Traffic Pattern Design Challenge

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Background

Due to current and upcoming construction projects, the University of Maryland - College Park campus has been facing significant disruptions to the traffic flow.

Building a Greater College Park

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Current Development

Learn More

Discovery District

Learn More

E. A. Fernandez Idea Factory

Learn More

Pyon-Chen Hall, Johnson-Whittle Hall and Yahentamitsi Dining Facility

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School of Public Policy

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The Purple Line

Learn More

Western Gateway

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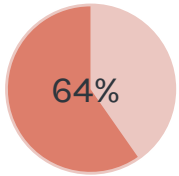
Problems

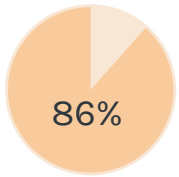
Main issues of the UMD traffic

- Cut-through traffic on main arterial (Campus Drive)
- Lacking bicycle facilities
- Traffic **congestion** during rush hours

* A survey done by the Department of Transportation Services, UMD



" 64% Respondents adopt **driving** as their most preferred travel mean."



"Dramatically, 86% choose to travel as **pedestrians** (walking, skating, skateboarding, etc.) from place to place"

Problems

We need **pedestrian-friendly** campus transportation

- “62% demands for major improvements towards pedestrian-friendly transportation”
- “35% considers conflict with vehicles deteriorates pedestrian experience on campus”
- “45% takes reducing conflict with pedestrians as first priority in improving driving experiences on campus”

Other Problems

- Lack of simple ways to receive the **latest** travel information, including changes due to constructions and parking availability (e.g. during the game season)
- Frustrations occur when failing to find alternative options due to unexpected road conditions
- Using parking permit improperly

Goals

- Reduce conflicts between pedestrians and vehicles
- Minimize traffic disruptions caused by vehicles
- Reduce traffic flow
- Provide up-to-date and easily-accessed transportation information
- Improve the sustainability of the transportation system

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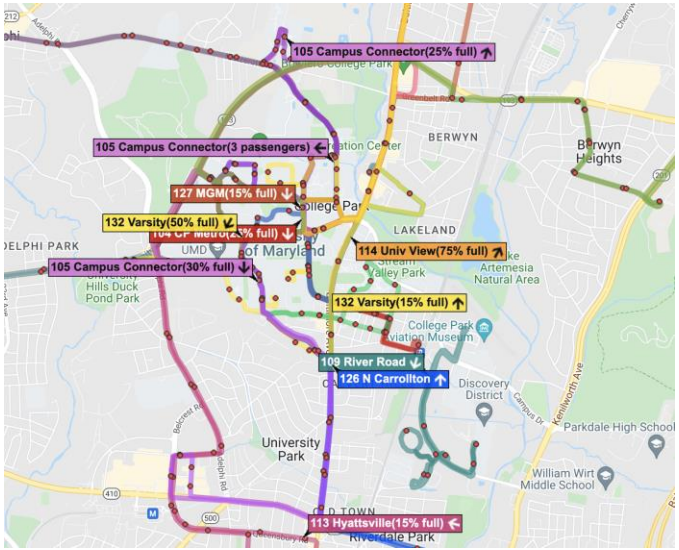
Design Idea

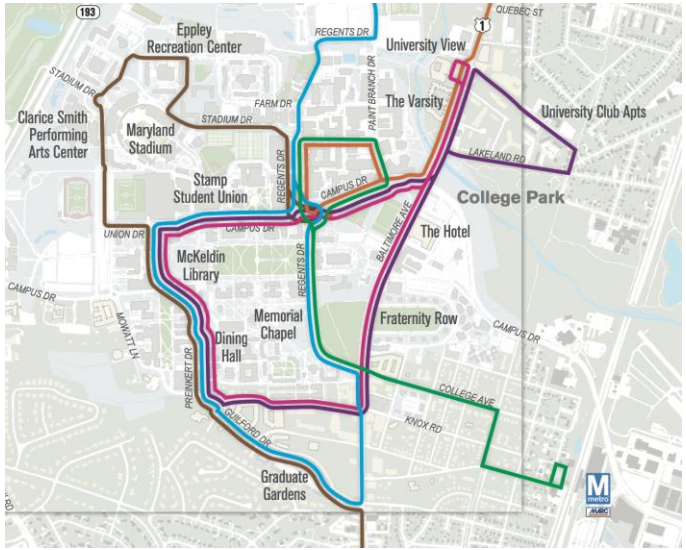
- School Bus

Current School Bus Routes

Current Shuttle-UM routes **highly overlapped** to each other in certain segments **inside the campus** perimeter.

