

Navigation and Infotainment System Monitor



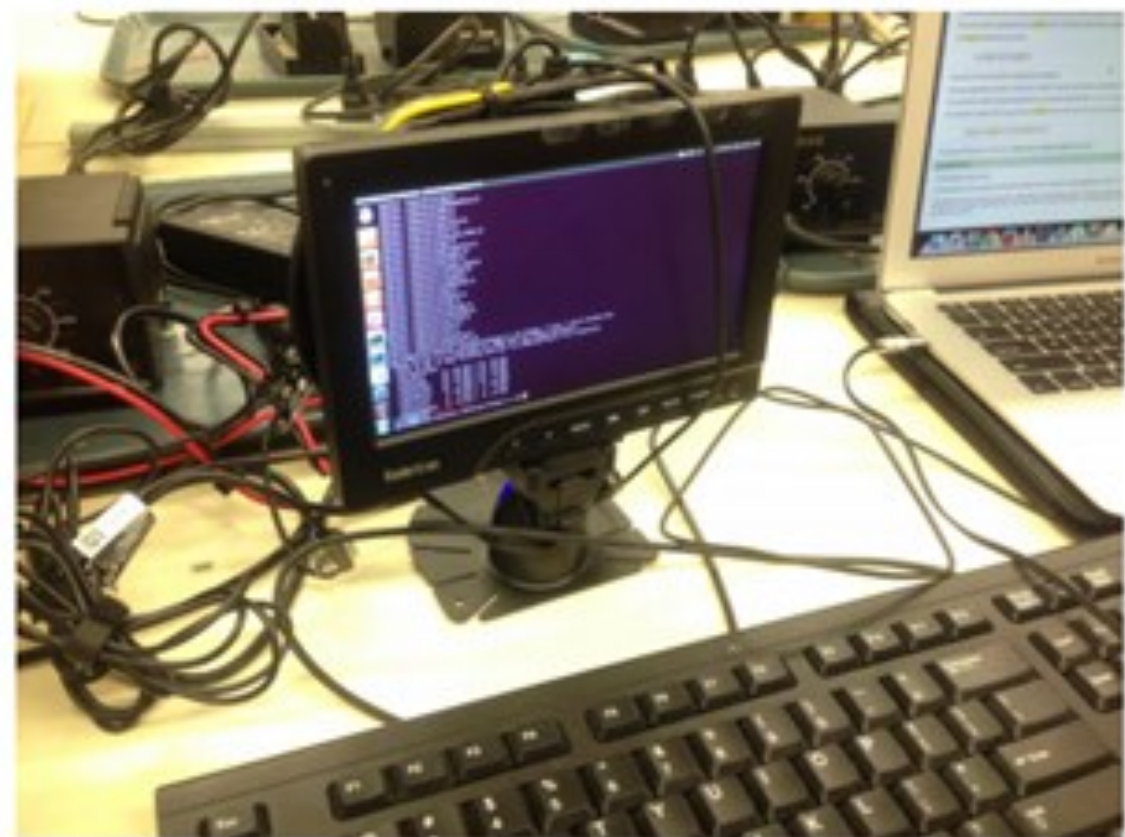
Design Team #9

MICHIGAN STATE
UNIVERSITY

DESIGN OBJECTIVES

This tool was developed for Robert Bosch's Car Multimedia Division. Like most companies, this division performs various types of on-road testing of their products. One of the on-road testing that needs to be conducted is to detect bugs in their products. The bugs can be detected just by viewing them. However, while driving, the driver cannot (and should not) record bugs that are occurring in their products. In order to make their testing easier and more user-friendly, Bosch gave us the project to design a monitoring system with four cameras that had video recording capabilities. The tool that was designed has the ability to record four different video camera outputs and store them into a USB flash drive, solely at the push of a button by the user. This device also has the ability to concatenate all four video streams into one video file and display that to the user when the flash drive is connected to a computer. This way, the tool allowed the driver to quickly push the record button when he or she observed a bug. The push of the record button allows the last two minutes of the recording to be stored onto the USB flash drive. When the user presses the stop recording button, the recording is stopped and the file is saved onto the flash drive completely. Bosch's main requirements were to:

- Have a 6-7 inch display with HDMI input connected to car
- Record two minute chunks of video
- Concatenate all four video streams into one video
- Have a time stamp on the screen (along with the GPS coordinates on the display).



CAMERA POSITIONS:

- Center stacked display
- Instrument cluster
- Front view of road
- Right side view of road



FINAL PRODUCT/IMPROVEMENTS

Our final prototype had many improvements in hardware and software compared to the previous prototype delivered to Bosch by the previous team. We met almost all of the requirements given to us by our Sponsor; however one to two functions were not accomplished due to time constraints.

For hardware, we added a 7" TFT LCD Touch VGA Monitor with HDMI input. This display has a resolution range from 800x480 to 1920x1440. A new power supply was also designed. This power supply has the ability to be powered by the 12V cigarette lighter in a vehicle. Further, in order to control the display, we have added eight switches by using the Cherry MX mechanical key switches. All the switches are connected to a programmed teensy board. We also designed an enclosure for our whole design so that it is more presentable than just a bundle of wires.

