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Beyond Tracking

Preliminary Design Report

1/28/2008

The Beyond Tracking system is a long range wireless RF network for distributing GPS location data, real-time bus seating availability, and other real-time information useful to both city transportation services and their patrons. Goals for this semester are oriented towards delivering a reliable product with a marketable image.

Table of Contents

Table of Figures 2

Project Features and Objectives 3

 Features 3

 Objectives..... 3

Concepts and Technologies 3

Flowcharts and Diagrams..... 4

 Vehicle..... 5

 Substation 6

 Base Station 7

Responsibility Division 8

Gantt Chart 9

Table of Figures

Figure 1: System Level Flowchart 4

Figure 2: Vehicle Flowchart..... 1

Figure 3: Substation Flowchart 1

Figure 4: Base Station Flowchart 1

Figure 5: Gantt Chart..... 9

Project Features and Objectives

The Beyond Tracking system is designed to meet a growing demand among both public transport systems and their patrons for real-time information on service availability.

Features

Beyond Tracking System will consist of the following:

- Real time location information
- Real time information on number of riders on individual buses
- Virtually no upkeep costs
- Unlicensed band
- Expandable network coverage
- System can be integrated with a wide variety of user interfaces such as real time internet maps, text messaging systems, or dedicated bus kiosks.

Objectives

Objectives for project this semester: continue work from Junior Design:

- Move breadboard design to PC board
- Improve hardware reliability
- Standardize power requirements
- Rewrite network code to GREATLY improve reliability and efficiency
- Provide a product demo with a marketable image.

Concepts and Technologies

There were a large array of communication and tracking technologies that we evaluated when we optimized the cost/benefit of our system.

Among the communication schemes evaluated were:

- Long range transmission in both licensed and unlicensed bands
- Cellular network leasing
- Daisy chained short range RF transceivers (Xbee)
- Piggybacking data over present bus radio system, and so forth

Positioning systems evaluated included:

- GPS
- Transponders
- Various triangulation schemes
- RF proximity to road side receivers, and
- Double integration of accelerometer data.

In the end, we determined that the low cost upkeep, development, and production of using GPS for positioning and using long range unlicensed ISM band RF transceivers for communications was the best option.