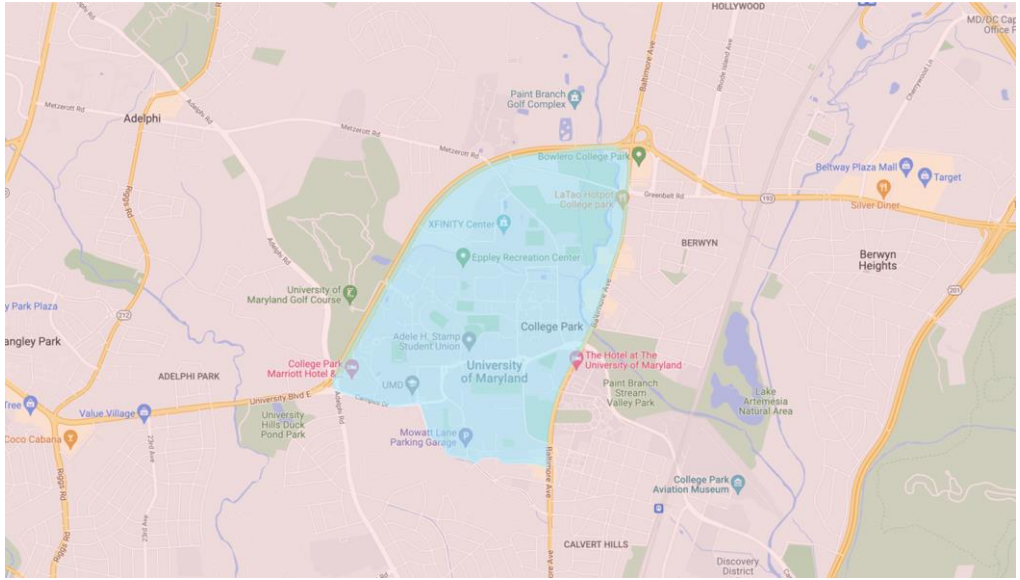


Full system map



Popular student bus routes

New School Bus System



Blue area: campus bus system; Red area: external bus system

1. **Detach** inner-campus circulation from the off-campus shuttle network
2. Add **connections** for off-campus **transit** and **parking lots** at campus periphery
3. Increase the **coverage** and **frequency** of the inner-campus shuttle routes by **buses** and sharing **bicycles**.
4. Replace all or some of the current shuttles with **electric buses**

New School Bus System

Benefits

- Encourage people to take public transit
- Cleaner, less noises environment
- More convenient on-campus travel

Texas A&M Launching State's First University-Operated Electric Buses

2 Design Idea

- Control Vehicle Quantity

Control the Number of Vehicles

- Redesign the parking **permit** policy
- **Limit** cars (except disabled) driving through the main arterials during **rush hours**
- Students can park at lots or garages on the campus periphery and take inner-campus shuttles (higher frequency) instead.

Benefits

- Relieve traffic congestion during rush hours
- Reduce conflicts caused by vehicles

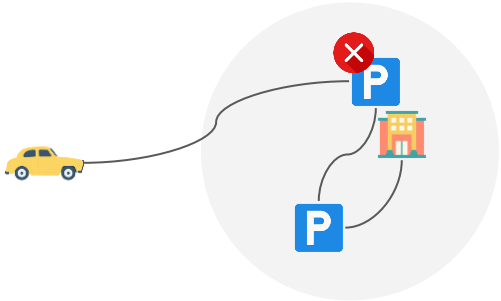
3 Design Idea

- IoT and App

One day of Ella's Commute

Ella

- Graduate student
- Drive to campus
- 3 times per week



1 Due to unexpected constructions, Ella needs to reroute and park at another parking lot.

2 Search for UMD parking map

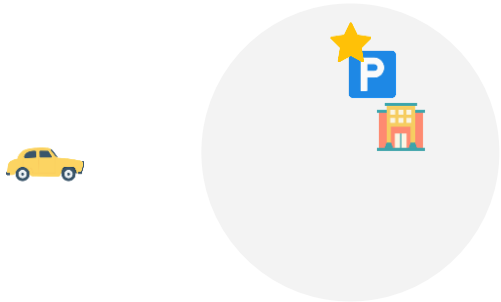
- Which parking lot is closer to her destination
- Would she be able to park this afternoon

3 Park at a parking lot. Walking takes 15 min.

Alternative ways such as shuttle or e-scooter.

