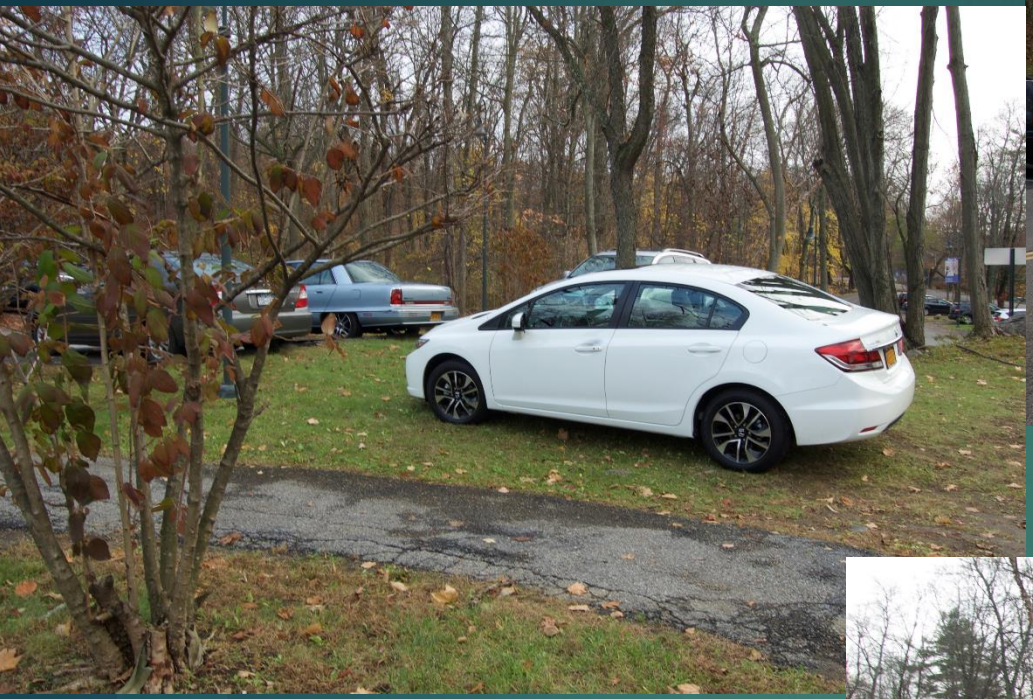
# Parking at Pace

By:

Dr. Mosley's System Analysis and Design Class


SECURITY
DIAL 773-3400
PACE
UNIVERSITY
512



# Proposed Solutions

- Sensor Technology
  - RFID Tags
  - Camera Recognition Software
- Golf Cart Shuttling
- Rent-A-Bike
- Propose new hours for Gym/Choate parking

# Targeted Audience

- Residents and Commuters
- Faculty/Staff
- Different questions were targeted towards different groups of individuals throughout the survey

# Steps Taken To Distribute Survey

- Orgsync
- Finding what groups to send it out too
- It was tricky distributing the survey via email to all student faculty and staff at pace
- Total Survey Responses: 186

# What Students are Saying

- “Parking is definitely an issue at Pace. Personally, I don't think freshmen should be allowed to have a car on campus to begin with due to the limited amount of spaces. I also don't think just because I dorm I should be penalized (AKA ticketed) by driving down to the library and to classes. I am in the library until very late at night studying (nursing) and I'm not walking back to the houses in the pitch black by myself at the wee hours of the morning. “

“Although I do not have a car on campus I often ride with friends or have my family members come visit on the weekends, and there is always "parking" but seldom where you need it to be. The parking lot behind Martin is an absolute nightmare. There are about 400 residents and maybe twenty spots, maybe. When the weather is in climate whether it be rain, snow, etc., you want to park as close as possible to your destination. So, when I live in Martin and I have to walk from the furthest spots in North, it makes things difficult and frustrating.”

