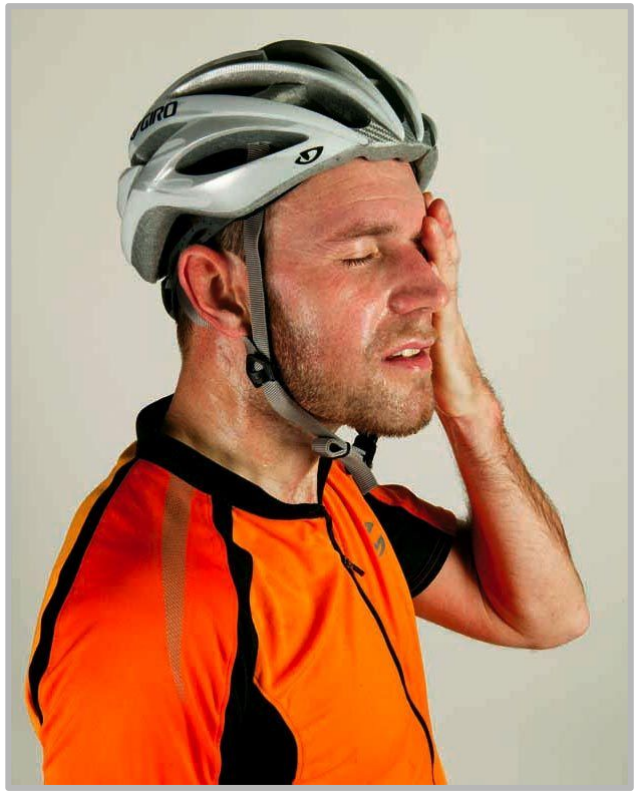
BikeMe:

Safer, faster bike parking

November 28th, 2016

Connie Chen, Amy Fong, Mandy Kim,
Annie Rosen, Jessie Wang



MOTIVATION TECHNOLOGY IMPACT DEPLOYMENT DEMO

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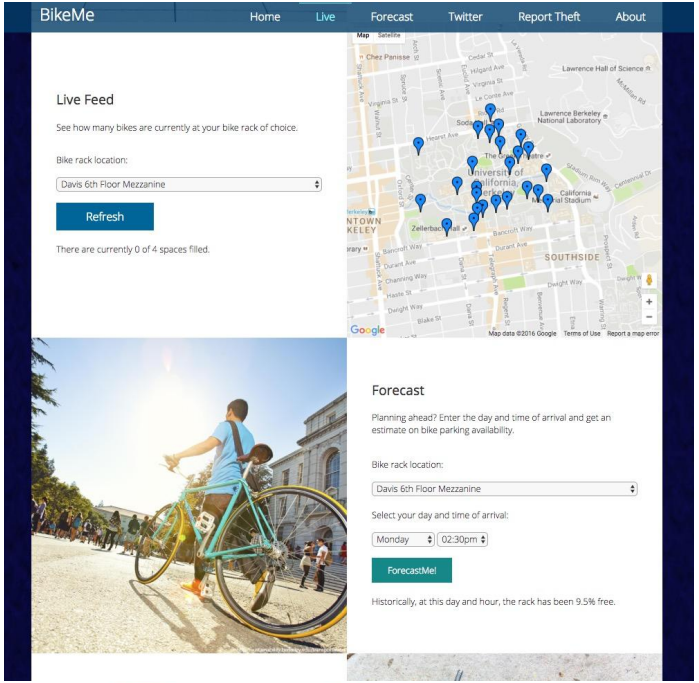
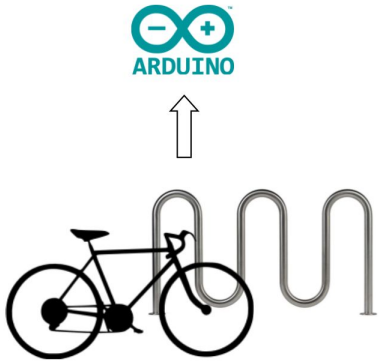
BikeMe Overview



