Commuter Tracking Sensor Network

Weekly Report - October 5th, 2014

Team Members:

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Project Website:

Navigate to Google Drive Share

Updated Milestone Chart

Milestone	Team Member in Charge	Modified Completion Date	Original Completion Date	Comments
5.1 Install software (Django, Apache, etc.)	Seth	6/21/2014	6/17/2014	COMPLETE Apache, Django, MariaDB are installed and ready to go.
6.1 Disable root login test	Seth	6/21/2014	6/16/2014	COMPLETE Done automatically when Raspbian was updated
6.2 Set the SSH port to a non-standard port test	Seth	6/21/2014	6/17/2014	COMPLETE SSH Port is set to 1315, not the default port of 22
7.1 Begin playing with Pixy Cam in USB tethered mode	Jared, Alex, Seth	7/11/2014	5/1/2014	COMPLETE We've all experimented and interfaced with the PixyCam now, and familiarized ourselves with its basic operation.
5.3 Install and configure fail2ban	Seth	9/1/2014	6/21/2014	COMPLETE
6.3 Disable password login test - must log in with SSH key	Alex, Jared, Seth	9/5/2014	6/21/2014	COMPLETE SSH Keys are required to login to the server via SSH
12.1 Create status webpage, hosted somewhere else	Seth	9/5/2014	9/5/2014	COMPLETE Status webpage that pings the gateway is functional. Its currently hosted on one of Seth's pis, located at http://people.rit.edu/~srh7240/ctsn_status .

10.1 Code Review for Pixy Software	Alex, Seth, Jared	9/8/2014	9/8/2014	COMPLETE Code review was completed. Information was documented regarding each file's contents.
11. Database Creation		9/23/2014	9/14/2014	
11.1 Create mysql or mariadb database so data from trail can be saved to it	Seth	9/23/2014	9/5/2014	Done for now. There will probably need to be some work done once the nodes need to save data to the database.
12.3 Link website to database	Seth	9/23/2014	9/21/2014	Done for now. There will probably need to be some work done once the nodes need to save data to the database.
12. Website Creation		9/26/2014	9/28/2014	Front end is complete, but there may need to be some work done on the backend down-the-road when nodes need to send data to the database
12.2 Create web front end	Seth, Alex	9/26/2014	9/14/2014	Front end is complete. There may need to be some backend work down the road when the nodes need to save data to the database.
16.2 Activate website	Team	9/27/2014	11/9/2014	Complete. Website is located at http://ctsn.student.rit.edu:1415 (login required)
3. Windbelt power module design		10/2/2014	6/18/2014	
5. Server/Gateway setup	Seth	10/6/2014	7/1/2014	The server is a Raspberry Pi located at ctsn.student.rit.edu.
2.1 Configure XBees for DigiMesh and have them	Seth, Jared	10/10/2014	6/1/2014	Awaiting antenna order to complete this task. Configuration should be fairly quick upon arrival of the order.

communicating in close proximity				
8.1 Use CAD tools to design sensor enclosure	Jared	10/10/2014	7/1/2014	This can continue with the maximum values for board size taken into account, which is 4 x 3.2 inches. We will most likely need this size board to fit all of the resistor configurations for the boost converters, along with other peripherals.
7.2 Interface Pixy Cam with an XBee	Jared, Alex	10/10/2014	6/22/2014	Antennas are ordered. They should be here this week.
3.4 Spice Transient Analysis	Alex, Jared	10/11/2014	9/22/2014	Extending analysis process to cover secondary boost converter with MPPT disabled, and different undervoltage and overvoltage resistor networks. We are looking for 6-10V or 5V to power the CMUCam. The XBee requires 3-3.3V, so we will need to do transient analysis on one of TI's step-down regulators.
13. Website Testing (See Gantt Chart)	Team	10/12/2014	10/4/2014	Almost done, just need the security majors to see if there is anything unsafe about the site. They won't be able to get to it until next Sunday
3.1 Breadboard prototyping	Alex, Jared	10/12/2014	6/1/2014	Cad work for the stencil is complete, and Jared is currently making them. The next step is to apply solder paste, the QFN chip, and use Nick Conn's oven to bake the board.
6.4 White Hat Hacker Test	Seth	10/12/2014	6/21/2014	Found volunteers to pen test the server. Since the website is mostly complete, we will begin