# Survey Results

- See PDF

# Interviews

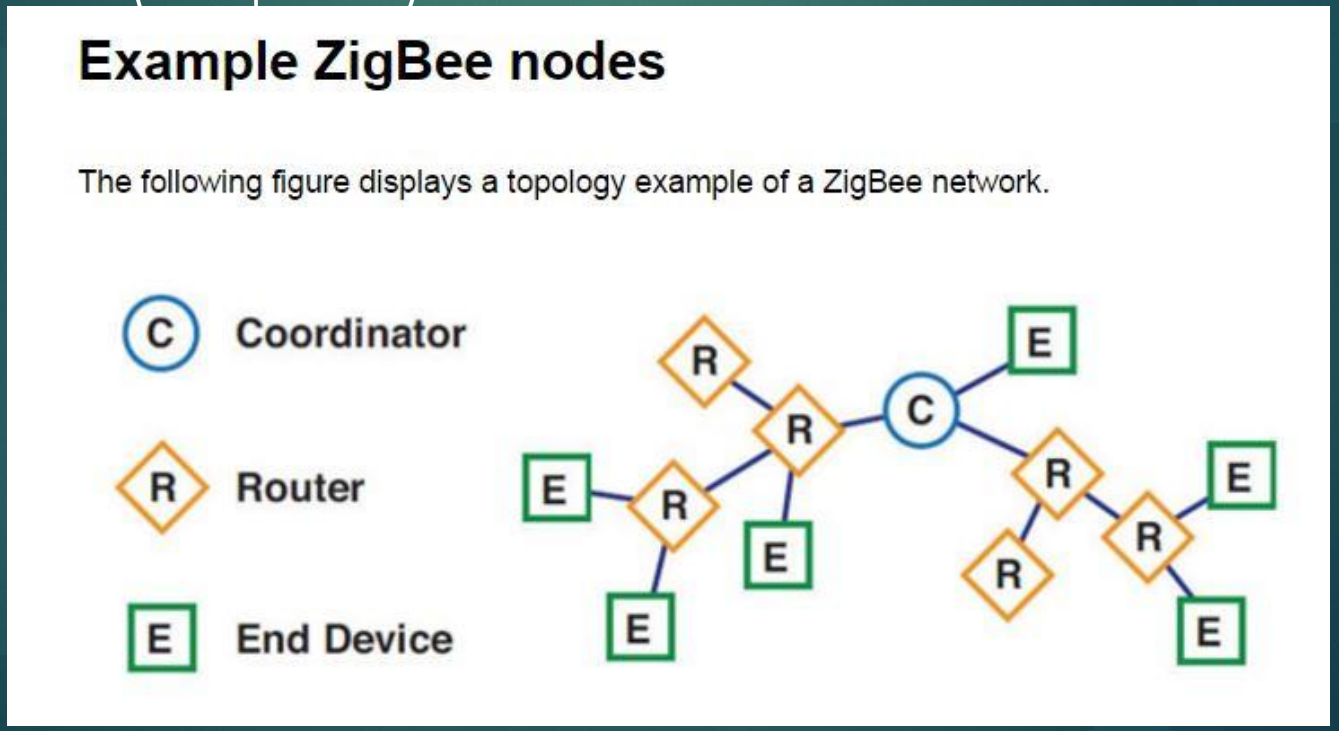
- Student
  - Do you have a car on campus? "Yes"
  - Do you have a problem with the parking on the PLV Campus?
    - "The parking situation at Pace Pleasantville is poorly designed. There is not enough room for the amount of students. I am currently parked on a grass mound" – Addison Casey
- Faculty
  - Do have a problem with the parking on the PLV Campus?
    - "Yes I do have a problem. I have issues with people that are parking in the faculty spots near the gym without a faculty sticker on their car. It has caused me to have to park way down near miller or behind the library when my office is located in Choate House"

    - Anonymous Professor

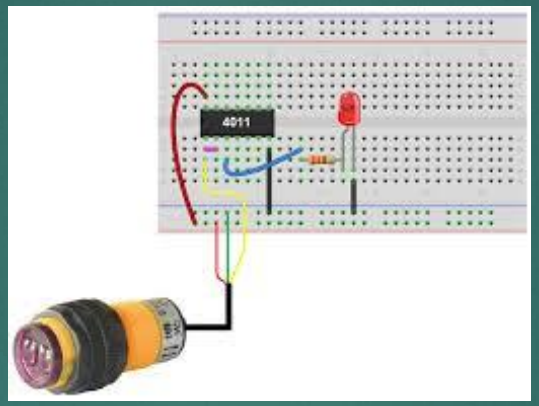
# Parking Lot Monitoring System (occupancy/proximity sensors)

