies have great impacts on drivers' parking choice, and even travelling behaviours

2. ITS parking technology impact analysis

ITS applications for parking:

- Parking Guidance and Information (PGI) system

Parking Policies   Policy Impacts

- Parking reservation system

iCity Park – Survey types

Revealed preference (RP) and stated preference (SP) survey

1. RP survey: collect data about drivers' parking spot choices made in real life
   – Complex to define choice set
   – Difficult to obtain attribute values of all available parking alternatives

2. SP survey: collect data about drivers' parking spot choices in different hypothetical scenarios with designed alternatives and attributes
   – Defined choice set, alternatives and attributes
   – Some concerns about validity

iCity Park Methodology

1. Survey design

The SP survey is designed as a parking game, iCity Park

The application includes three sections:

- Survey introduction

- Game instruction and game scenarios

- Socioeconomic question survey

iCity Park Methodology

1. Survey design – game settings
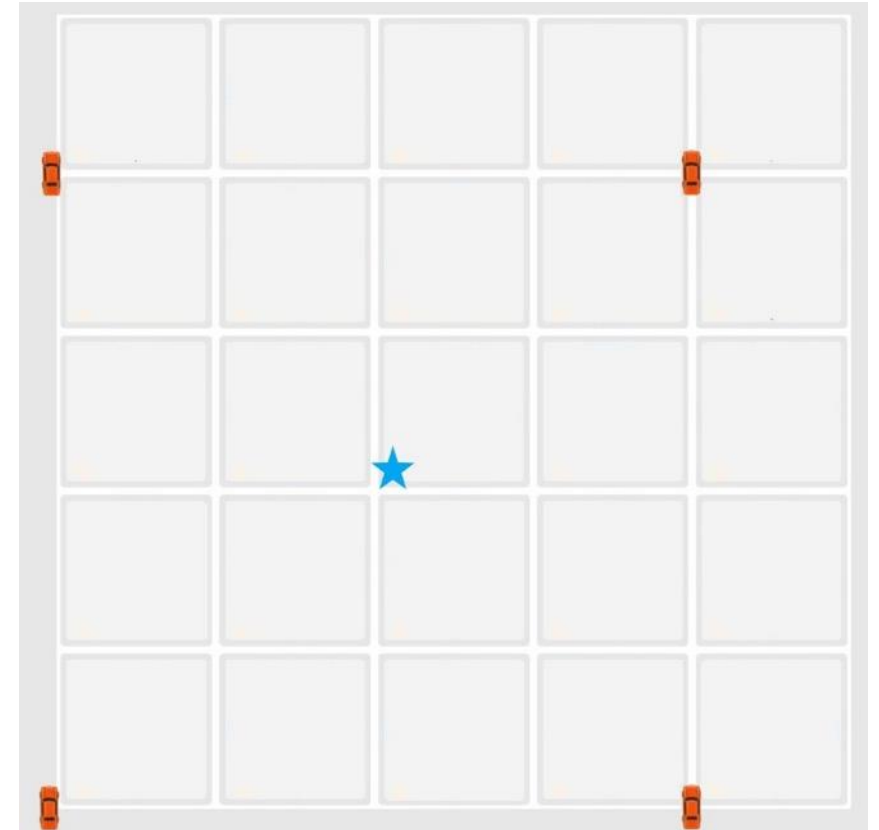
- Road network:

5x5 grid network, block length = 300m

- Initial location:

one of four intersections, four blocks from the destination

- Destination location:

a corner of the central block

iCity Park Methodology

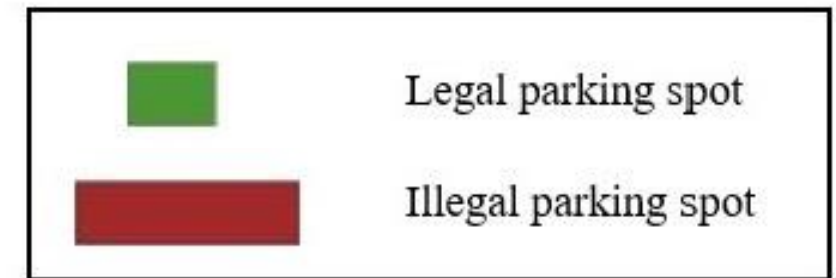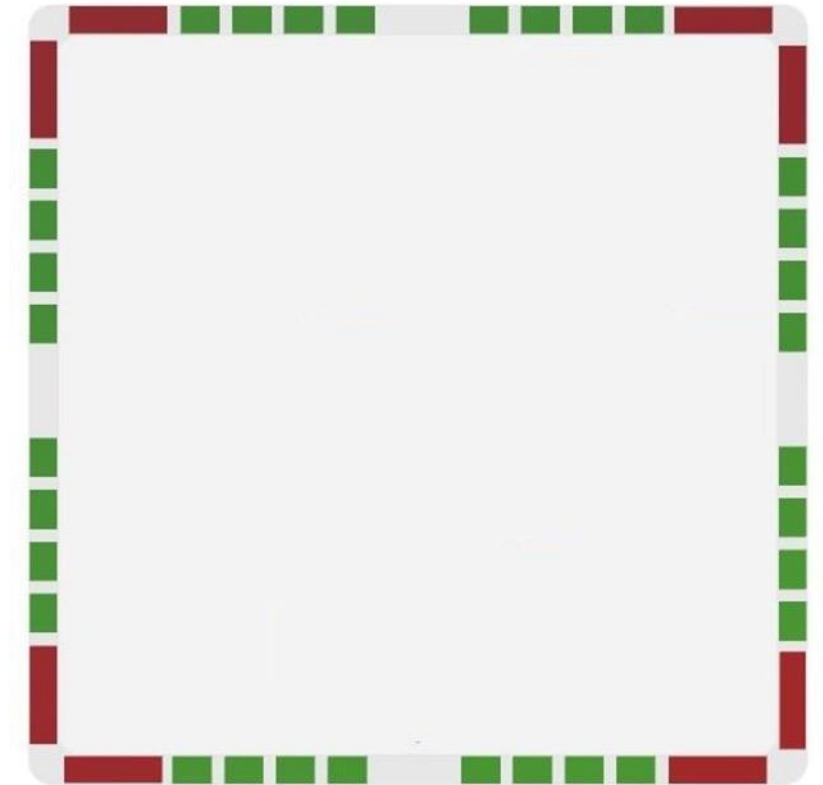## 1. Survey design – game settings

- Parking spot distribution (per block face):

Eight legal spots (green)

Two illegal spots (red)