				testing. They will not be able to help with it until next Sunday.
3.2 PCB design	Alex	10/12/2014	6/10/2014	Prior to continuing with PCB design, breadboard prototyping should be completed. Awaiting QFN to DIP converter for this.
6. Server/Gateway testing		10/12/2014	7/1/2014	Found volunteers to try to hack the server. They won't be able to help us until next Sunday though.
2. Networking Architecture Configuration and Testing		10/13/2014	6/15/2014	Soldered the xbee usb programmer and downloaded the program that will help program the XBees.
2.3 Small-scale trail deployment	Seth, Jared	10/13/2014	6/15/2014	
2.2 Range Test	Seth, Jared	10/14/2014	6/9/2014	Waiting for antennas to arrive to complete this task.
14.1 Sensors communicate target data with each other	Seth, Alex	10/14/2014	10/4/2014	
5.2 Interface XBee with Pi	Seth	10/15/2014	7/1/2014	New antennas are ordered. Awaiting arrival of order, so date must be pushed back
10.3 Train camera for identifying walkers, bikers, and horses	Seth	10/15/2014	8/1/2014	Algorithms researched and added to project database. Continuing research. Jared will be moving to assist with hardware, and Seth will continue with this after finishing the website (hence the date change).
8.2 Use 3D printer to print the enclosures	Jared	10/15/2014	7/15/2014	8.1 Must be done first

3.3 Ship design for stamping	Alex	10/17/2014	6/18/2014	3.2 Must be completed first
4.1 Solder on components	Alex	10/20/2014	6/29/2014	3.3 Must be completed first
4. Windbelt power module construction and testing		10/22/2014	6/30/2014	
4.2 Continuity tests	Alex	10/22/2014	6/30/2014	4.1 Must be completed first
8. Sensor Enclosure Design / Testing		10/22/2014	8/7/2014	
8.3 Test (See Gantt Chart)	Jared	10/22/2014	8/7/2014	Dependent on 8.2
10. Sensor Software - Identify targets		10/24/2014	9/1/2014	
10.4 Train camera to figure out what direction the target is going	Jared	10/24/2014	9/1/2014	10.3 Must be done first
1. Contact Monroe County Discuss deployment options for sensor nodes.	Jared	10/28/2014	10/27/2014	Not a priority until we complete more of the technical requirments.
14. Target Data Communication		10/28/2014	10/5/2014	
14.2 Sensors can communicate and write target data to database	Seth	10/28/2014	10/5/2014	

6.5 Ping disabled test	Seth, Security Majors	10/31/2014	6/21/2014	DEFERRED While the server is on the RIT campus, this is completed since outsiders can not ping rit.edu. If the server moves of campus for whatever reason, this will need to be revisited
10.2 Compile GCC version of Pixy software and note differences	Seth	10/31/2014	9/8/2014	DEFERRED According to the pixy cam developers, GCC version is not ready to use yet. That's fine though, we can use Keil instead.
7. Sensor hardware testing and integration		10/31/2014	7/11/2014	
7.3 Integrate with existing power module	Jared, Alex	10/31/2014	7/11/2014	Will be done upon completion of the power module.
15. Computer Vision Testing (See Gantt Chart)	Alex, Seth	11/1/2014	10/28/2014	
9. Windbelt Testing (See Gantt Chart)	Alex	11/5/2014	5/27/2014	Beaglebone is ready for data acquisition using ADC, and sending test data to the database. Outdoor testing will begin early this week. MariaDB is also being configured for a larger timeout to allow for the Beaglebone to transmit data for extended period of time.
17.1 Advanced II integration testing with focus on single node in controlled environment	Team	11/5/2014		

17.2 Advanced II integration testing with focus on single node in an outdoor environment	Team	11/10/2014		
17.Integration Testing		11/13/2014		
17.3 Advanced II testing with focus on operation in outdoor environment for multiple nodes	Team	11/13/2014		
16. Deployment		11/17/2014	11/9/2014	
16.1 Deploy nodes on trail	Team	11/17/2014	11/5/2014	

Current Milestones

Milestone	**Team Member in Charge**	**Modified Completion Date**	**Original Completion Date**	**Comments**
3.4 Spice Transient Analysis	Alex, Jared	10/11/2014	9/22/2014	Extending analysis process to cover secondary boost converter with MPPT disabled, and different undervoltage and overvoltage resistor networks. We are looking for 6-10V or 5V to power the CMUCam. The XBee requires 3-3.3V, so we will need to do transient