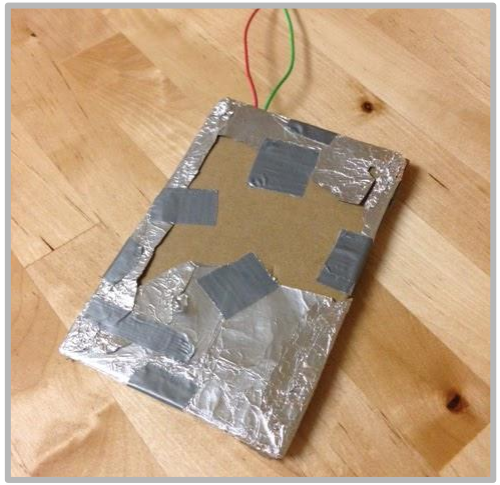
MOTIVATION TECHNOLOGY IMPACT DEPLOYMENT DEMO

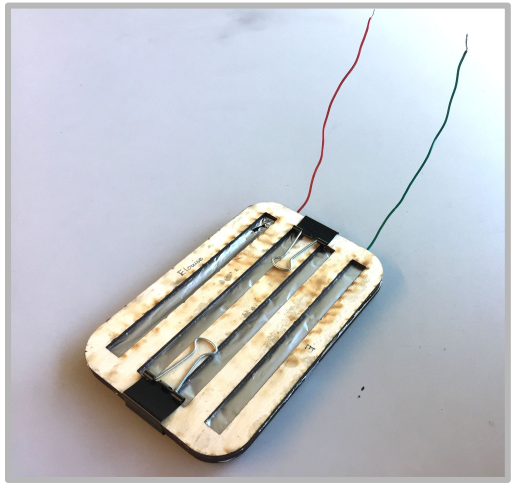
Infrastructure and Sensing

- 4 analog sensors on Arduino
- XBee (mesh of 1)
- AA battery power

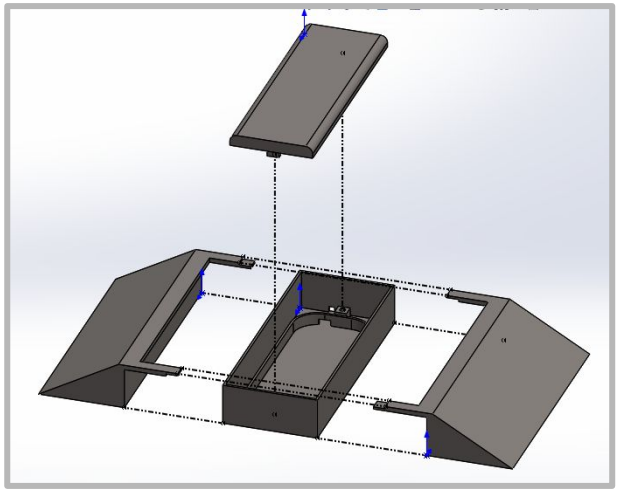


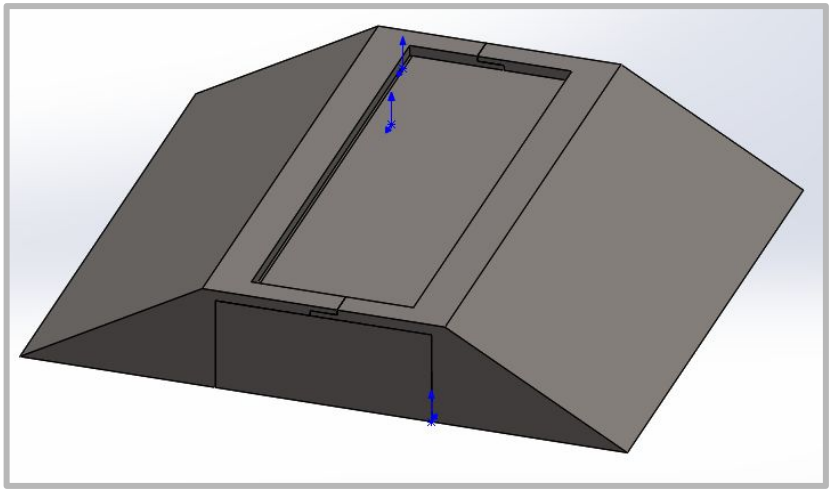
Sensor Design - Iteration I, II, III



