Modelling, Interfacing and Visualisation of Saab 340B G-NFLB Aircraft

Technical Summary

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1 Abstract

The development of a complete simulation environment for the Saab 340B G-NFLB aircraft is the goal of this project. The part of this Individual research project in fulfilling the goal was divided in three phases.

Phase 1 : The development of a three dimensional model of the aircraft

The initial work for the development of a three dimensional model was carried out by gathering measurement and dimension data of the aircraft. The open source blue prints of the aircraft were measured using plot digitisation measurement technique. The collected data was compared with JANES aircraft data for Saab340 to verify the accuracy of measurements. As a result of comparison, a good level data similarity was observed. Therefore, the modelling work was carried out by dividing the aircraft into major external parts using an open source 3D modelling software Blender and then the parts were named & assembled in AC3D which is an open source 3D modelling software to generate a compatible geometry for the open source Flight simulation software used on this project.

Phase 2: Integration of the graphical model & Flight control joystick with the mathematical model developed in MATLAB® & Simulink® environment

The geometrical model of the aircraft was brought to life by integrating it with the mathematical model. The mathematical model was developed in parallel to recreate the behaviour aircraft using the six degree-of-freedom (6DOF) block available in the aerospace toolbox of the Simulink® library by Mr. Sarth Patel of Cranfield University. The integration of the Flight control joystick meant that the control commands will be used to calculate the forces generated due to control surface deflections. The output from the mathematical model consisted of 6 major parameters, three of which related to the position of the aircraft (Latitude, longitude & altitude) and three relating the motions along the 3 axes (Roll, pitch and & yaw).

Phase 3: Visualisation of the aircraft using an open source flight simulation software

The behaviour of the aircraft in response to various control inputs had to be visualised graphically. This was achieved by integrating the mathematical model with the FligthGear flight simulator. This is an open source Flight simulation software. The 6 parametric outputs from the Simulink® model were used as an input to FligthGear. Also, The geometric model of the air-

craft was integrated with the software. XML language was used to define the geometry in the simulation environment. Similarly, the systems, the instruments, animations and viewing points for the simulation were created. The cockpit and the interior of the aircraft will require further work to create detailed geometrical features of the aircraft.

2 Reference images

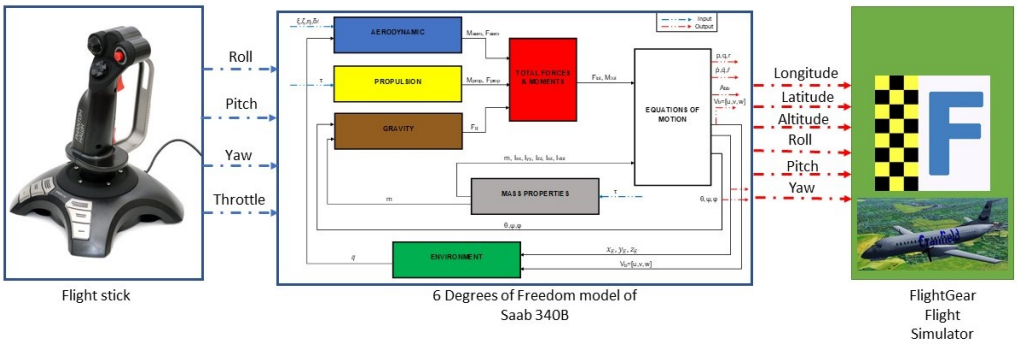

Figure 1: Data flow diagram

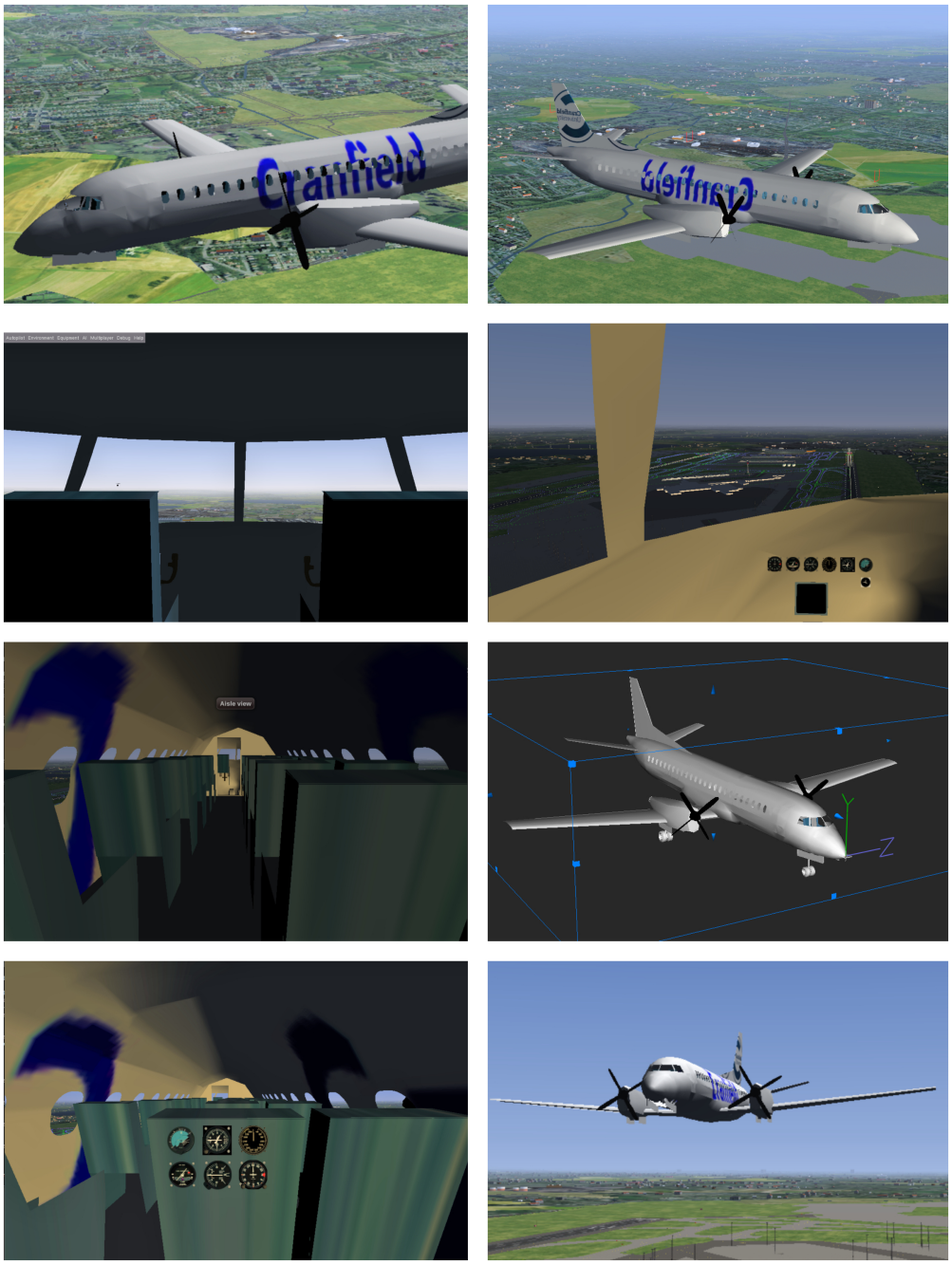

Figure 2: Aircraft Geometry and Visualisation