4 End up arriving at class late.

Ella’s Commute with the Integrated App



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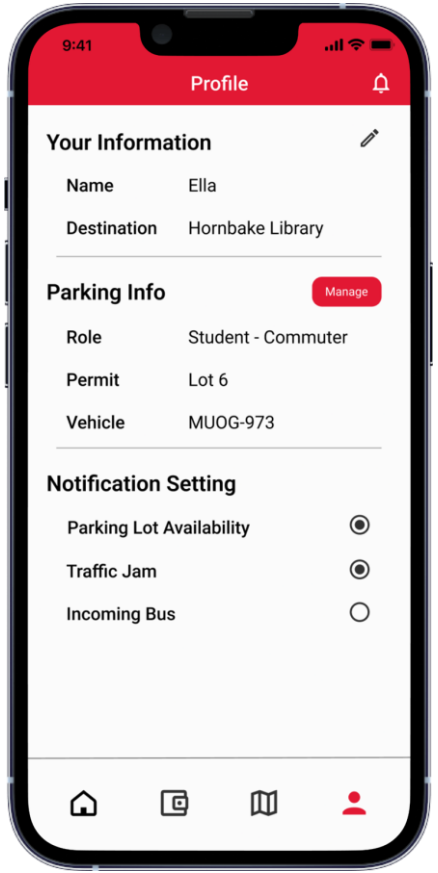
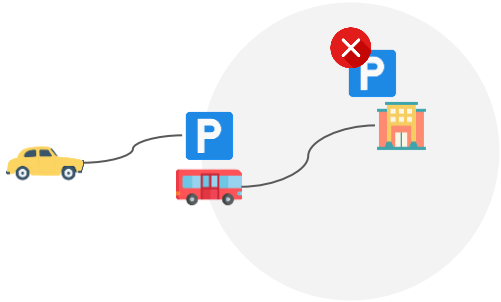
Ella registered a new permit which allows her to park at the parking lot 6 near her destination.

Today, the app sends her a notification early morning that the parking lot would be temporarily closed for today.

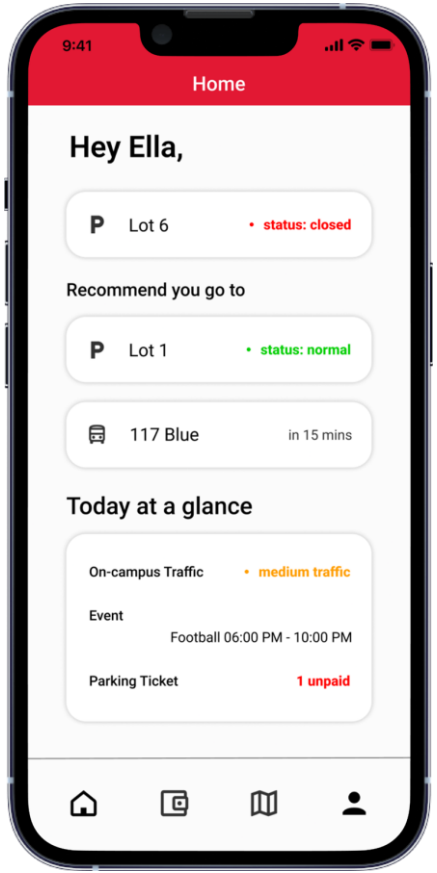


Ella’s Commute with the Integrated App



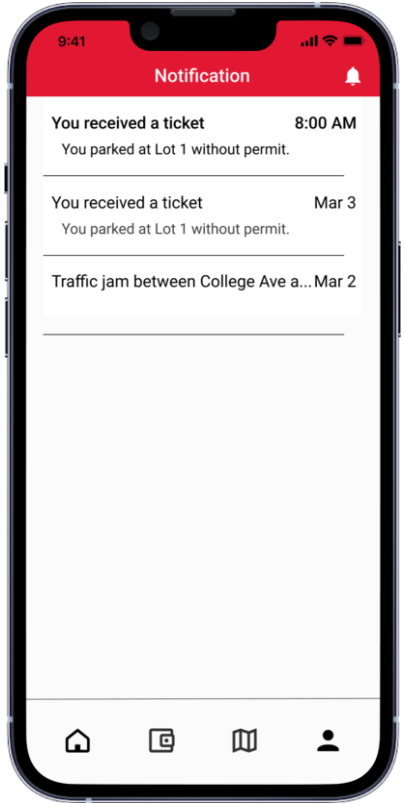
2 Since Ella already set up her destinations and transportation preferences in the app. The app suggests available parking and routing options.

