DUKEPOOL: Reducing Student Emissions through a Mobile Carpooling App

Duke UNIVERSITY | BASS CONNECTIONS

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Bass Connections in Energy & Environment: Design & Innovation

Motivation

Since 2007, Duke University has reduced greenhouse gas emissions by 24% as part of its Climate Action Plan. However, transportation-related emissions have increased by 31%, and Duke's calculations do not include emissions from students. We decided to create a mobile carpooling application for students who live off campus to help reduce these emissions. To inform our app design, we used surveys and collected valuable data about student transportation to and from campus.

Methods

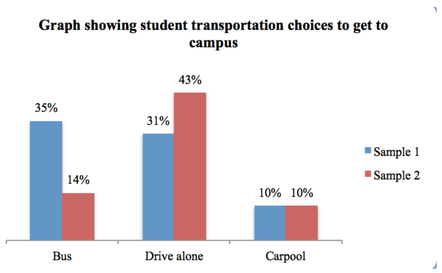
- Meeting with Duke Sustainability Office
- Survey distributed to Juniors, Seniors and Graduate students to determine driving patterns and emissions baseline
- Meeting with Duke Transportation Office to review incentives
- Focus group of 11 peers to evaluate app features
- Adobe Creative Cloud XD CC to create app prototype

Survey Results

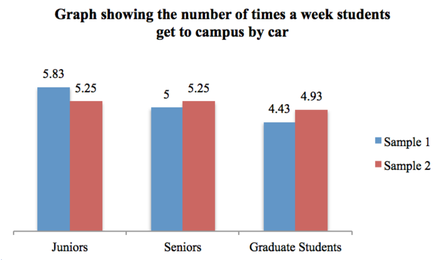
36% of students who live off campus drive alone

27% of students who life off campus take the bus

only **10%** carpool

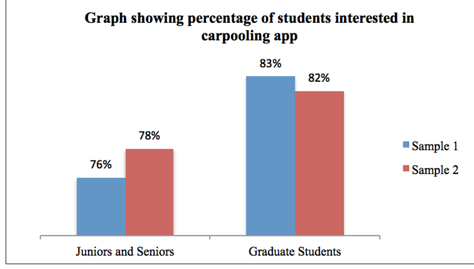


Juniors and Seniors are **more likely to drive alone** than graduate students



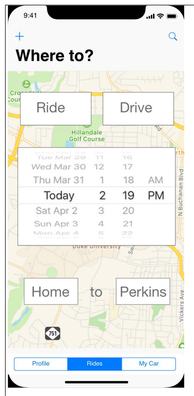
Students go to campus **5x per week**

70% of students live in high-density residential complexes

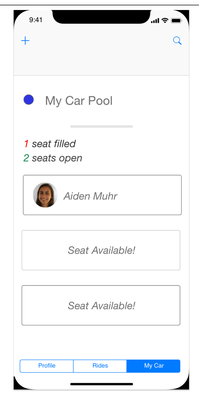


80% of students are interested in a carpooling app

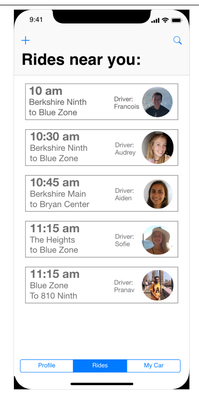
Features



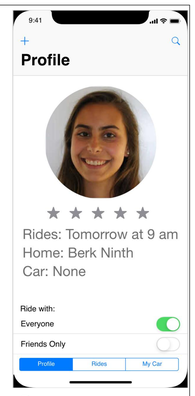
Riders: Choose pickup location, destination, and time slot



Drivers: Choose pickup location, destination, time, and number of seats in car

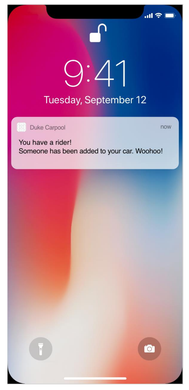


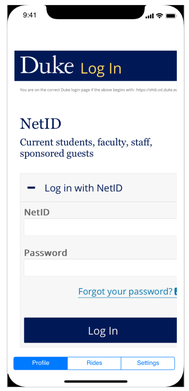
Filter: Ability to filter both passengers and drivers by a friends feature

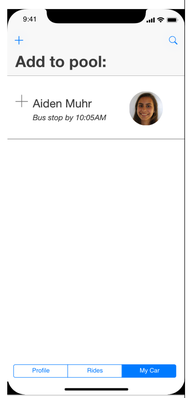


Rate: Anonymous rating will allow feedback and transparency

Built-in Chat: Communication between riders and drivers to facilitate pickup and increase confidence







Safety: Require a Net-ID at login and a profile picture as well as the ability to decline requests for a spot in the car

Incentives

At the start of a carpool, the app would produce a unique barcode that the driver could scan at the entrance to a parking lot. This would register the carpool and its occupants.

With this data, Duke could offer two incentives:

- **Refunds on parking passes**
  - Based on number of carpools a student has completed and car occupancy
- **Better parking spots**
  - Designated spots in Zone 1 & 2 of Blue Zone.
  - Barcode would link to car's license plate, so Duke parking enforcement can verify carpooling cars

Environmental Benefits

Based on our survey results, we calculated the baseline CO_2 emissions from student commuting and the associated reductions in emissions due to increased carpooling.

Assumptions

- 11 - total no. of trips per week per student
- 2.5 - Distance (miles) traveled per trip

Emissions

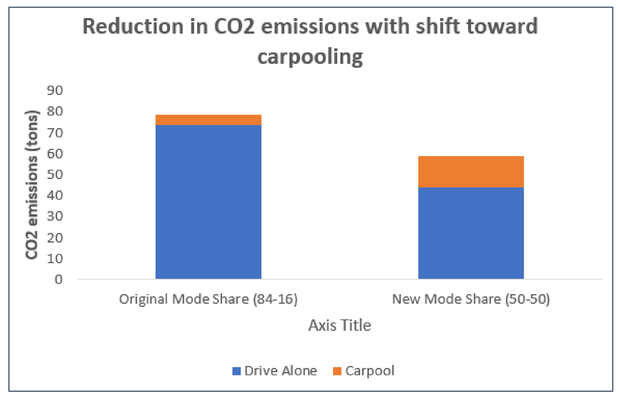
- 1 trip per student leads to 2.18 lbs of CO_2 emissions
- Total Weekly Trips (all student commuters) lead to **78.5 tons** of CO_2 emissions

Gasoline

- 1 trip per student leads to 0.11 gallons of gasoline usage
- Total Weekly Trips (all student commuters) lead to **8,015 gallons** of gasoline usage

Mode Sharing

- Current Mode Share - 84% drive alone, 16% carpool
- New Mode Share with the use of app - 50% drive alone, 50% carpool can lead to a **25% decrease in emissions**



Looking forward

The next steps for creating this application:

- Development of the app
  - Cost around $20,000
- Continued coordination with Duke's administration in order to solidify incentives for carpooling and ensure the app is free for all students
  - Work with the Duke administration to gauge what would be an appropriate amount to refund on parking pass and what parking spots they could offer to carpoolers.

We think our app has the potential to make a large impact on student transportation at Duke. We believe Duke will continue to lead by example in sustainability as the university works towards its 2024 goals.

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