ECE 480 - Team 3
Progress Report 1
3/13/09

Introduction:

We've come a long way since we first started this project. We've gotten the Beagle Board to connect to a monitor, keyboard, a mouse, and the internet, run Angstrom Linux, and run a few GUI prototypes. In addition, we've begun assembling the code needed to integrate a video, weather, and climate control into our display. At this point, we stand about 75% done with Phase 1 (constructing the GUI) and about 25% done with Phase 2 (integrating the hardware elements). We may have a lot done, but we still have a long way to go.

Hardware Status:

As mentioned in the introduction, the core of our hardware requirements are ready to go. We have the Beagle Board set up to run off an SD flash card, which allows it to boot its own operating system, without needing a connection to a host PC. We've connected a three port USB relay to the Beagle Board's single USB port, allowing us to connect up to three devices at once. So far, we've connected a mouse and keyboard, both of which were plug-and-play compatible with the operating system.

Our largest issue with the Beagle Board so far is the performance discrepancy between it and the PC's we are developing on. Our development PC's are much faster than the Beagle Board, so we may spend days developing a solution to a problem, only to find that it is too slow to run on the Beagle Board. For example, in our Java code, we created dozens of buttons and labels using Image objects. Our PC's were able to load and manipulate these images without any noticeable delay, but when we loaded the code onto the Beagle Board, it took 60 seconds to load the front screen, and another 30 seconds to respond to a button press. Obviously, this was unacceptable, so we had to go back over our code and find out how to improve performance. After two days of tweaking, we discovered that if we converted all of our Image objects to BufferedImage objects, we could improve runtime performance by sacrificing initial loading time. If we were developing our final product to run on PC's, we wouldn't have that issue in the first place.

We also have a 7" DVI-D touchscreen monitor with built-in speakers. While we can get the Beagle Board to send its display to this monitor, we haven't been able to install the drivers to allow the touchpad feature to work. The manufacturer has provided much of the source code needed to compile the drivers on our system, but the source won't compile due to syntax errors. While it may be possible to get the drivers to compile, it may take a long time to do, it may not work anyway, and our sponsors at TI decided that it isn't an important enough feature to spend a long time working on. Therefore, we've moved onto other, more important things.

We also encountered a problem with receiving weather information over the national weather band. We planned on using the Si4707 weather band decoder from Silicon Labs, but they informed us that we cannot get access to the chip's data sheet without signing a non-disclosure agreement. Since we do not have enough time to make that happen, we've had to look elsewhere for receiving weather information. Our

sponsors suggested we connect the Beagle Board to the internet and use it instead, with the added requirement that we also receive and display a forecast for the next few days.

Software Status:

Like the hardware, the core components of our software are installed and functioning properly. The Angstrom Linux operating system allows us to use the Beagle Board much like a regular PC. We can connect new devices, manipulate files, and run the programs we need to test our code. We've also installed a decent Java Virtual Machine called JamVM. While this virtual machine isn't as fast as the official VM released by Sun Microsystems, it is the best one that works under the ARM processor architecture (which is what the OMAP3 processors use). The core of our GUI is also done, with the main page and most of the graphical elements completed. At this point, all we need to do to complete the user interface portion of this project is assemble the sub-menus, which are the menus that pop up when the user presses a button on the main display. As mentioned in the hardware section, we've also set up an image manager system that properly loads the images into memory. This allows for good response time on both PC and Beagle Board and may, in the future, allow us to do basic animations to improve the overall look and feel.

In addition to finishing the GUI, we're also working on configuring the peripheral devices that we'll attach via USB. For the video camera, we're researching how we could launch another program that would pop up when a user requests video. This program would hover over our control panel and would be killed whenever program the operating system focus goes back to the control panel. For the weather, we've found a java system that sends a request for weather information to www.weather.com and parses through the response, which takes the form of an xml table. The trick now is handling the data objects this parser creates and using them to display the weather information on the weather sub-menu. Lastly we've found a generic USB device controller that we plan to use to control our climate control fan. If we can get a hold of a programmer to configure this controller, we can get it to control an analog switch that can start or cut off power to the fan.