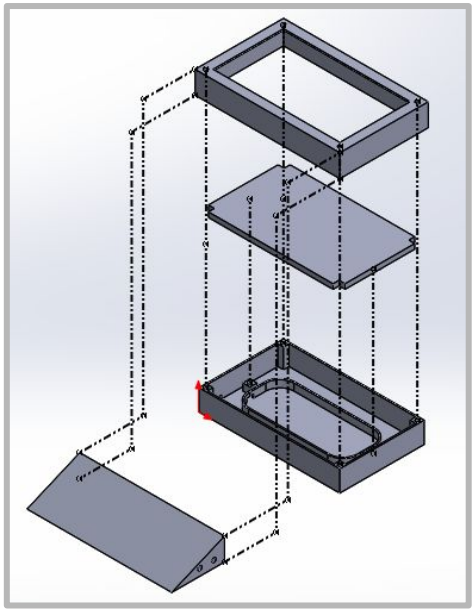


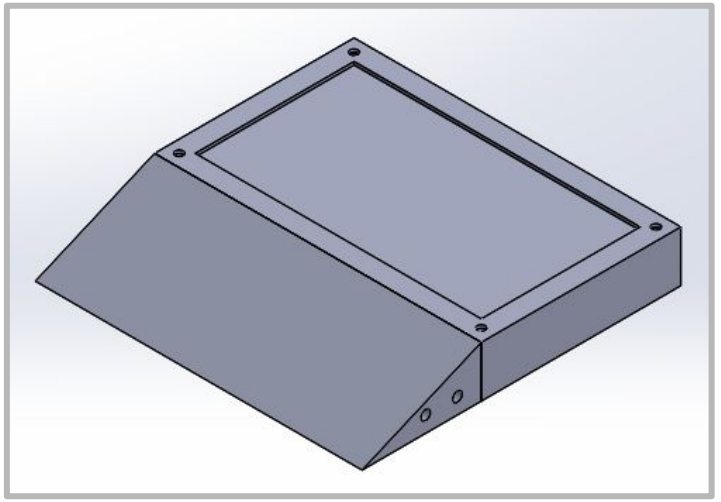
Sensor Design - Iteration I



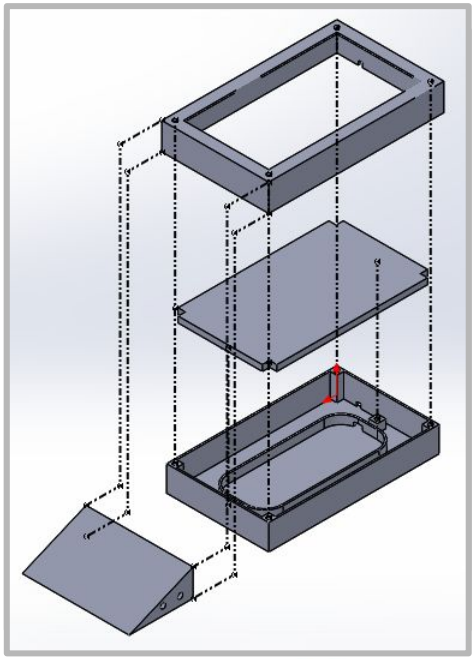


Sensor Design - Iteration II

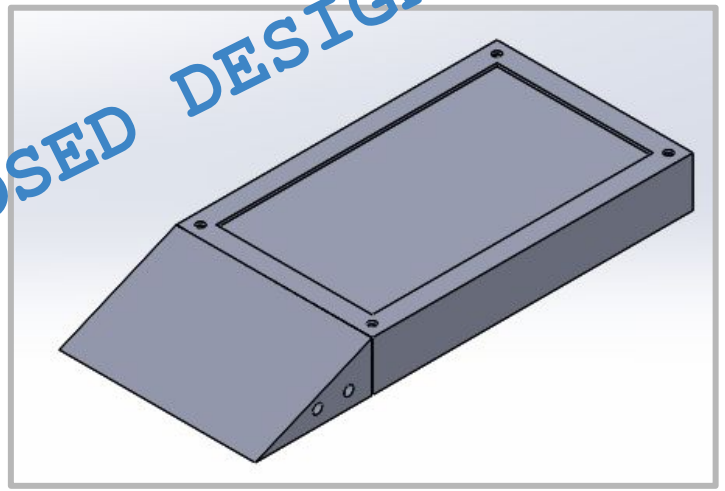




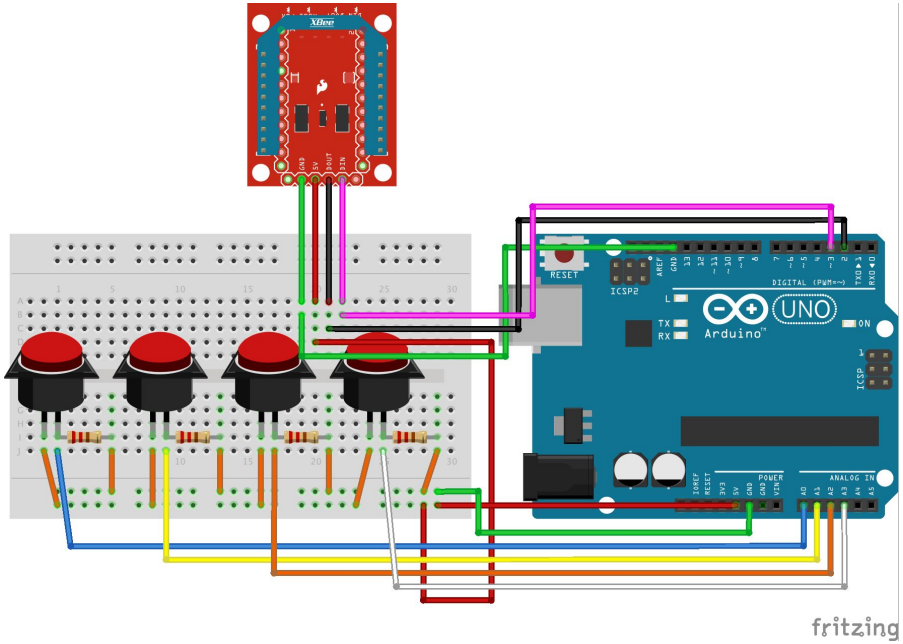
Sensor Design - Iteration III

