HIGH ALTITUDE LIQUID ENGINE: VIDEO AND DATA PROCESSING

Video and Data Streaming Processes: Enabling the efficient and streamlined storage of sensor data, and streaming of video

Figure 1: Team Logo

SENSOR DATA STORAGE

While engine test operations are being conducted by the HALE team, data is collected from various sensors affixed to the test apparatus. The data consists of readings from temperature, pressure, and flow-rate sensors.

This data goes through the following pipeline in order to be stored in an API-accessible database:

Figure 2: Sensor Data Storage Pipeline

- The sensor data interface is a program that acquires sensor data from the LabView control system over an open websocket
- The API is a NODE.js RESTful webserivce that acts as an interface to the database. It allows programs to send GET and POST requests to fetch and store sensor data respectively. The endpoints are as follows:

  GET /readings/:startDate?/:endDate?

  POST /readings
- The database is an instance of a MongoDB database. It contains a singular collection that stores the sensor data called “Readings”

Base 11 Space Challenge

Oregon State University American Institute of Aeronautics and Astronautics is currently competing in the Base 11 Space Challenge. A $1 Million prize will be awarded to the first institution that is able to "put a single stage liquid bi-prop rocket in space by the end of 2021" [1].

The engine being developed by OSU AIAA needs to be meticulously tested under many circumstances before it will eventually be launched. In order to aid in the tests, an apparatus known as the test stand has been built. The test stand is a rack that the engine can be mounted on that includes plumbing for the various fuels, sensors to collect data, and various other control systems. The test stand is located at the OSU Propulsion Lab (P-Lab).

Liquid Engine Testing

While tests are underway, only a few people are permitted to be at the P-Lab due to safety regulations. There is a closed-circuit camera system that is used to view various angles of the test stand while tests are underway, but the live footage is only available in the P-Lab.

Additionally, there is pressure, temperature, and flow-rate data collected by various sensors on the test stand while tests are underway. The data is written to .tdms files on a local network share in the P-Lab.

ACKNOWLEDGEMENTS

Team members:
Taylor Griffin - griftayl@oregonstat.edu
Duncan Hunter - hunterdu@oregonstate.edu

Client: Dr. Nancy Squires of Oregon State University AIAA - Nancy.Squires@oregonstate.edu

CAPTURE AND STREAM

On-site at the OSU propulsion lab the engine test will be captured by a series of IP-Addressed CCTV Cameras which feed in through an NVR. Our machine is designed to record or “capture” the video from the cameras and then transmit or “stream” the video to a viewing platform. In this case, the video platform we are using will be Youtube.

The “Capture Rig” is the hardware that the capture and broadcast software will run off of. We are first using a Blackmagic Design Intensity Shuttle USB 3.0 to intercept the video signal from the NVR which collects the CCTV Camera feed and then pass that video out via the Open Broadcasting Software (OBS) which has built-in functionality with the Blackmagic Design Intensity Shuttle USB 3.0 and YouTube. We chose YouTube as our viewing platform because of its dependability and ease of setup in the future.

Youtube has built-in features to receive live video from OBS as such it is ideal for easy set up in the future other HALE club members.