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Key Project Information

- **Tag line:**
  Building a Smart City Economy and Information Ecosystem to Motivate Pro-Social Transportation Behavior

- **Funded by:**
  National Science Foundation ($1.4m) and
  University of Pittsburgh (seed funding)

- **Duration:**
  September 1, 2017 – August 31, 2020

- **More Info:**
  https://PittSmartLiving.org, @PittSmartLiving

Team Members

School of Computing and Information

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GSPIA

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TransitScreen

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Project Partners

- Port Authority of Allegheny County
- Healthy Ride Pittsburgh
- City of Pittsburgh
- Oakland Business Improvement District
- Pittsburgh Downtown Partnership
- Envision Downtown
- Oakland Transportation Management Association
- Pittsburgh 2030 District
- Radius Networks
- UPMC
- University of Pittsburgh:
  * Department of Parking, Transportation & Services
  * Office of Community and Governmental Relations
  * Center for Social & Urban Research
- Daniele Quercia, Bell Labs, Cambridge, UK

Project Goal #1

Design, develop, deploy, and evaluate a multimodal trip planning mobile app that:

1. Provides commuters with real-time information of arrival and utilization of all relevant options of public transit (e.g., bus, subway, shuttles, bikes, etc.)
2. Enables commuters to automatically ”compose” smart multimodal trips
3. Supports other criteria for routing beyond trip duration (e.g., healthy life-style, scenic routes, etc)

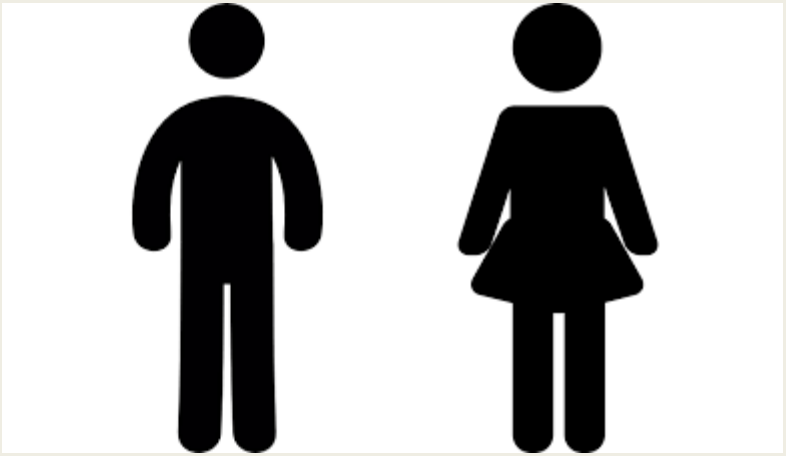
Project Goal #2

Build a marketplace around **multimodal mobility**, where businesses can offer time-sensitive incentives connected to real-time transit information to nearby commuters (e.g., the next bus is too full, come in and enjoy $1 off coffee).

- Incentives must be in support of pro-social behavior
- Desired pro-social behavior can be influenced by Transit Operators