				analysis on one of TI's step-down regulators.
13. Website Testing (See Gantt Chart)	Team	10/12/2014	10/4/2014	Almost done, just need the security majors to see if there is anything unsafe about the site. They won't be able to get to it until next Sunday
3.2 PCB design	Alex	10/12/2014	6/10/2014	Prior to continuing with PCB design, breadboard prototyping should be completed. Awaiting QFN to DIP converter for this.
5.2 Interface XBee with Pi	Seth	10/15/2014	7/1/2014	New antennas are ordered. Awaiting arrival of order, so date must be pushed back
10.3 Train camera for identifying walkers, bikers, and horses	Seth	10/15/2014	8/1/2014	Algorithms researched and added to project database. Continuing research. Jared will be moving to assist with hardware, and Seth will continue with this after finishing the website (hence the date change).
9. Windbelt Testing (See Gantt Chart)	Alex	11/5/2014	5/27/2014	Beaglebone is ready for data acquisition using ADC, and sending test data to the database. Outdoor testing will begin early this week. MariaDB is also being configured for a larger timeout to allow for the Beaglebone to transmit data for extended period of time.

Next Milestones

Milestone	Team Member in Charge	Modified Completion Date	Original Completion Date	Comments
2.1 Configure XBees for DigiMesh and have them communicating in close proximity	Seth, Jared	10/10/2014	6/1/2014	Awaiting antenna order to complete this task. Configuration should be fairly quick upon arrival of the order.
7.2 Interface Pixy Cam with an XBee	Jared, Alex	10/10/2014	6/22/2014	Antennas are ordered. They should be here this week.
3.4 Spice Transient Analysis	Alex, Jared	10/11/2014	9/22/2014	Extending analysis process to cover secondary boost converter with MPPT disabled, and different undervoltage and overvoltage resistor networks. We are looking for 6-10V or 5V to power the CMUCam. The XBee requires 3-3.3V, so we will need to do transient analysis on one of TI's step-down regulators.
13. Website Testing (See Gantt Chart)	Team	10/12/2014	10/4/2014	Almost done, just need the security majors to see if there is anything unsafe about the site. They won't be able to get to it until next Sunday

3.1 Breadboard prototyping	Alex, Jared	10/12/2014	6/1/2014	Cad work for the stencil is complete, and Jared is currently making them. The next step is to apply solder paste, the QFN chip, and use Nick Conn's oven to bake the board.
6.4 White Hat Hacker Test	Seth	10/12/2014	6/21/2014	Found volunteers to pen test the server. Since the website is mostly complete, we will begin testing. They will not be able to help with it until next Sunday.
3.2 PCB design	Alex	10/12/2014	6/10/2014	Prior to continuing with PCB design, breadboard prototyping should be completed. Awaiting QFN to DIP converter for this.
6. Server/Gateway testing		10/12/2014	7/1/2014	Found volunteers to try to hack the server. They won't be able to help us until next Sunday though.
2. Networking Architecture Configuration and Testing		10/13/2014	6/15/2014	Soldered the xbee usb programmer and downloaded the program that will help program the XBees.
5.2 Interface XBee with Pi	Seth	10/15/2014	7/1/2014	New antennas are ordered. Awaiting arrival of order, so date must be pushed back

10.3 Train camera for identifying walkers, bikers, and horses	Seth	10/15/2014	8/1/2014	Algorithms researched and added to project database. Continuing research. Jared will be moving to assist with hardware, and Seth will continue with this after finishing the website (hence the date change).

Status

Difficulties

Getting the BeagleBone to connect to the RIT wireless via the command line is very difficult to do. We are re-attempting to do so with a Wi-Fi adapter that is known to work for the distribution we are currently running on the BeagleBone. In order to eliminate the possibility that the Wi-Fi dongle is underpowered, an external hub will be used to provide power to it.

Surprises

If an open connection to MariaDB is not used for a period of time, MariaDB will automatically close it. This will mean some rework is needed in some areas, since it was (incorrectly) assumed that the connection will remain open indefinitely.

The ADC on the BeagleBone is surprisingly easy to use. The user need only connect the ADC to one of the available hardware slots via shell, and then ping the open port using an executable.

