T-38 Primary Flight Display Prototyping and HIVE Support Abstract & Summary

Avionic Systems Division: The HIVE (Human Integrated Vehicles & Environments) EV3
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ABSTRACT

This fall I worked in EV3 within NASA's Johnson Space Center in The HIVE (Human Integrated Vehicles & Environments). The HIVE is responsible for human in the loop testing, getting new technologies in front of astronauts, operators, and users early in the development cycle to make the interfaces more human friendly. Some projects the HIVE is working on includes user interfaces for future spacecraft, wearables to alert astronauts about important information, and test beds to simulate mock missions.

During my internship I created a prototype for T-38 aircraft displays using LabVIEW, learned how to use microcontrollers, and helped out with other small tasks in the HIVE. The purpose of developing a prototype for T-38 Displays in LabVIEW is to analyze functions of the display such as navigation in a cost and time effective manner. The LabVIEW prototypes allow Ellington Field AOD to easily make adjustments to the display before hardcoding the final product. LabVIEW was used to create a user interface for simulation almost identical to the real aircraft display.

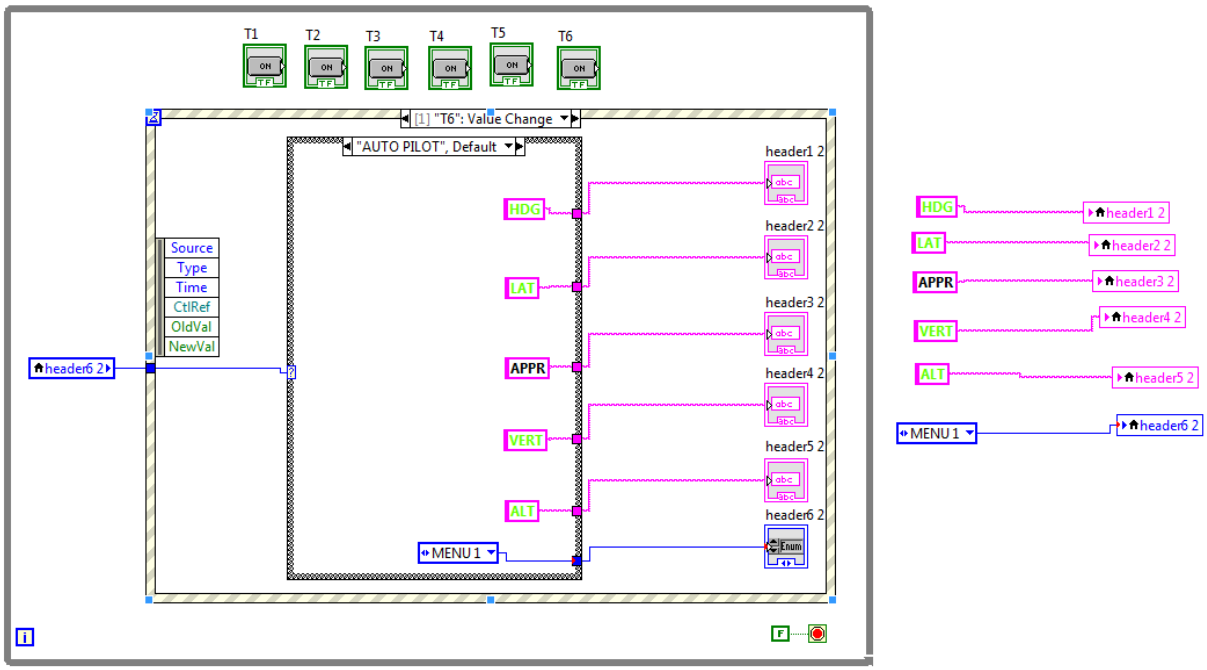
Goals to begin the T-38 PFD (Primary Flight Display) prototype included creating a T-38 PFD hardware display in a software environment, designing navigation for the menu's, incorporating vertical and horizontal navigation bars, and to add a heading bug for compass controls connected to the HSI (Horizontal Situation Indicator). To get started with the project, measurements of the entire display were taken. This enabled an accurate model of the hardware display to be created. Navigation of menu's required some exploration of different buttons on the display. The T-38 simulator and aircraft were used for examining the display. After one piece of the prototype was finished, another trip of to the simulator took place. This was done until all goals for the prototype were complete. Some possible integration ideas for displays in the near future are autopilot selection, touch screen displays, and crew member preferences. Complete navigation, control, and function customization will be achievable once a display is fully developed.