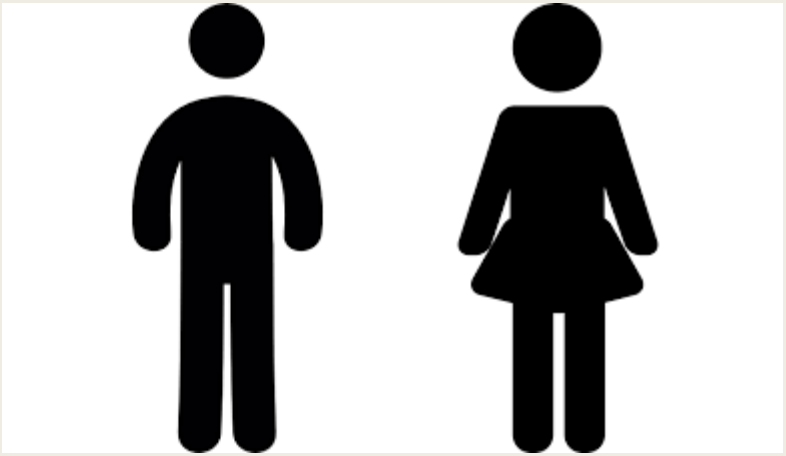
Motivating Application

People waiting at the bus stop



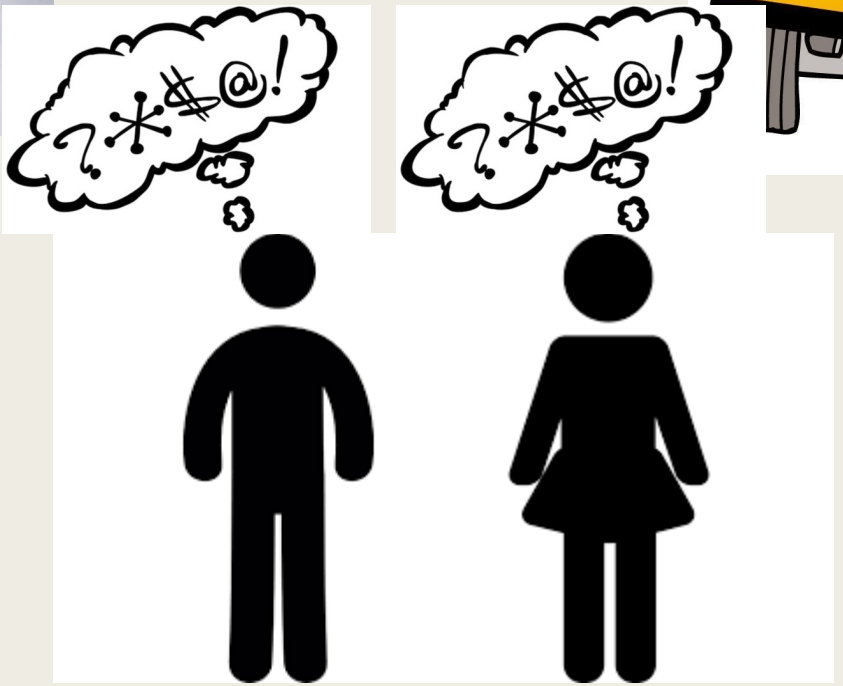
Motivating Application

Next bus arriving in 2 min!



Motivating Application

Bus has arrived.
Bus is full!



Our proposal

- Mobile app notifies commuters their bus will be full
- Additional options:
  - Provide incentives to take later bus
    - E.g., discount for coffee, discount for bus ticket, discount for Uber/Lyft ride
  - Provide other multimodal routing options
    - E.g., take HealthyRide bike to other bus stop and take a different bus route (must make sure there are bikes available!)
- Multimodal routing can also be at planning stage (i.e., before you get to bus stop)

Mobility Providers

- Incentives
- Pro-Social “rules”
  (e.g., reduce peak demand)

Travelers

- Realtime Information
- Incentives
- Better Quality of Life

- Realtime Information
- Marketplace for incentives
- User Preferences
- Historical Data
- Predictive Models

Local Businesses

- Incentives
- Redemption rules
  (e.g., no coupons before 5pm)

Employers

- Sustainability Incentives
- Redemption “rules”
  (e.g., verify carpooling)

Expected Main Technical Contributions

1. Show how to balance utilization across both public transportation networks and local businesses, thus improving not only public transit but also general urban living.
2. Design and evaluate the market mechanism that integrates and aligns the incentives of various stakeholders.
3. Shift of attention from temporal efficiency (i.e., fastest route) to more sustainable commuting (e.g., public transit, biking etc.) as well as commuting options geared towards the well-being of dwellers (e.g., "beautiful" routes, "clean" routes, "accessible" routes etc.).

Under the hood

- Marketplace Design
  - *Would incentives even work? Which ones?*
    - Surveys, lab experiments, living lab evaluation
  - *incentive "rules" (businesses)*
  - *pro-social behavior "rules" (Transit Operators)*

- Analytics of demand, transportation preferences, and behavior at large scale
- Predictive modeling
- Personalized notifications
- Make sure users are not "gaming" system

First Steps

- Engaged in discussion with multiple stakeholders.
  - *Data/API access from Port Authority, PittShuttle, and HealthyRide*
- **Preliminary survey**
- Installed **TransitScreen/PittSmartLiving** displays in **8** locations:
  - *Carnegie Library of Pittsburgh – Main*
  - ***City-County Building (Pittsburgh City Hall)***
  - ***Panther Central (Pitt ID Center)***
  - *Sennott Square Building (CS Department)*
  - *Skyvue Apartments*
  - *UPMC Falk Medical Building*
  - *UPMC Montefiore Hospital*
  - *UPMC Presbyterian Hospital*

Preliminary Survey

(891 respondents in broader Pittsburgh area, February 2017)

- Is reliable information about public transit (e.g., arrival, capacity, etc) going to help you decide in favor of using public transit?
  - *Yes: 64% / No: 35%*

- Would monetary incentives for using public transit help you decide in favor of using public transit?
  - *Yes: 59% / No: 40%*

Preliminary Survey – II

(891 respondents in broader Pittsburgh area, February 2017)

- If you are using public transit, do you have flexibility in your schedule?
  - *Yes: 37% / No: 12%*

- If your bus is going to be full, would you be willing to wait for the next bus, if it was known to be less crowded?
  - *Yes: 54% / No: 41%*

- Would monetary incentives (e.g., discount for coffee) help you decide in favor of waiting?
  - *Yes: 48% / No: 49%*

