NoctIR

Your Eyes at Night

Team Members:
Robert Abbott
Westley Anastasio
Patrick Zhao

Mentor:
Ilan Ben-Yaacov

Sponsor:
FLIR

The purpose of our Senior Capstone Project '14 is to take an already existing FLIR product and augment its design to make it more affordable and accessible to the public. The original PathfindIR, which is an aftermarket version of thermal imaging cameras in high-end cars, are expensive and requires a substantial amount of installation due to all the wiring components. Our product will eliminate the cost and issues involved in the wiring and installation process by providing the PathfindIR WiFi capabilities.

The existing PathfindIR system includes a thermal camera connected to the ECU board. The ECU board receives serial video data from the camera which it then processes. The ECU board outputs analog video data.

In our new design for the existing PathfindIR, we will be adding three main components which will be implemented oh a PCB (yellow board in fig. 1) separate from the original ECU board (green board in fig. 1). The first component is the video decoder. The video decoder turns the analog video to a basic digital format. The data from the decoder is then transmitted to a DE0-nano FPGA. The FPGA turns the raw digital data into the YUV video format. The YUV video is then sent to the third component; a Redpine Signals WIFI Direct chip. The WiFi chip then transmits the video data to an Android smartphone.

The three additional components are combined on a single printed circuit board which connects to the ECU board to get the analog video data. The board is referred to as the 'WIFI Board' and it goes in the same enclosure as the ECU board that will sit in the car. The WiFi board has the video decoder and DE0-nano dev board on one side, and the WIFI chip on the other side. The WIFI chip is isolated on one side of the WIFI board to allow the board's ground plane to shield it from interference caused by other electronics in the system. The antenna of the WiFi chip is placed below a plastic FLIR logo to allow transmission of the signal outside of the enclosure.

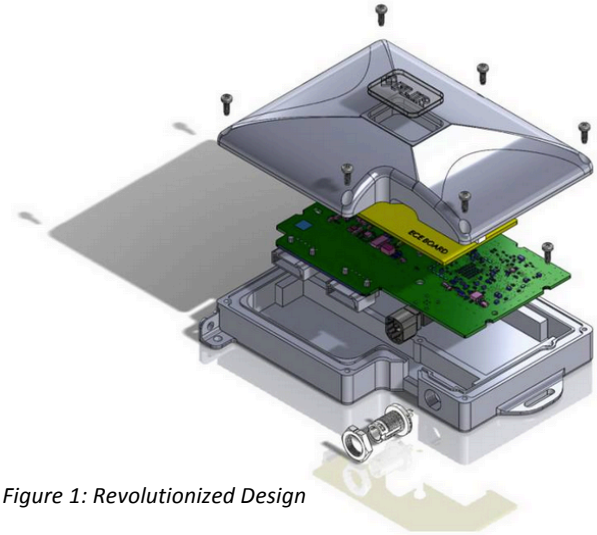

Figure 1: Revolutionized Design

Power to the system is provided by the battery of the car. In the current configuration, the WiFi board will be constantly powered and will control the power flow to the ECU board. Since the WiFi board has miniscule power requirements, leaving it on does not drain the car battery at a significant rate. Recently, it has also been proposed that the WiFi board's power be linked to the ignition of the car, eliminating the battery drain of our device. The hardware for the power system and the ignition power control is actually available on the board design so we foresee that it will be implemented in the prototype.