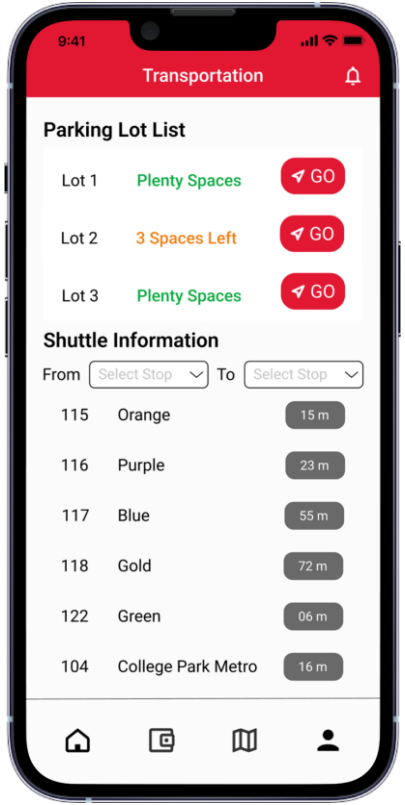
3 After arriving at the suggested parking lot, Ella goes to the connecting stop to take the 117 shuttle.



App Features

- Integrate all travel information
  - Metro rail (Purple Line)
  - Shuttle
  - Private vehicle parking
  - Bike, E-scooter
- Notifications
  - Construction
  - Game season
- Customization
  - Destinations
  - Transportation preferences
  - Frequent commute time

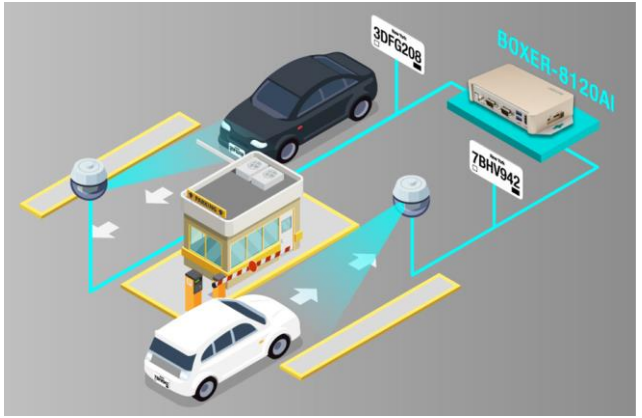


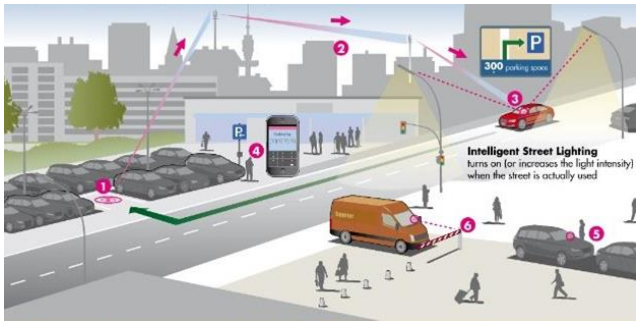


How IoT helps

Sensors, cameras, license plate recognition

- At the entrance and exit of parking lots
- On each space.
- On top of the intersections with largest volume of pedestrians or traffic flow.





IoT + App

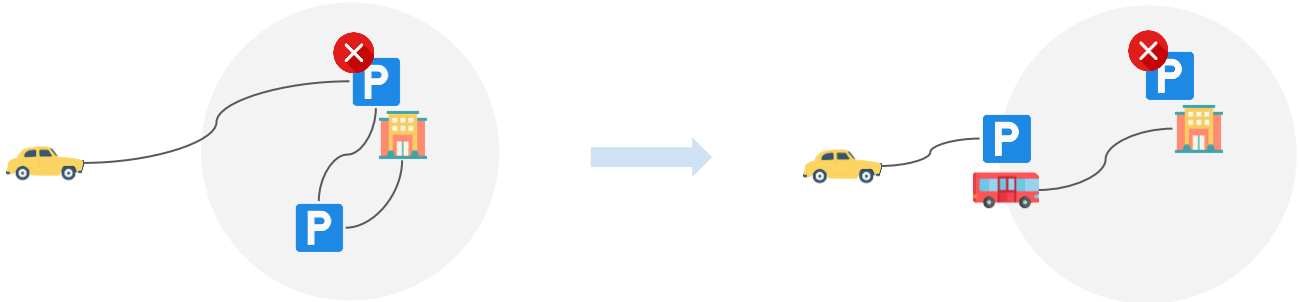
Benefits

- Real-time parking data and traffic status
- Big data for forecasting
- Public safety
- Less congestion

With the integrated app

- Real-time parking availability
- Reroute suggestions
- Dynamic management of transit schedule and parking pricing

New School Bus System + Vehicle Control + IoT + App



- Limit the number of vehicles running on the campus
- Shorten the length of vehicle routing
- Reduce traffic flow and conflicts
- Alleviate confusion and frustration in travel experiences
- Improve the sustainability