

## Team Members

Julian Knight [cknight7@gatech.edu](mailto:cknight7@gatech.edu) 404 585 1386

Jon Pokrzyk [jpokrzyk@gmail.com](mailto:jpokrzyk@gmail.com) 404-277-7482

Dimitri Tarassenko [dt@crystalcc.com](mailto:dt@crystalcc.com) 404-384-2843

10AM Checkpoint Call

Pitch time may be reduced to 2 minutes

We're presenting **#16.**

Judging criteria:

1. idea/concept
2. completeness
3. difficulty
4. impact to city
5. presentation
6. viability

Siemens:

<http://www.mobility.siemens.com/mobility/global/SiteCollectionDocuments/en/road-solutions/urban/solutions-around-parking/intelligent-parking-solutions-en.pdf>

Questions for Doug:

<http://www.atlanta-airport.com/HJN/2012/02/fa1.htm>

Hosako Yoshida

- Is \$100 with the labor or not? **installed**
- A map of the covered parking lot (sample, doesn't have to be the whole thing, one floor of one terminal is enough **not going to be able to get it in time, have a sketch /dt**
- Map of all uncovered would be better for me to estimate video camera costs (how many cameras) **not going to be able to get it in time - will have to use the google maps image /dt**
- Total number of light fixtures?
  - **10 per isle**
  - **total: 4000**
- Total number of covered parking spaces? **~11,000**
- Total number of uncovered parking spaces?
- a more precise layout of the parking :
  - isle width **15ft**
  - ceiling height: **82in to 9ft**

- spot width: **3yd**
- spot depth: ? yd?
- isle length: **50yd**

### Tasks:

- Web-frontend for the parking availability [Jon]
  - both customer view and maintenance view (shows tracker devices, malfunctions, etc)
- Spreadsheet with hardware costs [Dimitri]
- Estimated labor costs
- Presentation (PowerPoint?) [Dimitri]
  - costs
  - features
- Github team and link - mathilde@gmail.com

### Hardware Research / Costs Estimates (per device~5\*per space)

- Find controller [Julian] - ATmega32L [or ATmega328]
  - how many sensors can 1 drive?
    - 8 sensors at a resolution of 1inch [or 6 for 328]
  - how many signal lights can 1 drive?
    - 10-17? more with an encoder. plenty, anyway.
  - Cost- \$4.56 @2000 [\$4.20 @2000 for 328]
- Sensor [Julian] : Maxbotix sonar modules (details below)
  - range: 254" (6.45m). Estimated worst-case range is 210" (17.5ft)
  - interface with uC - analog output (also capable of RS232 or PWM)
  - bulk cost: \$15~20 (times 6 per device)
- Misc circuitry (including power supply) - \$5 - \$10
- Video cameras
- Signal lights and AC(?) relays?
  - relay depends on lights. good power relays like [this](#) = \$3.10 @2000
- Power supply for the signal lights?
  - depends on lights. AC power lights would be brighter and not require a supply. LED lights would be more efficient
- Hardware for signal lights (optional)
- Ethernet over power
- Mounting hardware
- Case / enclosure
  - if we have standard mount points for several sensors, it will allow us to rotate sensors individually, and put more or fewer for edge cases:  
[https://dl.dropboxusercontent.com/u/12480267/IMG\\_20131115\\_224109.jpg](https://dl.dropboxusercontent.com/u/12480267/IMG_20131115_224109.jpg)
- Total estimate (bulk):
  - electronics  $(5+6*3+7) + 2$  (for [manufacturing](#)) +  $6*15 = 123$

- case/mounting -
- lights -
- EoP -

## Prototype Cost estimate

- \$65 microprocessor board <http://www.adafruit.com/products/418>
  - arduino with built-in ethernet
- \$25 x 6 proximity sensors <http://www.adafruit.com/products/980>
- \$10 power supply
- ~\$30 lights + relays
- $25 \times 6 + 65 + 40 = 255$

## Software Development

- API for controllers
- Main controller bus
- DB

## Software Features

### Data:

Light Fixture

[http://www.cooperindustries.com/content/dam/public/lighting/products/documents/mcgraw\\_edison/spec\\_sheets/mcgraw-edison-valet-092068-sss.pdf](http://www.cooperindustries.com/content/dam/public/lighting/products/documents/mcgraw_edison/spec_sheets/mcgraw-edison-valet-092068-sss.pdf)

the mount is Pendant Box / Bird Guard (PBG)

11" by 15"

*Sensor:*

MB10X0 Series [LV-MaxSonar-EZ{1..4}] from maxbotix.com

<http://www.adafruit.com/products/980>

Range: 0-254" (6.45m)

<http://www.maxbotix.com/pictures/LV/LV-EZ%20Sensor%20Beam%20Patterns.gif>

<http://www.maxbotix.com/articles/054.htm>

MSRP for single from maxbotix = \$30

single from adafruit -> \$25

bulk from adafruit -> \$20

In bulk direct from manufacturer, we might hit \$15. \$20 is a safe bet

Power: 2.5-5.5V @3mA

Communication - RS232 or PWM or Analog (Vcc/512)

Analog- inch resolution. AnalogRead() >>1 (divide by 2) will return number of inches. definitely best option. Requires 1 ADC pin per parking spot

*Microprocessor:*

ATMEGA328 - 6ADC channels, 2 SPI (one needed for Ethernet)

<http://www.digikey.com/product-detail/en/ATMEGA328P-15AZ/ATMEGA328P-15AZTR-ND/1914586>

<http://www.atmel.com/devices/ATMEGA328.aspx>

approx \$4.20 @2000

OR

ATMega32L - 8 ADC channels, 1 SPI (needed for Ethernet)

<http://www.digikey.com/product-detail/en/ATMEGA32L-8AU/ATMEGA32L-8AU-ND/739772>

approx \$4.56 @2000

*Other circuitry:*

1 oscillator

<10 resistors

<6 capacitors

1 power regulator

1 ethernet jack

components for 5V AC-DC circuit