

Testing Quick Reference Handbooks in Flight Simulators

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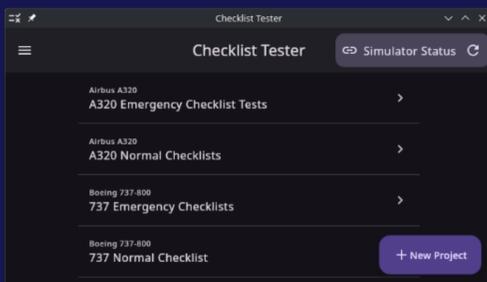
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Problem

Safety is important in aviation, and there are countless of faults that could happen during a flight. Which is why checklists are created to help pilots get safety critical steps right in unexpected events and to get the situation under control.

Solution

An application that connects to X-Plane and runs checklists, whilst getting statistics from the flight simulator to provide a result on how well the checklist performed. The application allows to create and manage checklists, and store the results of tests that were run for those procedures.



Architecture

A variety of tools has been used to provide ease of use and to provide formal verification. This has been designed to be able to run on as many desktop computers as possible. As a result, there are two logical sections to this, the formal model and the connector.

The formal model is created using **VDM-SL**, which provides the logic for running through the checklists and makes sure that the checklists are completed in a valid manner.

With the formal model, the connector provides a user interface using **Compose Multiplatform**, allowing the input of checklists, which get saved in a **SQLite** database, and to run the tests by linking the formal model and the flight simulator using NASA's **X-Plane Connect Toolbox**.



Aim

To test checklists for flaws that could compromise the safety of the aircraft by checking that the checklist can be completed within a reasonable amount of and the reproducibility of the checklist's outcome.

Objectives

1. Research current checklists that are testable and may be problematic
2. Implement a formal model that runs through checklists
3. Produce a front end application to input and run checklists
4. Connect the formal model, front end application, and flight simulator to allow for a more accurate representation of aircraft systems and flight conditions

Features

- Front end application to run checklists in a flight simulator automatically
- Create projects and checklists that gets saved locally
- Tracks how each item in the checklist performed in the simulator
- VDMJ interpreter built into the application
- Compatible with Windows, macOS, and Linux

Future Development

1. Add an AI pilot that can fly the aircraft
2. Implement support for other flight simulators like Prepar3D
3. Add pre-defined aircrafts to the application to simplify inputting checklists
4. Research pilot reaction times to implement more variables for checklists to be tested on