- Vehicle driving speed: 25 km/hr

- Walking speed: 1 m/sec

🟩	Legal parking spot
🟥	Illegal parking spot

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iCity Park Methodology

1. Survey design –

Conventional parking scenarios

- Can view parking spots near vehicle location

- Players direct the vehicle in the network to cruise for parking

- Under moderate time and cost pressure

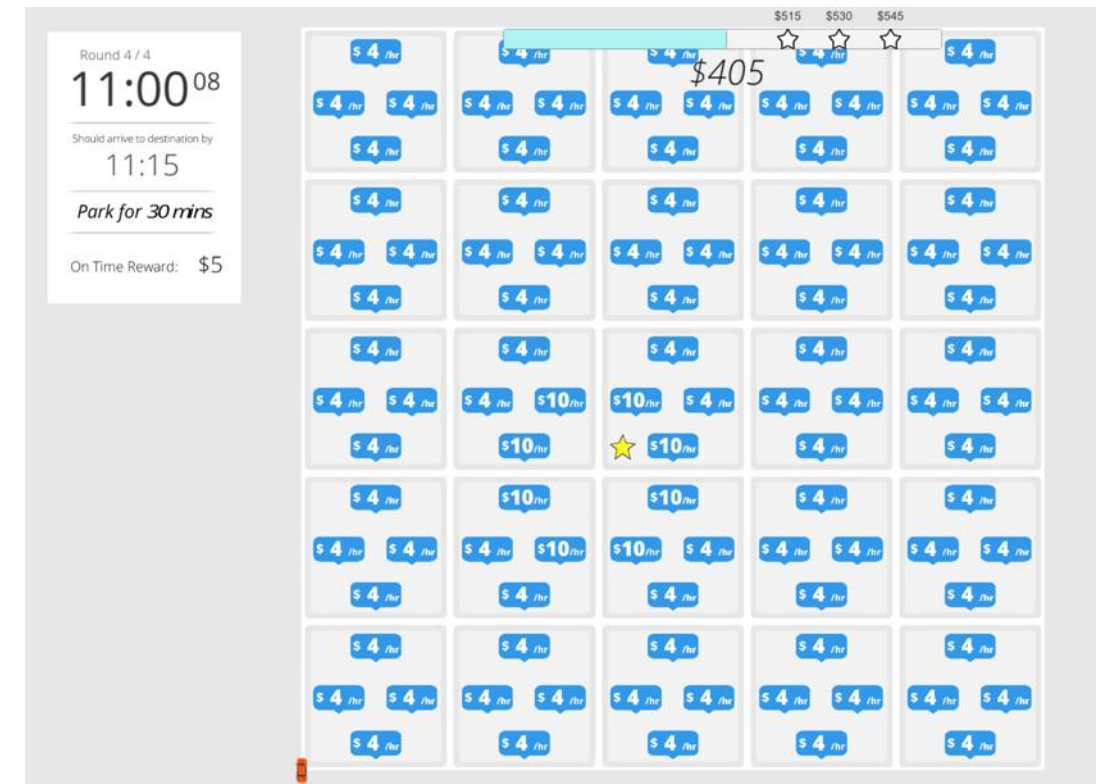- Simulates conventional parking behaviour
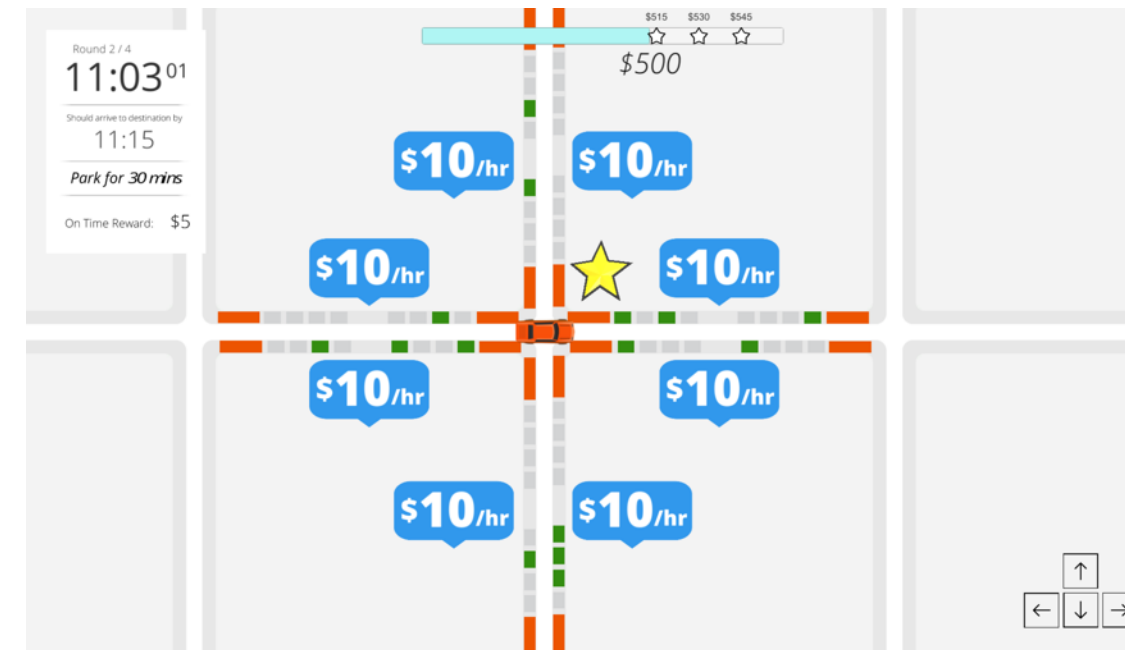
iCity Park Methodology
1. Survey design

Assisted parking scenarios

- Can view all parking spots in the network

- Players zoom into the map and select available parking spots

- Simulates parking behaviour with intelligent parking systems

iCity Park Methodology

1. Survey design – questionnaire and database

Survey was done on 68 students, staff and faculty, in our lab. Many scenarios each.

Socioeconomic information

- Age, gender, occupation status, education level, travel mode, parking frequency, etc.

The database records game setting and all decisions made by respondents

– Scenario settings (all parking spot location coordinates, attributes)

– Player decisions (driving routes, viewed spots, selected spots, parking cost, on-time performance, scores)

iCity Park Methodology

2. Discrete choice model

Used to evaluate the influential factors for parking choices

- Model structures
  - Multinomial logit (MNL) model
  - Nested logit (NL) model
  - Mixed logit (MXL) model

iCity Park Findings - Parking Strategies

Parking Spot Attributes	Preference	Relative Sensitivity	
		Conventional parking	Assisted Parking
Parking Location	Close to destinations	Lower	Higher
Parking Type	Legal parking alternatives	Lower	Higher
Legal Parking Rate	Low parking rate	Lower	Higher
Illegal Parking Hourly Citation Probability	Low citation probability	Lower	Higher

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iCity Park Findings - Parking Strategies

Respondents with different demographic attributes have different parking choice behaviours only in assisted parking.

- Older respondents are less sensitive to legal parking cost and less likely to park illegally

- Female drivers are less likely to park illegally

iCity Park Conclusions

1. Conclusions on iCity Park as a data collection tool for on-street parking

- Gamified SP approach helps to assess the most important factors in parking choice and expose respondents to a controlled experiment

- It is useful for testing parking preferences, effects of parking assistance, and search strategies

- Rich data set, but some concerns over how representative of real life.

iCity Park Conclusions

2. Conclusions on the parking choice modelling

- Mixed logit model gave the best fit.

- Results show a parking information and reservation system can improve driver's efficiency, reduce their cost and reduce illegal parking.

Questions?

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