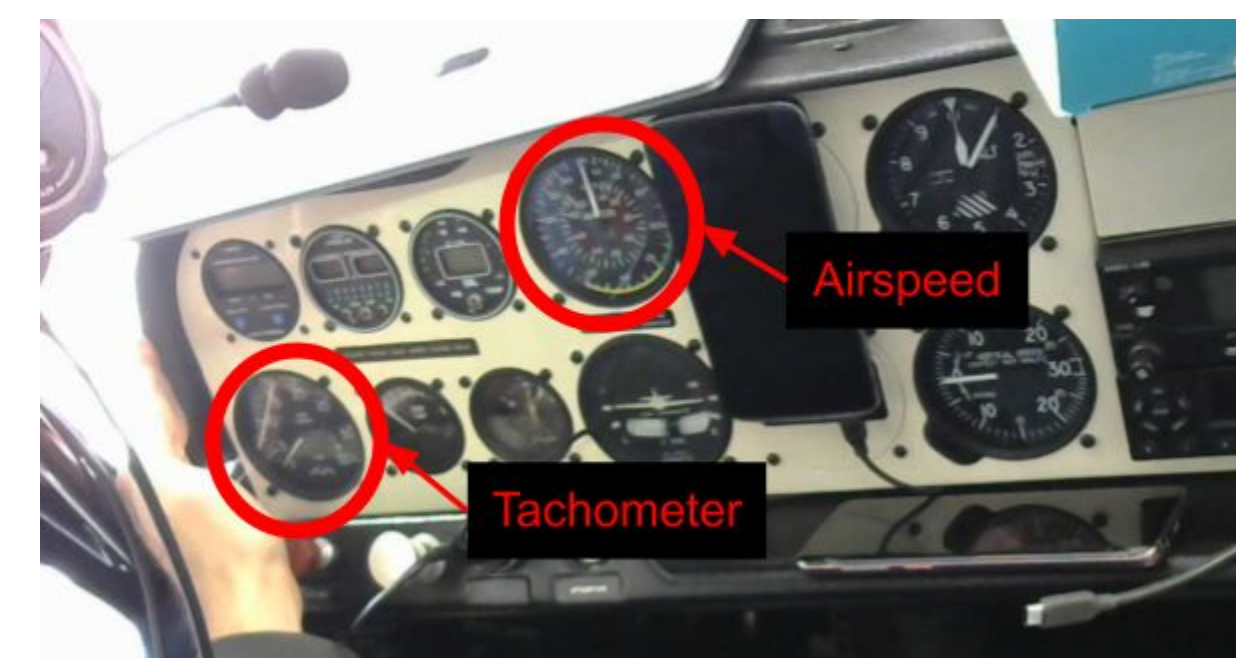# Aerobatic Flight Recorder

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Project Motivation

Aerobatic pilots perform amazing feats of airmanship in air shows and aerobatic competitions. However, aerobatic planes often do not come with flight recording equipment, and pilots are unable to record and replay the telemetry of their flights.

Implementation

Hardware:

- GPS – latitude & longitude
- IMU – acceleration
- Dashboard Camera
- Control Input Camera
- Raspberry Pi
- LEDs & Buttons
- Touch Screen

Functionality:

- Calibrate camera positions
- Start & stop data recording
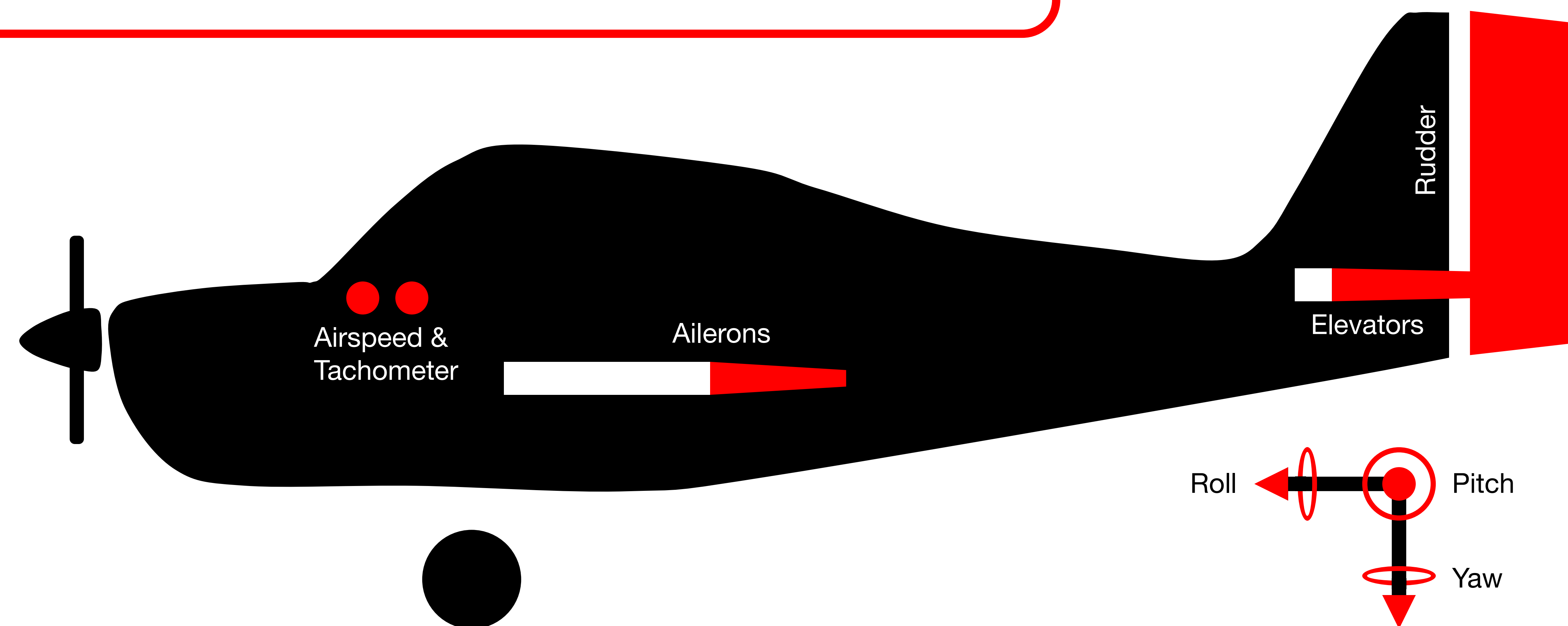- Produce a .FDR (Flight Data Recorder) file that can be visualized using X-Plane 11