Other than the T-38 prototyping, I spent time learning how to design small circuits and write code for them to function. This was done by adding electronic circuit components to breadboard and microcontroller then writing code to speak to those components through the microcontroller. I went through an Arduino starter kit to build circuits and code software that allowed the hardware to act. This work was planned to assist in a lighting project this fall but another solution was discovered for the lighting project. Other tasks that I assisted with, included hands on work such as mock-up construction/removal, logic analyzer repairs, and soldering with circuits.

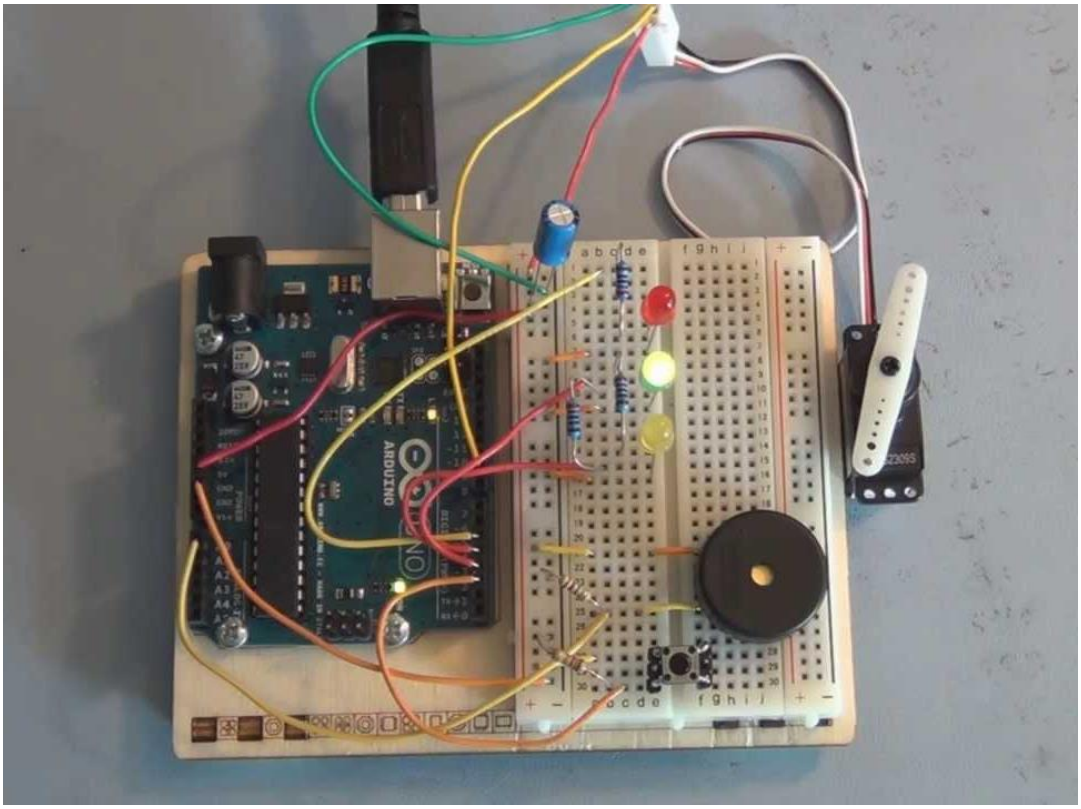
IMPACT OF INTERNSHIP EXPERIENCE ON CAREER The unique opportunity to be involved work with NASA has significantly changed my educational and career goals. This opportunity has only opened the door to my career with engineering. I have learned over the span of this internship

that I am fascinated by the type of work that NASA does. My desire to work in the aerospace industry has increased immensely. I hope to return to NASA to be more involved in the advancement of science, engineering, and spaceflight. My interests for my future education and career lie in NASA's work - pioneering the future in space exploration, scientific discovery and aeronautics research.

Current Status on T-38 Evaluation Software



Code in LabVIEW for T-38 Evaluation Prototyping



Arduino Microcontroller Project