Successes

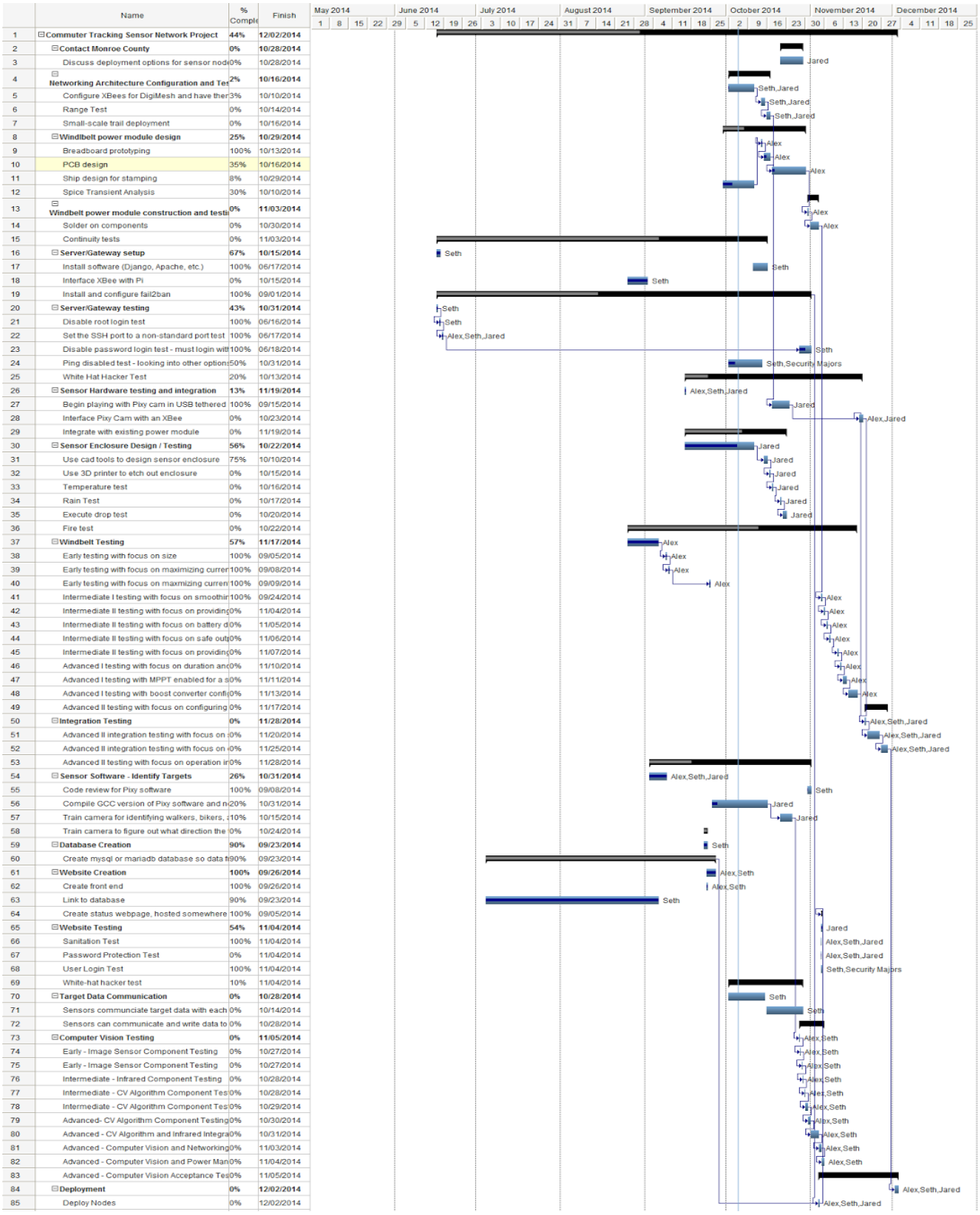
We are able to take measurements from the windbelt from the ADC on the BeagleBone and send the data to the database for analysis.

Research is progressing on CV algorithms. Jared has narrowed down results dependent on project needs.

Open Questions & Problems

More research must be done to figure out which step-down converter to use with the 3.7V battery prior to plugging in the XBee devices. This will most likely done this week, keeping in mind that we wish to use a TI device to be able to enter the design competition.