We are also working on a few independent system components. One basic feature we'd expect a system like this to have is a clock. However, in order to properly update the time, we need to make our GUI multi-threaded. While this process is mostly done, we need to finish working out the issues with resource sharing and preventing race conditions within our GUI components. For example, we need to prevent the clock thread from trying to update the time while the virtual machine is trying to draw it on the screen. Once we've accomplished that, we can also add features like a faux security system and thermometer that can make events happen at random times, rather than in response to user input.

Budget Status:

Maximum: $ 1,000

Current Total: $ 662.52

Breakdown:

Beagle Board.....	$ 150
SD Card (8G).....	$ 14.59
SD Card Reader.....	$ 7.99
USB 2.0 3-Port Hub with Ethernet Adapter.....	$ 40.99
USB to 5.5mm Barrel Jack Adapter.....	$ 2.95
Acrylic Case for Beagle rev B5.....	$ 29.00
Monitor Cable (HDMI A to DVI-D).....	$ 8.00
USB Std-A-Female to mini-A-Male Adapter.....	$ 9.00
DB9M to 1DC10F AT/Everex Serial Adapter.....	$ 2.00
DVI-D 7" Touch Screen Monitor.....	$ 399.00

Potential Future Expenses:

USB Video Camera.....	~$ 50
USB Controller Programmer.....	~$ 50

Conceptual Design Re-evaluation:

I/O Devices:

	Easy to use	Intuitive	Portability	Feasibility	Compatibility	Performance Improvement	Score
Importance	5	2	3	1	6	4	
Touchscreen	6	6	6	1	1	5	87
DVI Monitor	4	5	3	4	3	3	73
Mouse	5	4	2	5	4	2	76
Keyboard	2	2	1	3	2	1	36
SD Card	1	1	5	6	6	6	88
Speakers	3	3	4	2	5	4	81

Home System Demos:

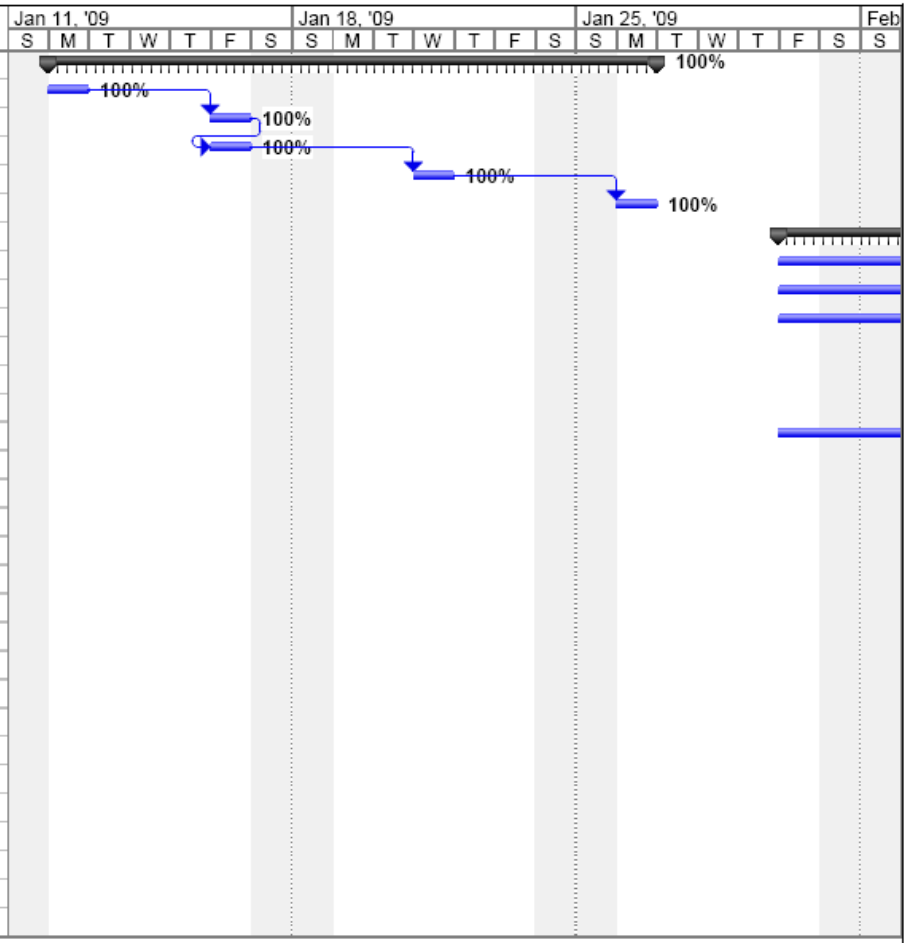
	Sponsor Importance	Ease of Implementation	Processor Overhead	Memory Requirement	Usefulness	User Appeal	Cost of Devices	Score
Importance	5	3	4	2	7	6	1	
Lighting	1	1	5	6	2	2	4	70
Security	2	2	6	4	1	5	3	88
Climate Control	3	3	4	5	4	1	6	90
Weather	5	4	3	3	3	3	1	95
Video	6	5	2	1	6	6	2	135
Wi-Fi	4	6	1	2	5	4	5	110