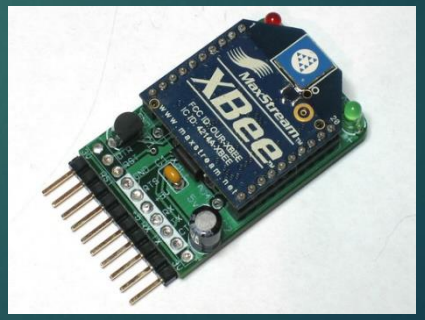
# Mesh Network of Sensors by Xbee

- Xbee WSN (wireless sensor network)
- 1 coordinator, several routers, and numerous nodes(endpoints)



# Parts Needed for Implementation



# RFID Tags

- A RFID chip will be installed in every parking space on campus.
- Every student, faculty, and employee of Pace will receive their parking decal with a RFID chip enabled.
- With this decal security and administration will be able to see who's car is parked in a specific spot.
- This enables security to better understand who is parking in the wrong lots and know who the owner of the vehicle is.
- This will allow for security to receive information from the RIFD sensor and provide a ticket if necessary.

# RFID TAGS

- **Ethical:** Students can check to see if theres available parking before entering the parking lot.
  - *Minimalizes driving around looking for a spot.*
- **Unethical**: Students on their phones while driving around campus

# User Interface

## Alumni Hall

The available spots are:

- 9
- 13
- 15

## North Hall

The available spots are:

- 6
- 11

## Martin Hall

The available spots are:

- Lot Full

## Town Houses

The available spots are:

- 1
- 3
- 7
- 16
- 25
- 28

## Gym

The available spots are:

- 9
- 13
- 15

# Creating the Mobile App

- The Pace mobile app team can help design and create the mobile application
- If we use a consulting firm to create the mobile application it will cost about $25,000.
- The same interface that shows up on the guard house will be the information that shows in the mobile app along with a login screen that uses Pace credentials

# Camera Recognition Software

- Place a few cameras in each lot on top of the building
- The cameras will take a picture of the lot when the lot is empty and when the lot is full
- By using the image recognition software we will develop it will be able to tell in real time what spots are open and what spots are taken
- The cameras will take two images and blend them together using the software to determine the available spots.

# Golf Carts

- Price of Carts:  $5,000 (Electric)
- Maintenance: $75-$150 per year on insurance. Tune up every 6 months ($60-$80) per visit
- Labor Costs: Monday-Friday 10:00am-4:00pm, Same payroll as Briarcliff shuttle drivers.
- Could be offered as students job.

# Golf Carts

- **Ethical**: Reduces the amount of cars driving around campus and minimalizes issues with parking
- **Unethical**: Not everyone will be able to use a golf cart. Unfair for student body as a whole.

# Rent-A-Bike

- Bike cost: $50-70, 30 bikes = $1800
- Rack setup: $10,000 ($17,000 with solar panels) 30 bikes.
- Maintenance: $50 per bike each year
- First 15 minutes are free, after, that 0.60 cents per 15 minutes ($2.40 per hour)
- Or charge by day

# Gym and Choate House Parking Hours

- Choate and Gym parking hours for residents should be as followed:
  - 9:00 P.M. – 9:00 A.M.
  - If students are still in time restricted parking spots after allotted time has expires security can ticket or tow them if necessary
  - Students should be informed that if they can not follow the time restriction rules they should NOT park there.
- Resident Only parking signs need to be placed in all residential parking lots

# Resident Parking – GYM Time Blocks

- **Ethical:** Alumni residents will be able to park more conveniently near their building at night
- **Unethical:** When the time block is over, students will all receive tickets for being illegally parked
  - **Example**: If a student is parked in a time sensitive spot when the gym staff shows up in the morning it can cause conflict and a chain reaction.