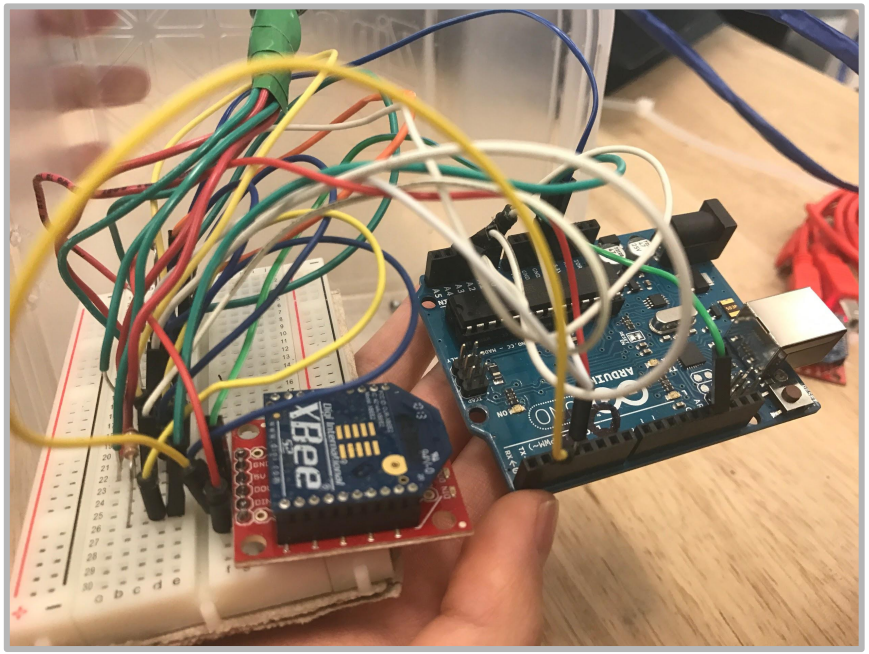


PROPOSED DESIGN



Sensor Design - Wiring

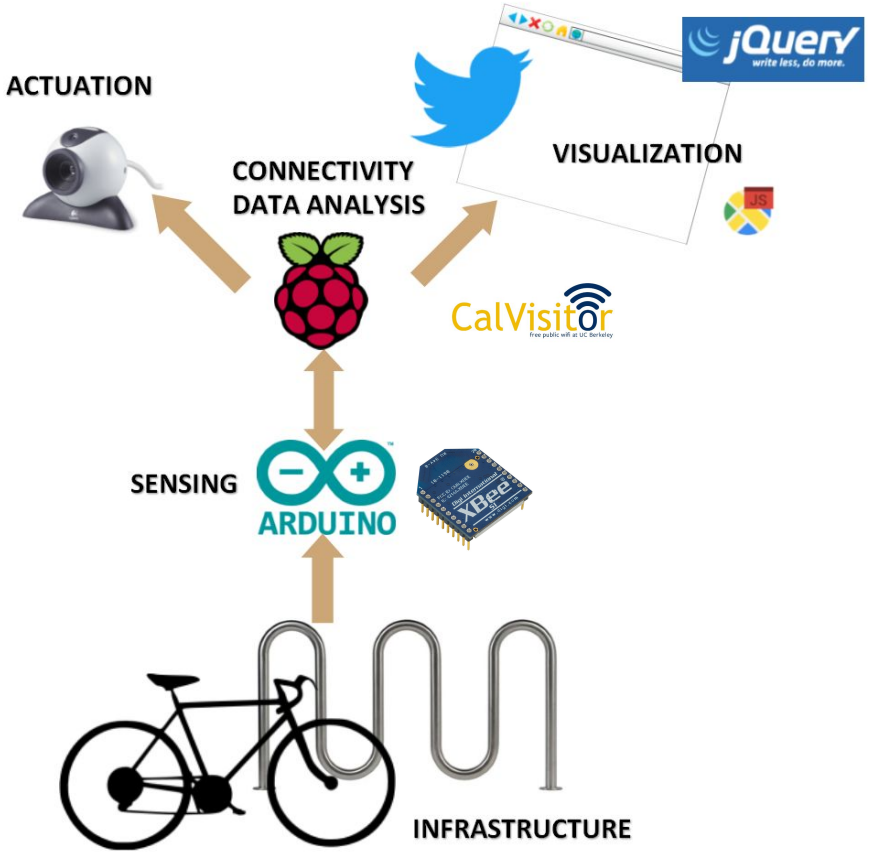




MOTIVATION TECHNOLOGY IMPACT DEPLOYMENT DEMO

Connectivity

- Tools:
  - Wall plug/battery power
  - XBee (connector)
  - Raspberry Pi Serial Port
  - SQLite Database
  - Wifi dongle
  - Heroku server