Conclusion:

While we do still have a lot to do, we've gotten a great start. By working over spring break, we've gotten a jump on the work we'll have to do in the coming weeks. We still have a lot of potential features we could add if we have time at the end of the semester, and given our current progress, we stand a fair chance of implementing a few, if not all, of those features.

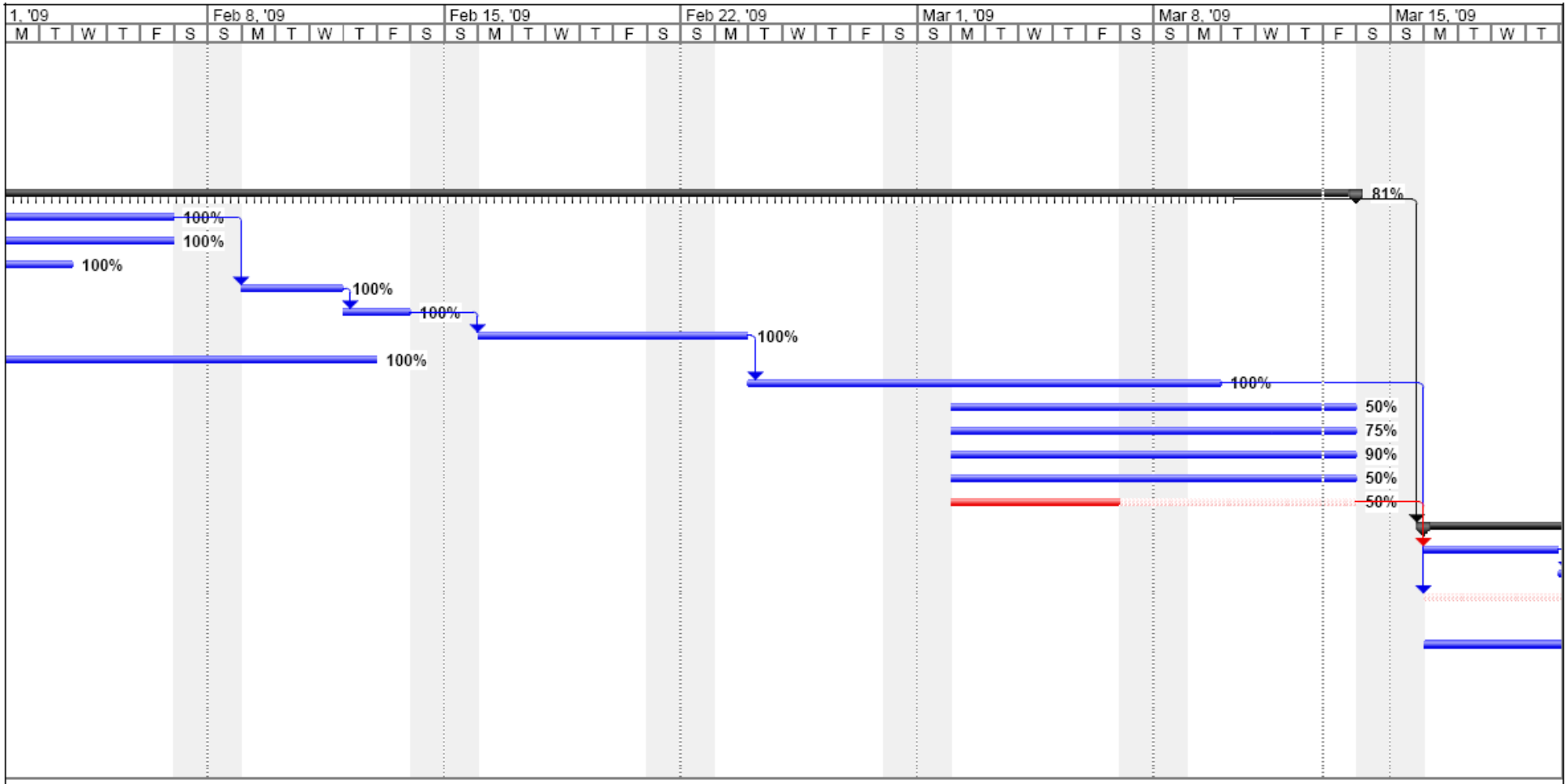
Updated Gantt chart:

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Pre-Design**	**11 days?**	**Mon 1/12/09**	**Mon 1/26/09**	
2	Signed up for project	1 day?	Mon 1/12/09	Mon 1/12/09	
3	First Team Meeting	1 day?	Fri 1/16/09	Fri 1/16/09	2
4	Contact Facilitator/Sponso	1 day?	Fri 1/16/09	Fri 1/16/09	3
5	Meet with facilitator	1 day?	Wed 1/21/09	Wed 1/21/09	4
6	Conference call with spons	1 day?	Mon 1/26/09	Mon 1/26/09	5
7	**Design: Phase 1**	**31 days?**	**Fri 1/30/09**	**Fri 3/13/09**	
8	Receive Hardware	6 days	Fri 1/30/09	Fri 2/6/09	
9	Conceptual GUI design	6 days	Fri 1/30/09	Fri 2/6/09	
10	Pre-proposal	3 days	Fri 1/30/09	Tue 2/3/09	
11	Install operating system	3 days	Mon 2/9/09	Wed 2/11/09	8
12	Configure development en	2 days	Thu 2/12/09	Fri 2/13/09	11
13	Add blank GUI component	6 days	Mon 2/16/09	Mon 2/23/09	12
14	Research weather band	10 days	Fri 1/30/09	Thu 2/12/09	
15	Implement GUI Display	10 days	Tue 2/24/09	Mon 3/9/09	13
16	Graphical icons, Visual Lay	10 days?	Mon 3/2/09	Fri 3/13/09	
17	Digital Clock (Vick)	10 days	Mon 3/2/09	Fri 3/13/09	
18	Weather Information (Sung	10 days?	Mon 3/2/09	Fri 3/13/09	
19	System Calls (Da)	10 days	Mon 3/2/09	Fri 3/13/09	
20	Research on sending signa	10 days?	Mon 3/2/09	Fri 3/13/09	
21	**Design: Phase 2**	**17 days**	**Mon 3/16/09**	**Tue 4/7/09**	7
22	Add video doorbell hardwa	4 days	Mon 3/16/09	Thu 3/19/09	20
23	Incorporate video into GUI	7 days	Fri 3/20/09	Mon 3/30/09	22
24	Add weather reciever hard	10 days	Mon 3/16/09	Fri 3/27/09	15
25	Configure weather reciever	7 days	Mon 3/30/09	Tue 4/7/09	24
26	Obtain and Install HVAC fa	10 days	Mon 3/16/09	Fri 3/27/09	
27	Configure GUI to run HVA	5 days	Mon 3/30/09	Fri 4/3/09	26
28	**Finishing Touches/Polishing**	**17 days?**	**Wed 4/8/09**	**Thu 4/30/09**	**21**
29	Condensing Hardware	6 days?	Wed 4/8/09	Wed 4/15/09	
30	Packaging Total Hardware	10 days?	Thu 4/16/09	Wed 4/29/09	29
31	All Hardware and Software	3 days?	Tue 4/28/09	Thu 4/30/09	