Gantt Chart



	Name	% Complete	Finish
1	**Commuter Tracking Sensor Network Project**	**44%**	**12/02/2014**
2	**Contact Monroe County**	**0%**	**10/28/2014**
3	Discuss deployment options for sensor node	0%	10/28/2014
4	**Networking Architecture Configuration and Tes**	**2%**	**10/16/2014**
5	Configure XBees for DigiMesh and have ther	3%	10/10/2014
6	Range Test	0%	10/14/2014
7	Small-scale trail deployment	0%	10/16/2014
8	**Windlbelt power module design**	**25%**	**10/29/2014**
9	Breadboard prototyping	100%	10/13/2014
10	PCB design	35%	10/16/2014
11	Ship design for stamping	8%	10/29/2014
12	Spice Transient Analysis	30%	10/10/2014
13	**Windbelt power module construction and testi**	**0%**	**11/03/2014**
14	Solder on components	0%	10/30/2014
15	Continuity tests	0%	11/03/2014
16	**Server/Gateway setup**	**67%**	**10/15/2014**
17	Install software (Django, Apache, etc.)	100%	06/17/2014
18	Interface XBee with PI	0%	10/15/2014
19	Install and configure fail2ban	100%	09/01/2014
20	**Server/Gateway testing**	**43%**	**10/31/2014**
21	Disable root login test	100%	06/16/2014
22	Set the SSH port to a non-standard port test	100%	06/17/2014
23	Disable password login test - must login with	100%	06/18/2014
24	Ping disabled test - looking into other option	50%	10/31/2014
25	White Hat Hacker Test	20%	10/13/2014
26	**Sensor Hardware testing and integration**	**13%**	**11/19/2014**
27	Begin playing with Pixy cam in USB tethered	100%	09/15/2014
28	Interface Pixy Cam with an XBee	0%	10/23/2014
29	Integrate with existing power module	0%	11/19/2014
30	**Sensor Enclosure Design / Testing**	**56%**	**10/22/2014**
31	Use cad tools to design sensor enclosure	75%	10/10/2014
32	Use 3D printer to etch out enclosure	0%	10/15/2014
33	Temperature test	0%	10/16/2014
34	Rain Test	0%	10/17/2014
35	Execute drop test	0%	10/20/2014
36	Fire test	0%	10/22/2014
37	**Windbelt Testing**	**57%**	**11/17/2014**
38	Early testing with focus on size	100%	09/05/2014
39	Early testing with focus on maximizing curren	100%	09/08/2014
40	Early testing with focus on maxmizing curren	100%	09/09/2014
41	Intermediate I testing with focus on smoothir	100%	09/24/2014
42	Intermediate II testing with focus on providing	0%	11/04/2014
43	Intermediate II testing with focus on battery d	0%	11/05/2014
44	Intermediate II testing with focus on safe out	0%	11/06/2014
45	Intermediate II testing with focus on providing	0%	11/07/2014
46	Advanced I testing with focus on duration and	0%	11/10/2014
47	Advanced I testing with MPPT enabled for a s	0%	11/11/2014
48	Advanced I testing with boost converter confi	0%	11/13/2014
49	Advanced II testing with focus on configuring	0%	11/17/2014
50	**Integration Testing**	**0%**	**11/28/2014**
51	Advanced II integration testing with focus on s	0%	11/20/2014
52	Advanced II integration testing with focus on	0%	11/25/2014
53	Advanced II testing with focus on operation ir	0%	11/28/2014
54	**Sensor Software - Identify Targets**	**26%**	**10/31/2014**
55	Code review for Pixy software	100%	09/08/2014
56	Compile GCC version of Pixy software and n	20%	10/31/2014
57	Train camera for identifying walkers, bikers,	10%	10/15/2014
58	Train camera to figure out what direction the	0%	10/24/2014
59	**Database Creation**	**90%**	**09/23/2014**
60	Create mysql or mariadb database so data h	90%	09/23/2014
61	**Website Creation**	**100%**	**09/26/2014**
62	Create front end	100%	09/26/2014
63	Link to database	90%	09/23/2014
64	Create status webpage, hosted somewhere	100%	09/05/2014
65	**Website Testing**	**54%**	**11/04/2014**
66	Sanitation Test	100%	11/04/2014
67	Password Protection Test	0%	11/04/2014
68	User Login Test	100%	11/04/2014
69	White-hat hacker test	10%	11/04/2014
70	**Target Data Communication**	**0%**	**10/28/2014**
71	Sensors communciate target data with each	0%	10/14/2014
72	Sensors can communicate and write data to	0%	10/28/2014
73	**Computer Vision Testing**	**0%**	**11/05/2014**
74	Early - Image Sensor Component Testing	0%	10/27/2014
75	Early - Image Sensor Component Testing	0%	10/27/2014
76	Intermediate - Infrared Component Testing	0%	10/28/2014
77	Intermediate - CV Algorithm Component Tes	0%	10/28/2014
78	Intermediate - CV Algorithm Component Tes	0%	10/29/2014
79	Advanced- CV Algorithm Component Testing	0%	10/30/2014
80	Advanced - CV Algorithm and Infrared Integra	0%	10/31/2014
81	Advanced - Computer Vision and Networking	0%	11/03/2014
82	Advanced - Computer Vision and Power Man	0%	11/04/2014
83	Advanced - Computer Vision Acceptance Tes	0%	11/05/2014
84	**Deployment**	**0%**	**12/02/2014**
85	Deploy Nodes	0%	12/02/2014