

Project Sense

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By Aakash Rangan, Jerome Dinakar, Abhay Narayanan Team 67

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Objective

- Create a notification system for a bicycle and car to communicate relative locations to each other
 - \circ ~ Uses GPS data and radio waves to inform each device of location
- System will give relative distance from another system within 30 meters
 - Allow both operators to be constantly updated of each other's location
- Extremely helpful to either party when a bicycle or car shows up in their blind spot





Original Design / Final Block Diagram



(Changes: Display and Speaker Omitted)



Requirements



- Input Voltage at 4.7 V
 - Checked with multimeter
- GPS should have clear view of the sky
 - Verified with weather readings
- Given the control signal, the right LED should turn on
 - Examined with Oscilloscope

Physical Board Design







Data:

Analysis & Interpretation

7 ELECTRICAL & COMPUTER ENGINEERING

GRAINGER ENGINEERING

Data

```
Generated latitude: 12.0000000000
                                           GPS Data from system
Generated longitude: 34.0000114440
12.00
34.00
haverval
Received latitude: 12.000000000
                                          GPS Data from other
Received longitude: 34.000000000
                                           system
1.24
code 0 sent
                    Distance between systems
here
here
0
```

Failures

- Likely by improperly wiring our original components we broke our original set of ordered components
- Antenna of our original components were very flimsy and broke during usage
- Were unable to consistently yield GPS data that updated in real time









- Partially functional GPS unit
- Functioning Transceiver
- Able to correctly program ATMEGA
- Code seemed to be functional in determining distances when given generated GPS values





Ethical Issues



- User Privacy Concerns
 - Usage of Unique Tags to identify Bikes and Vehicles
- EM Waves Effects
 - RF limit incident on an individual



- Implementing Directionality
 - Using UWB technology for computing more accurate angle of arrivals
- Incorporate visual Display for the car system
- Multiple user incorporation
- More precise GPS systems

Conclusion



- If we were to redesign our project, we would take a different approach
 - The approaches of time of flight and of GPS are not very reliable methods to accomplish our goals
 - Perhaps higher precision RF equipment could be used to accomplish our goals via time of flight
- We learned quite a bit throughout the project
 - This was our team's first time tackling PCB design
 - This is also our team's first time programming a microcontroller rather than using a dev board
 - It was a very worthwhile experience to research parts from scratch and implement them using information from the datasheet



Questions?