Project: Gantt Chart.mpp
Date: Fri 3/13/09

Critical	Baseline	Project Summary
Critical Split	Baseline Split	External Tasks
Critical Progress	Baseline Milestone	External Milestone
Task	Milestone	Deadline
Split	Summary Progress	
Task Progress	Summary	



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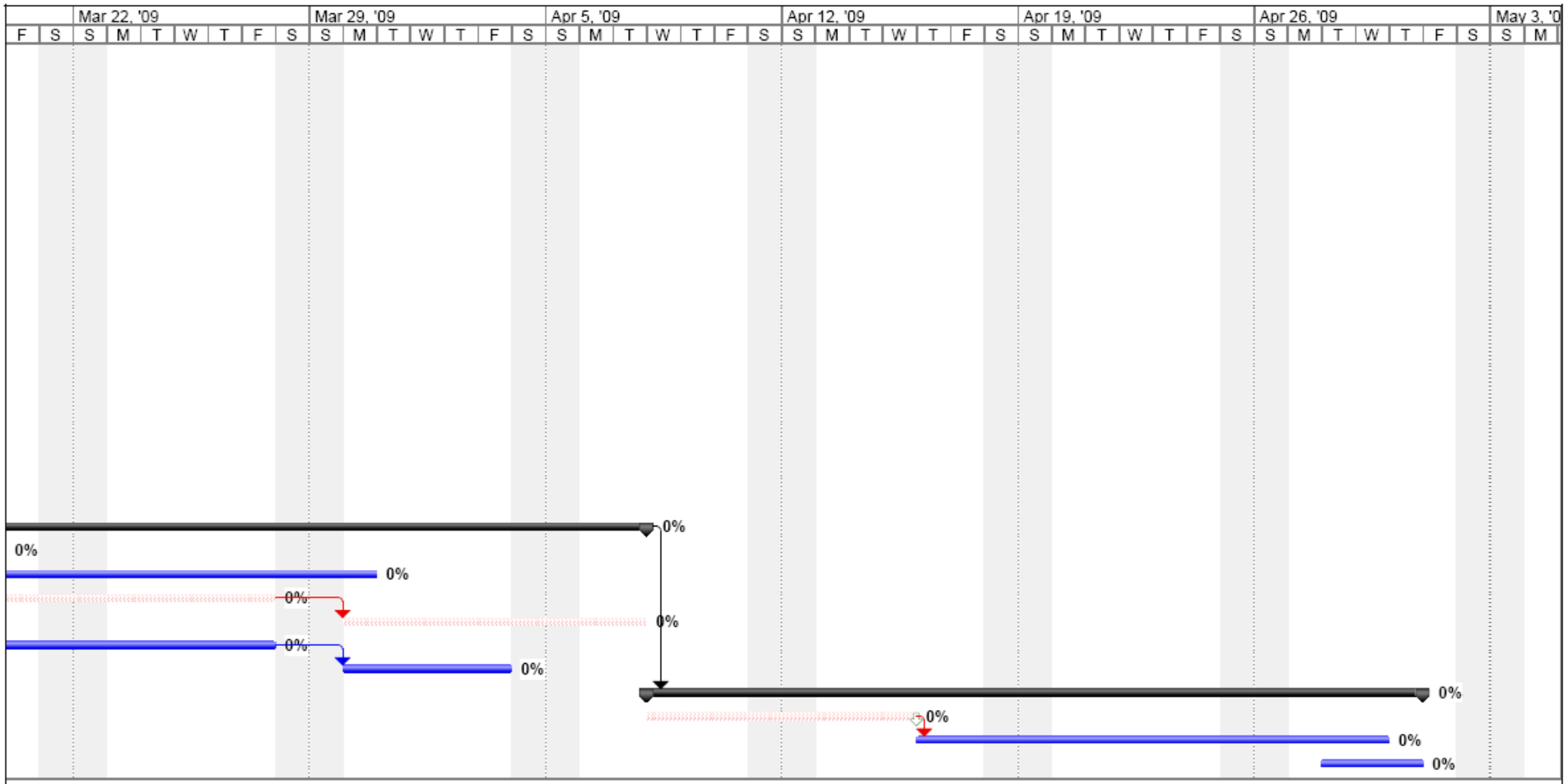

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