Flowcharts and Diagrams

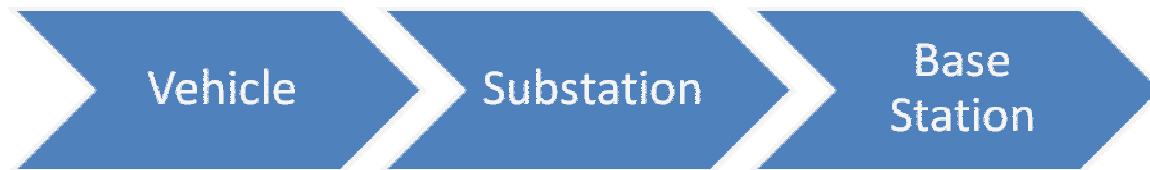


Figure 1: System Level Flowchart

Vehicle

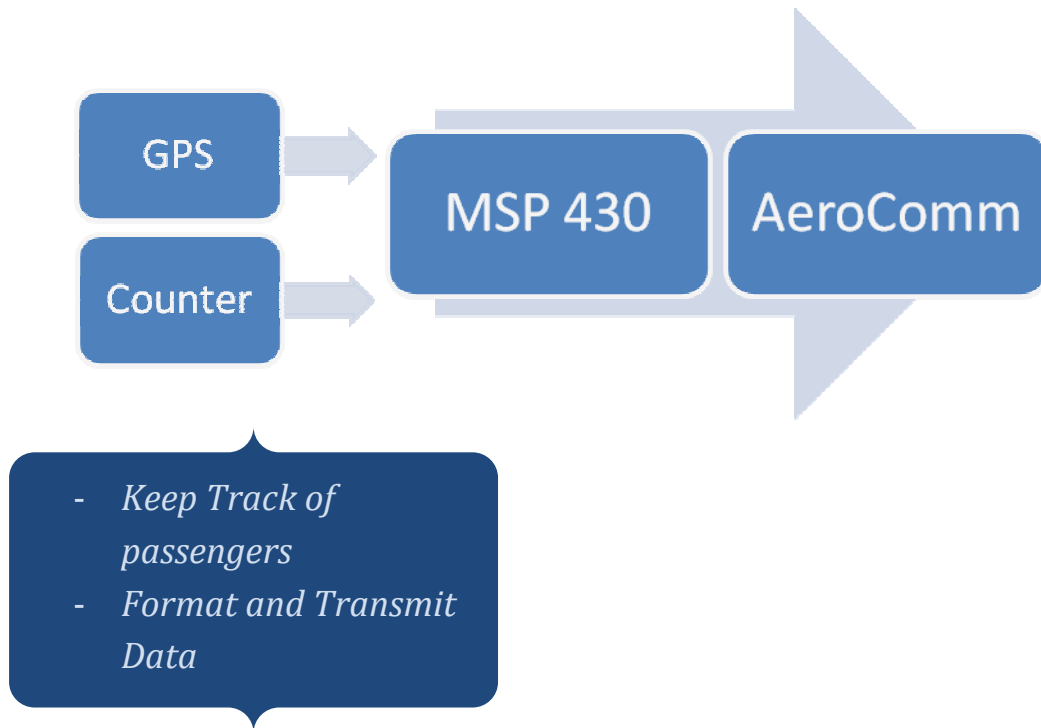


Figure 2: Vehicle Flowchart

Substation

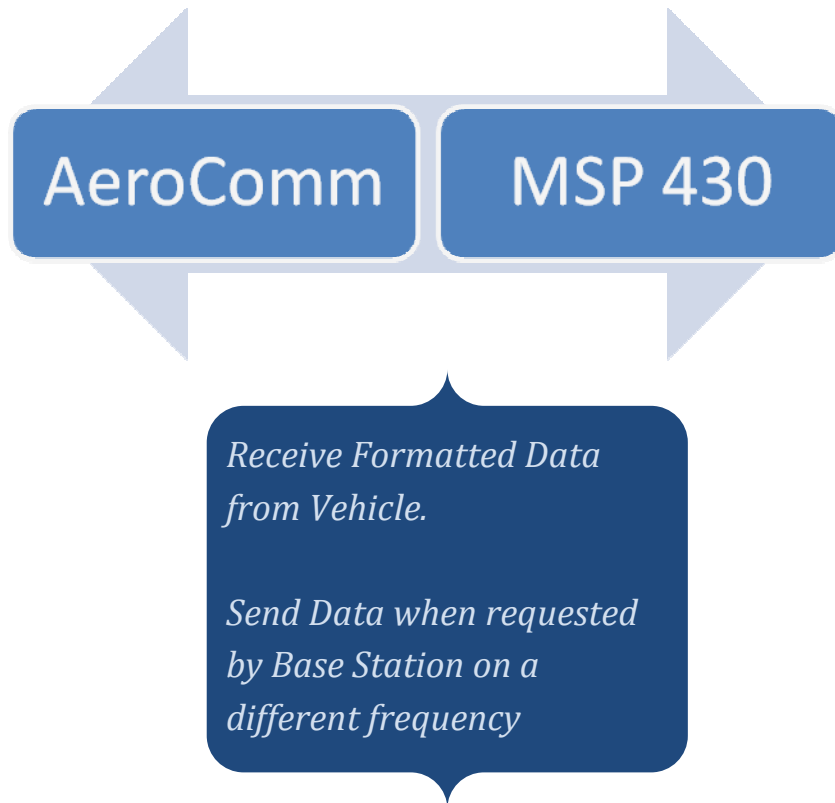


Figure 3: Substation Flowchart

Base Station

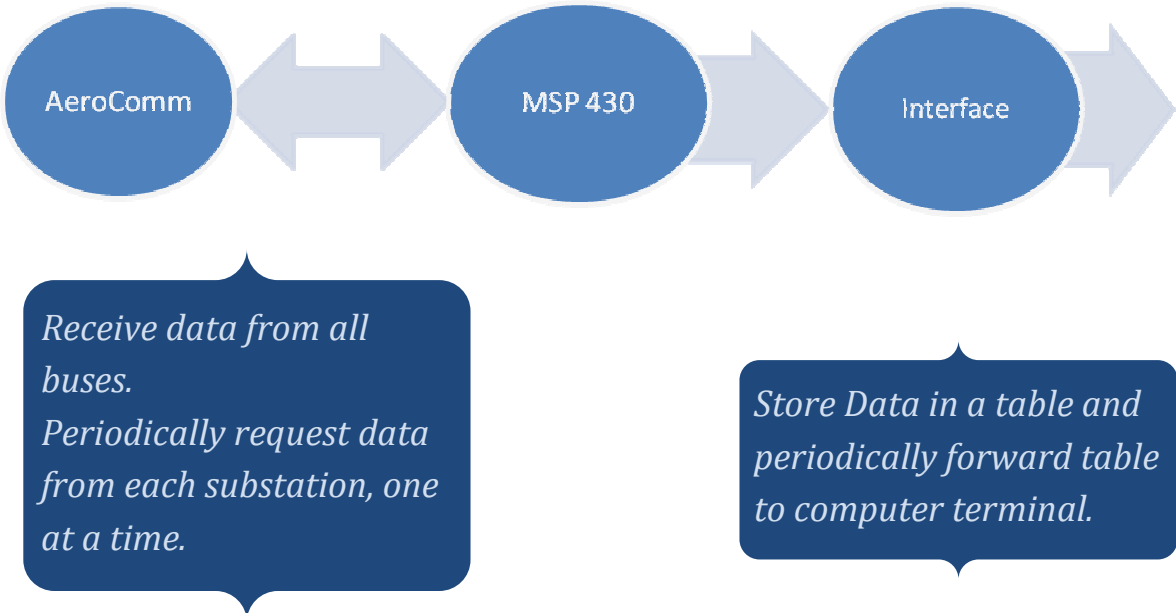


Figure 4: Base Station Flowchart

Responsibility Division

Project Tasks	Raul	Ashley
PCB Design	✓	
PCB Population		✓
Code – Counter	✓	
Code – GPS Formatting		✓
Code – Transmission (AT Commands)	✓	
Code – Interrupts	✓	
Code – Data Tabulation		✓
Code – Data Request		✓
Counter – State Machine	✓	✓
Power Management	✓	
Computer Terminal Demo Software		✓
Aesthetic Engineering	✓	✓

Table 1: Responsibility Division