# Options Adopted by Other Universities

# University Business Study

1. Prioritize parking permit distribution - University of Georgia
2. Make meters mobile - Binghamton University (N.Y.), University of Wisconsin-Milwaukee, University of Massachusetts, Washington State University, and the University of California, Santa Cruz.
3. Raise the rates - University of New England (Maine) raised the annual parking permit fee from $90 to $300
4. Subsidize local mass transit – Cal Poly
5. Provide shuttle service - Rutgers, Fairfield University (Conn.)
6. Stagger class times – Rutgers

# University Business Study

7. Park at the edges.
8. Offer a pedestrian-friendly core campus - Fairfield University
9. Stop through traffic during the day - University of Virginia
10. Direct traffic efficiently - University of Central Florida
11. Offer incentives for not driving - University of North Carolina at Chapel Hill
12. Cater to alternative transportation users - University of California
13. Provide rideshare boards - Carleton College (Minn.)
14. Run a van pool - Boise State

# University Business Study

15. Bring car sharing to campus - University of New England

16. Offering free use of the showers to those who agree to bike or walk instead of driving - Dartmouth College

17. Bike lockers near residence halls - Cal Poly

18. Give bikes away - Ripon College (Wis.) and the University of New England

19. Lend them out - University of California, San Diego

20. Rent them out - University of Buffalo (N.Y.)

# Parking Spot Data

- Number of spot on campus: 1,777
- Faculty spots: 150
- “R” decals issued: 483
- “C” decals issued: 457
- “B” decals issued: 44
- 8/31 – 11/15/15 Non registered vehicle tickets: Approx. 976

# Cost Benefit Analysis

- Sensor Tags
  - X Bee/Zig Bee Cost: $15-$50 per tag depending on brand and level of merchandise
  - If $15 tags are bought: (1,777 x $15 = $26,655) – Before Tax
  - Can be put into parking spots directly after interface and app development is complete
- RFID Tags
  - Cost: 50 cents - $25 depending on brand and level of merchandise
  - If $1.00 tags are bought: $1,777 – Before Tax
  - Can be implemented directly onto students parking pass and used by security to issue citations or gather information about who is on campus
- Creating the Interface
  - Seidenberg Project
  - Mobile App Develop
    - Cost: If done professionally an average cost of $25,000
    - Time: 18 weeks

# Return on Investment

- Sensor Tags
  - Students and faculty will be able to see what parking lots have open spots in real time
  - Students and faculty will spend much less time searching for parking once they get on campus
  - Security can have a better view on how many people are on campus with vehicles
- RFID Tags
  - Security can now have access to vehicle information using the RFID tags
  - If a vehicle does not match up to a ground sensor they can be ticketed or towed accordingly
  - This will ease parking constraints around campus and stop the issue of unidentified vehicles on campus
- Interface
  - If the app and interface development becomes a student project, students will benefit from the real world experience
  - The interface will provide a clear view of how many spots and where they are available at the entrance gates
  - The app will be the portal for the whole system. Students can sign in with their pace credentials and see what is available and where in more detail

# Training

- Security Personnel and Faculty Managers of the system will be given full system overview and instructions during the transition to the new system
- System Overview and Instructions Manual will be developed and provided to Head of Security, I.T. and Mangers of the system.
- Training instructions on the system will be given to Head of Security.
  - Head of Security may use these tools to conduct future training sessions with new hires and direct reports.
- A brief description of the Pace Parking System will be developed and provided to new students during orientation sessions.

# Training

- A topographical display of Pace Pleasantville campus parking areas and where systems are implemented will be provided during system rollout period
- A sign will be posted at the guard station/s:

  "*Pace Parking System - To improve university convenience, Pace has employed a new parking system to assist you in on-time class attendance. Parking spots are available in the designated areas as identified by the display monitor above.*"

# Tutorial

- A video that explains how the new Pace Parking System as well as golf cart and bicycle loan systems works will be developed
  - Will be shown during Freshmen orientation of new students
  - Uploaded to the Pace.edu website

# Thank you!

# References


- http://www.vipgolfcartservice.com/Maintenance_Tips.html
- http://www.treehugger.com/cars/bike-share-programs-becoming-increasingly-popular-on-college-campuses.html
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