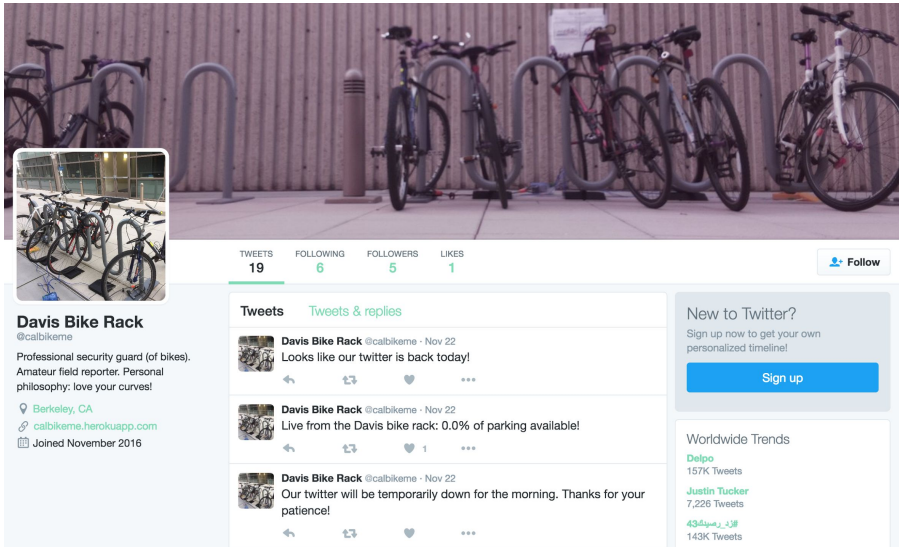
Connectivity

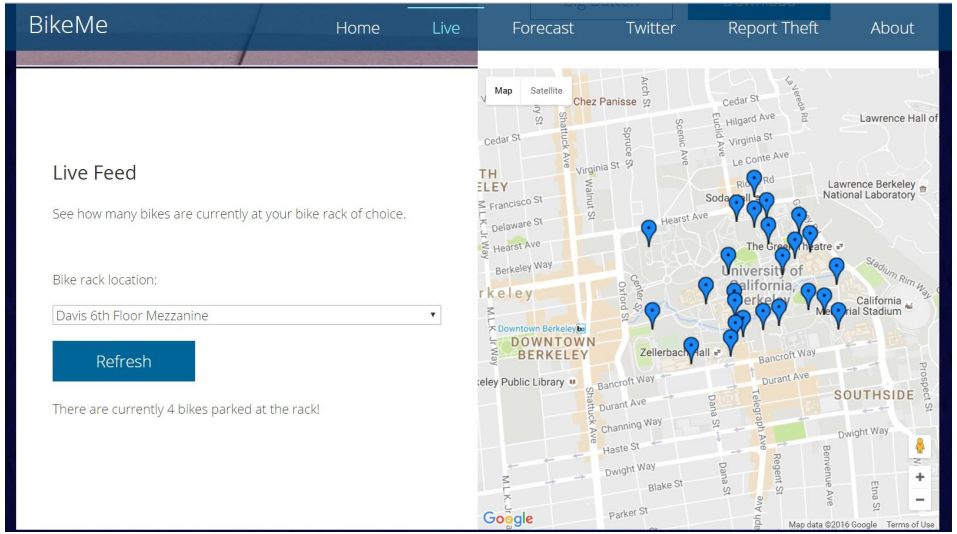
- Raspberry Pi:
  - RPi will actuate picamera based on past and present sensor data
  - RPi updates SQLite database:
    - All raw data
    - Predictions for each day of week

Connectivity

- Cyber Layer:
  - RPi updates Wallflower Atto stream on Heroku
    - One prediction stream for each day of week and live data
    - RPi updates the prediction based on old and incoming sensor data

Visualization





- Google Maps API to create map of bicycle racks throughout campus.
- HTML, CSS, Javascript

Actuation

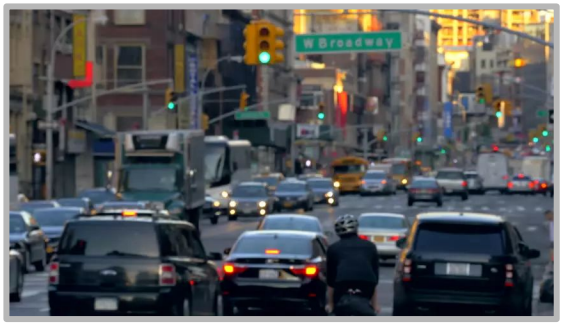
- piCamera for Raspberry Pi can be controlled through the command line or Python
- Photos saved to Google Drive folder via wifi - unlimited storage!

Impact