Gantt Chart

Task Name		Planned	Extension	Down time	Assigned Lead
Introduction - Preliminary Project Proposals (team)	0	1	0	0	Team
Research/ Project Abstract (team)	1	1	0	0	Team
Preliminary Design Report	2	1	0	0	Team
Power Management	3	1	1	0	Raul
Order Parts / PCB Design and Population v.1.0 / Testing	3	4	1	0	Team
Code - GPS Formatting and Transmission	7	1	1	0	Ashley
Code - Interrupt Routines	8	1	1	0	Raul
Code - Data Tabulation	9	1	1	0	Ashley
Code - Data Request	10	1	1	0	Ashley
Counter - State Machine	4	2	1	0	Team
Demo Software	10	2	1	0	Ashley
Aesthetic Engineering/ Website	8	3	1	0	Team
Testing and Troubleshoot	12	1	1	0	Team
Demo	14	1	0	0	Team

Table 2: Gantt Chart

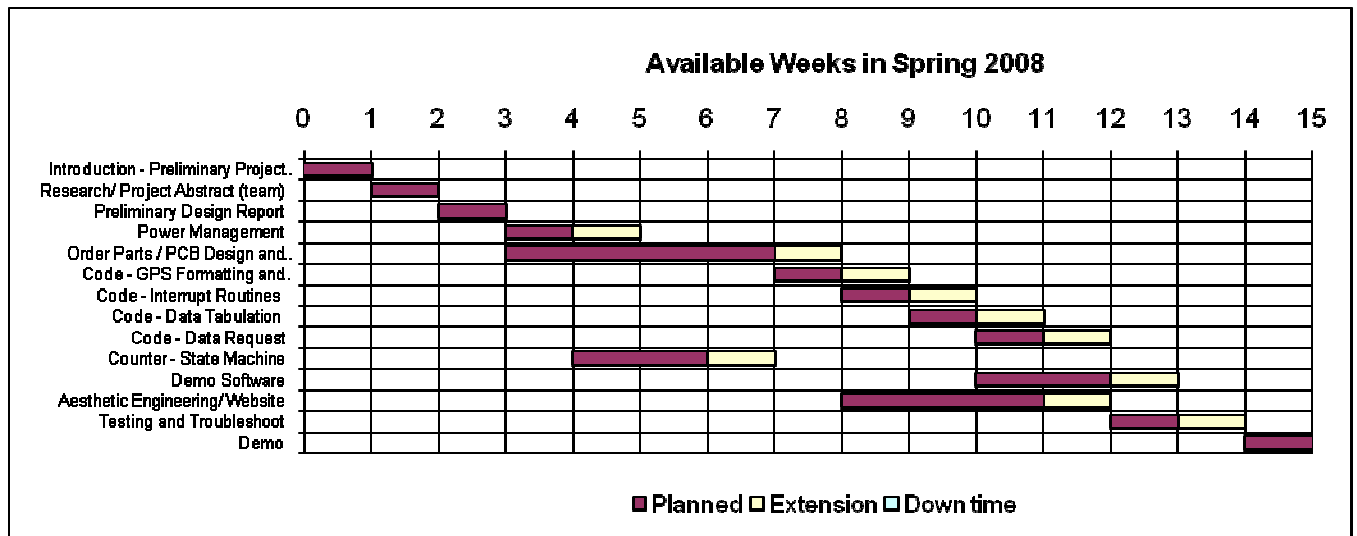


Figure 5: Gantt Chart