Airspeed and Tachometer

Classical computer vision techniques are used to read the values of the airspeed and tachometer dials from an RGB video stream.

Position and Orientation

GPS and IMU data are combined using Kalman filtering to track the position and heading of the plane.

Airspeed & Tachometer   Ailerons   Rudder   Elevators

Roll   Pitch   Yaw

Control Surfaces

The elevators (at the rear of the plane) and ailerons (in the wings) affect the pitch and roll of the plane respectively, and are controlled by the flight stick.

The rudder affects the yaw, and is attached to the rudder cables controlled by the rudder pedals.
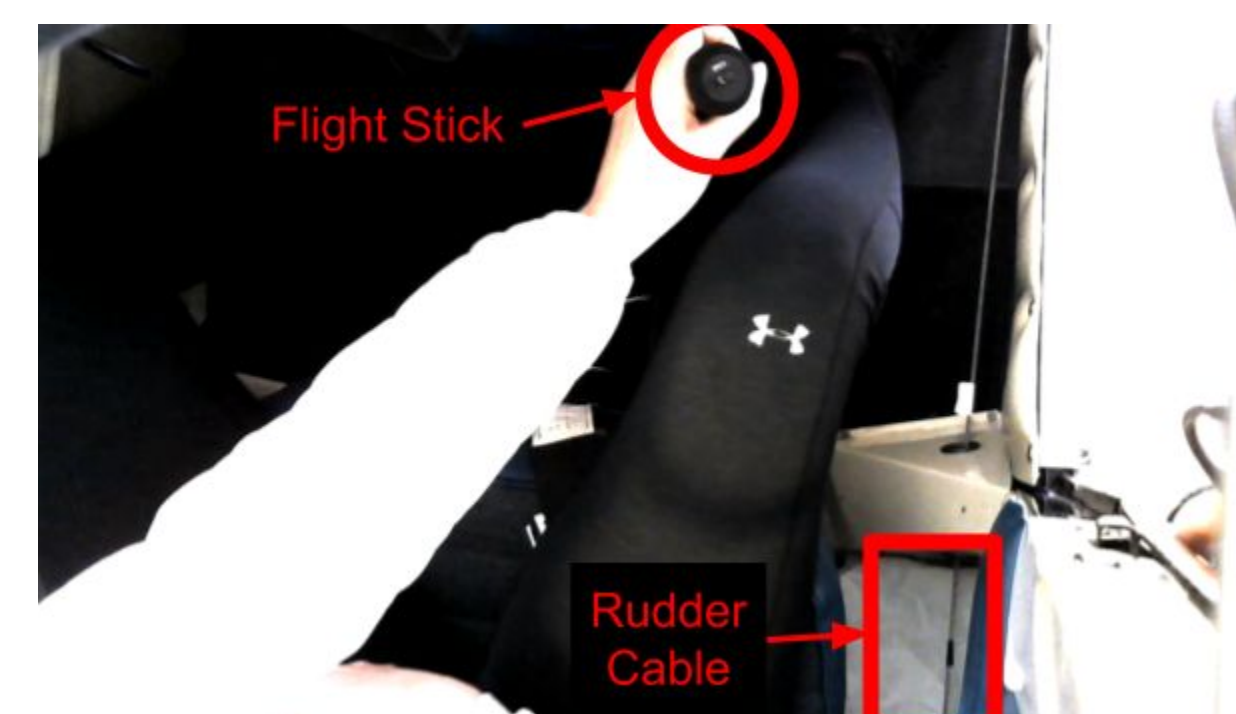
Future Work

- Improve data filtering & smoothing by including pilot input in the data model
- Extend the image processing algorithms to work from different camera angles
- Update the user interface to include more configuration options