Next Steps

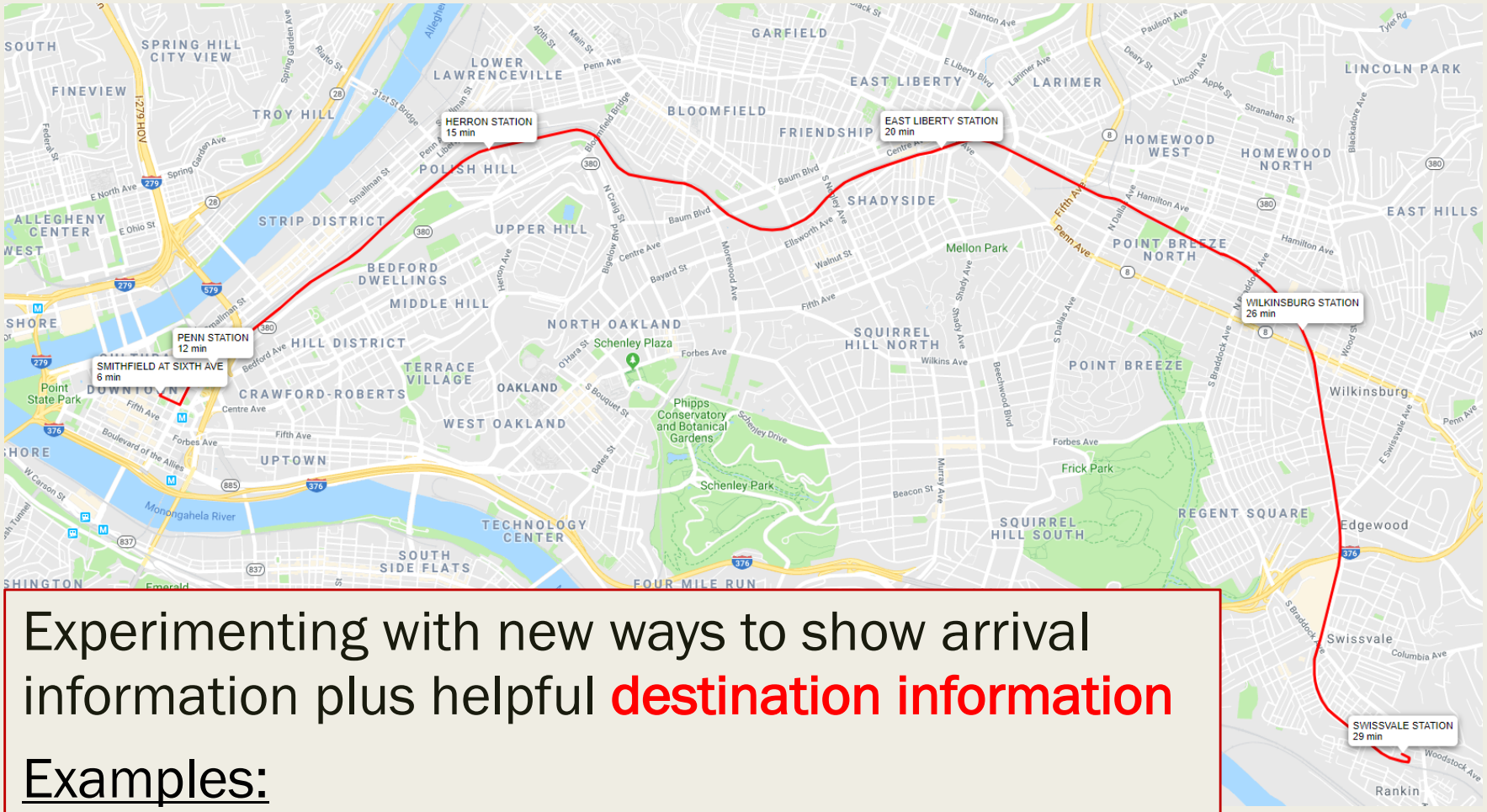
- Progress on technology front:
  - *Understanding Data (Build Predictive Models)*
  - *Understanding Human Behavior*
  - *Design and Develop System*

- Important (ongoing) discussions:
  - *Additional PittSmartLiving displays*
    (to increase multimodal focus and project footprint)
  - *Recruiting businesses*
  - *With Transit Operators*
    (incentive alignment, information linkage, surveys, etc)

Next Display

Our next display will be at brand new **Port Authority Service Center** (facing outwards).

Next Display



Experimenting with new ways to show arrival information plus helpful **destination information**

Examples:

- Expected arrival time of bus @ destination(s)
- Shared bike availability @ destination(s)

Other research of interest

- Pitt project team has combined expertise in:
  - *Data science (including data visualization)*
  - *Economics (esp. behavioral economics)*
  - *Privacy*
  - *Social science*
  - *Transportation*
- Very interested in other research problems in this space, especially (real-time) data-driven ones:
  - *E.g., first/last mile issues, dockless bike sharing*
- Possibilities for student capstone/internship projects or additional research funding proposals

Discussion

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