- Half of 700 New York City office workers living within 10 miles of their job said they would bike to work if provided with safe lanes, secure parking, and wash-up facilities. (Pucher, J. et al., 1999)
- About 86,000 adult New Yorkers, 2.5% of all commuting residents, usually bike to work or school (NYC.gov)
    - 3.4 million who DON'T bike -> 1.7 million will begin biking

Impact

- The average commuter in New York City emits about seven pounds of carbon dioxide per round-trip commute for a total of 1,750 pounds of CO_2 each year (transalt.org)
    - 7 lb/commute/day * 1.7 mil commutes eliminated →



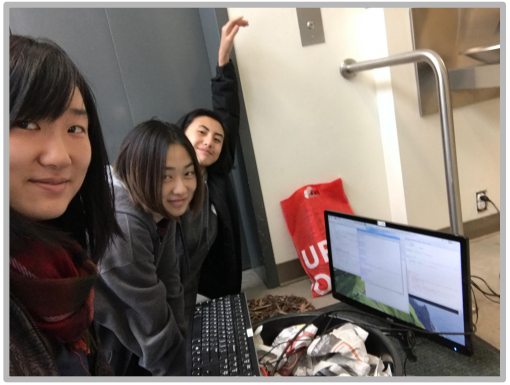
11.9 million pounds of CO_2 not emitted per day in NYC (5,400 tons)

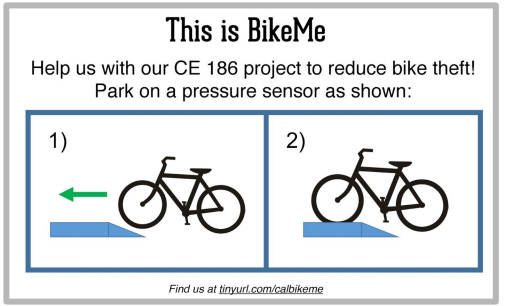
Impact

- ***5,400 tons of CO_2 is...***
  - 600,000 gallons of gasoline
  - 0.16% of daily U.S. gasoline used

Deployment

- Successes
- Challenges
- Lessons learned





Demonstration

- Pressure Sensor Demo
- BikeMe Website: bikeme.tk