Team: Boq

Team Members:

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Project Synopsis: Carputer/Vehicle Monitoring System

Team Boq is designing a system to be used for monitoring statistics about the vehicle the system is plugged into. The basic requirements of the system are as follows: highest priority is logging data about vehicle health, speed, rpm, fuel economy etc. This data will be uploaded to a server via wireless networking interface when the user requests. The server will display the log file in a usable fashion. There will be logs and charts available at the users request to show relevant information.

The heart of the system is an Xboard. An Xboard consolidates the major functionality of a computer on one small circuit board. Kontron, the manufacturer of the Xboard, has provided documentation on implementation. The Xboard is the size of a SODIMM(laptop memory module). We will be designing the main board for this computer. The main board will consist of a printed circuit board creating connections to additional modules. Some of the connections will be USB, serial, VGA, Ethernet, and IDE. Additional modules will consist of voltage regulator/filter, OBD2 to RS232 converter, video output, and user input devices. There are also many wishlist items which we are hoping to complete and those will be mentioned at the end of this synopsis.

Vehicle power is actually pretty “dirty”. There are many obstacles which need to be overcome in order to get consistent clean voltage. When a car is started the voltage drops to 8 or less volts depending on what source we look at(we are going to measure exact values ourselves). When the alternator gets going voltage can spike, again different sources indicate different spike values, some of which seem ridiculously high. While running, the alternator produces line noise, as well as noise from the ignition system. Noisy power is unacceptable in a digital data gathering situation. Noise could cause data corruption or even total garbage.

To transcend these obstacles we have several ideas. The first idea is to include the functionality of a UPS. The uninterruptible power supply will have a precursor circuit which will handle voltage regulation, filtering, and charging of the battery. We

feel that this approach offers the best protection. The battery will provide the proper voltage when the starter motor is cranking, as well as other low voltage situations.

We will be using an OBD2 to RS232 converter to facilitate communication between the vehicle and the Carputer. The decision to use this part was made because of the lack of documentation on the OBD2 protocol.

The user interface will be an LCD with a touchscreen overlay. The touchscreen overlay uses a connection between two surfaces and a voltage divider to determine location on the screen being touched. This information is sent to a controller which will send pointer information to the main system via USB. The computer will then execute the command given by the user, based on the location of contact on the screen.

We have split the project into tasks with tentative deadlines for completion. During the summer break, we are going to solidify the design of the project down to the smaller details. Colby will be leading this aspect of the project. The risk factor here is minimal in that most of this work was completed during Spring of 2005.

Toward the end of the summer break our team will split into two smaller teams. Brandt and Colby will design and manufacture the mainboard, and all interfaces to the other hardware. In parallel, Brian will work with Scott to get all of the software working on a regular Linux box. The risk factor for Brian's team is minimal. Because we are using Linux and we all are somewhat familiar with it, we do not foresee serious issues here. Brandt's team with Colby on the other hand we give a risk factor of high. While somewhat familiar with the processes, we have not done anything on this scale, also there is a high probability for unforeseen circumstances cropping up here. Due to the high risk we are going to use a printed circuit board manufacturer, PCB123, as a backup.

The first two weeks of Fall semester we will come back together as one team to integrate the software and hardware and do some rigorous testing. Brandt will direct this portion of the project. The risks at this stage are medium. There is the possibility of incompatibility and unforeseen issues here.

For the following three weeks we will break into two sub-teams again. Colby will lead in programming the server with Brian. We have decided on C# because it offers the most ease of use to the programmer, has many visually pleasing aspects, and we are doing all Linux on the smaller system. The risk here is minimal; the risk is that it will not look as good as we want. Scott will work with Brandt on the OBD2 software on

the embedded system. The risk factor here is medium. The base software we are going to use is open source and bugs may exist.

Team Boq will then work together once again and make a four week push to finish the project. These four weeks will be dedicated to working out bugs, unforeseen stuff, and all around polishing of the details. Brian will head up this free for all toward the finish line. Risk for this part of the project is moderate. All work up to this point assumes most things go well, if they do not this is make or break time.

We have left the last five weeks of the semester to implement some fun stuff we would like to do, as well as order the custom enclosure. The enclosure is going to be manufactured by a friend of the team. We will have the hardware ready for a GPS unit in the event we get everything else done. This is our number one wishlist item. Other wishlist projects consist of adding music playing ability. In the event that everything goes horribly wrong we have this buffer to fall back on. Colby will be heading up this aspect of the project. Risk here is high, if we do not finish, we will not graduate.

We are confident that this will not be the case. We are aiming high and hoping to hit right on target. We have received most of our parts, and will be ordering additional parts over the summer. We plan to meet several times, and with schedules forgiving we will start the initial phases of the project.

Below is an initial Bill of Materials, or BOM. We have listed the parts in category and possible providers. Most parts are commonly available at any of the local electronics shops. Some of the parts which are more specific include the LCD touch screen, the OBD2 converter and Xboard. All of these high risk parts have already been received at the time of this proposal.

Power Supply:			
	Cables to power with in-line	$15	
	Sealed Lead Acid Battery	$30	Batteries Plus or other
	Caps/Inductors/Diodes/FETs/R	$10	DigiKey or Mouser
OBD2:			
	OBD2-RS232 Connector	$108	Multiplex Engineering
	Misc Cables	$10	Best Buy/Radio Shack
Screen			
	8” LCD with Touch Screen	$0	Source: Brian's Brother in
	USB IC		DigiKey or Mouser
Known Widgets:			
	Ethernet to 802.11	$40	Best Buy/Amazon
Enclosures:			
	Main Enclosure Metal/Plastic	$30.0	
Main Board:			
	Xboard	$270	Kontron of DE
	Slot for Xboard	$5.00	DigiKey or Mouser
	Mini Hard Drive	$0.00	Colby
	DVD-drive	$30.0	Best Buy/Amazon

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