For the software, one of the main improvements was the operating system. We replaced the previous system with a lighter and faster system. A true DVR function is also added to our design. Our system is always recording in the background, and allows the user to save up to five minutes of video by pressing one of the key switches we added. Also, the design can record up to four streams of video and merge them concurrently into one video. We added a feature to allow the user to view the image of each video camera separately, at the push of a button. This helps the user position the cameras to their liking. Further, when the battery is on, the recording device is ready to use. The quality of the video was also improved from the previous prototype. There are, however, a few functions that need to be tweaked and fixed in the future. A user HMI needs to be designed for the screen to show the video file name, current state, and present state of the memory remaining. Some minor bugs may need to be fixed in the future. This project does not need another team to work on it; however it may need a computer science engineer to work on the minor improvements. It would be beneficial if that computer science engineer was good at interface design. The minor tweaks and improvements could easily be done within one month's time.

BEFORE



AFTER



FINAL COSTS

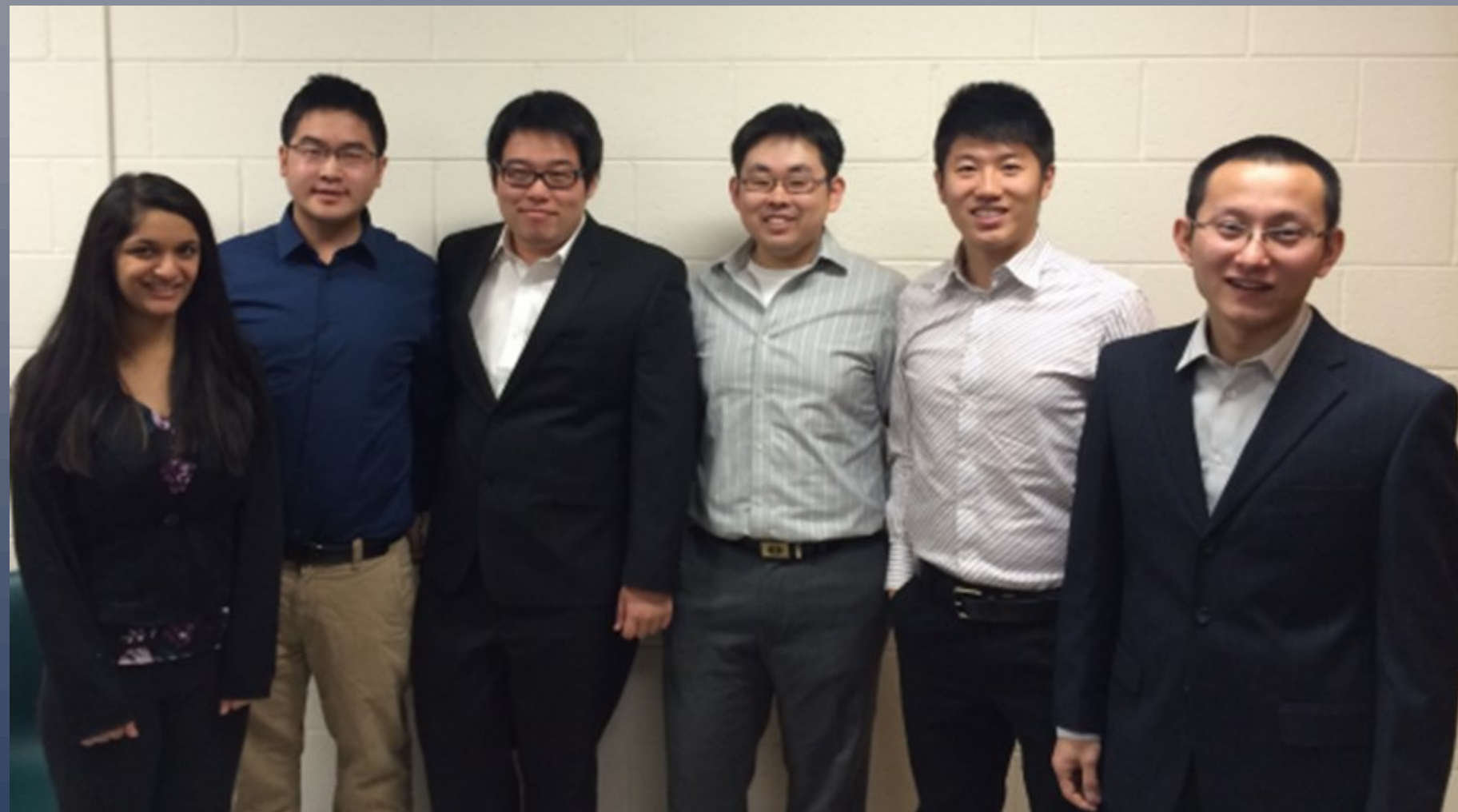
PART	QUANTITY	COST
Kollertron 7inch screen	1	\$154.99
Quick splice connector	1	\$12.04
Coleman cable 14-gauge	1	\$6.59
12V/5A lighted On/off Plug	1	\$5.93
Male Jack DC power adapter	1	\$4.88
Ac to dc adapter car cigarette lighter	1	\$14.99
Cherry MX key switch	12	\$18.00
Key Cap	8	\$9.99
3M Double Side Tape	1	\$4.99
Super Glue	2	\$4.99
Plastic Box	2	\$10.00
Total Cost		\$247.39

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- Mr. Clark Smalley
- Mr. Martin Beeker
- Dr. Robert McGough



Facilitator: Dr. Robert McGough



Left to Right: Radhika Somayya, Jianying Tang, Yan Gong, Xinye Ji, Shengzhe Gao, Kun Zhang



Sponsor: Mr. Clark Smalley

