Software Requirements Specification

Project: Primary Flight Display (PFD)

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1 Introduction

Type: Section

1.1 Purpose

[SRS-2] The purpose of this project is to make a detailed SRS about the Primary Flight Display. The PFD has three subsystems or components which are User Interface, Data Layer, and the Network Component. The PFD is one of the most important tools that a pilot can access during his flight and any discrepancy or errors could be life-threatening for everyone on board. It is mission critical that the PFD is thoroughly vetted, tested, and detailed in the requirements specifications below.

Type: Section

1.2 Product functions

[SRS-14] The main function of the Primary Flight Display is to provide the pilot with crucial information about the avionics and flightpath. Raw data points such as the airspeed and heading every 500ms are displayed for the pilot to use as a tool to gauge the safety of the flightpath. The product function starts at the Network Components which are the instrumentation picking up the raw data. From the Network Components, the raw data is sent to the Data Layer which will parse out this data for easier reading. The clean data will be sent from the Data Layer to the User Interface so that the pilot can see the different gauges for the aircraft.

Type: Section

1.3 Definitions

[SRS-18] Primary Flight Display - This is an avionics interface that pilots use to gauge data on the flightpath and the plane itself

User Interface - Display data to the end user

Data Layer - Receives, filters, aggregates, stores, and provides clean data

Network Component - Receives raw data from sensors (e.g. airspeed, heading)

Knots - 1.15 miles per hour

Pitch - The direction of the nose or tail of the aircraft, not the direction it is heading in

Altitude - How high an aircraft is from sea-level which starts at 0 feet

Type: Section

1.4 Acronyms and abbreviations

[SRS-19] PFD - Primary Flight Display

SYS - Software Requirements Specification

SUBSYS - Subsystem Software Requirements Specification

REQ - Requirement

NC - Network Component

DL - Data Layer

UI - User Interface

Type: Section

2 Requirements

Type: Section

2.1 SYS: Primary Flight Display (PFD)

- **REQ-PFD1**: The PFD shall provide an indication of the aircrafts current airspeed.
    - This requirement would be implemented in the User Interface SUBSYS because it is showing the airspeed on the PFD to the pilot.
    - The end user, pilots, will only see the airspeed on the User Interface and not the Data Layer or the Network Component.
- **REQ-PFD2**: The PFD shall log the aircraft's current heading every 500 milliseconds.
    - This requirement would be implemented in the Data Layer SUBSYS because it is logging the aircraft's current heading every 500 milliseconds.
    - The aircraft's current heading is stored in the Data Layer once it has been received from the Network Component.

[SRS-21]

Type: Functional Requirement

2.2 SUBSYS: Network Component

[SRS-22]

- **REQ-NC1:** The Network Component shall receive the aircraft's current airspeed from sensors in the form of raw data.
- **REQ-NC2:** The Network Component shall send the aircraft's current airspeed in the form of raw data to the Data Layer.
- **REQ-NC3:** The Network Component shall receive the aircraft's current heading every 500 milliseconds from sensors in the form of raw data.
- **REQ-NC2:** The Network Component shall send the aircraft's current heading in the form of raw data to the Data Layer.

Type: Functional Requirement

2.3 SUBSYS: Data Layer

[SRS-23]

- **REQ-DL1:** The Data Layer shall receive, filter, aggregate, store, and provide the aircraft's current airspeed from the Network Components **(***Trace Link* **REQ-PFD1)**
- **REQ-DL2**: The Data Layer shall receive, filter, aggregate, store, and provide the aircraft's current heading every 500 milliseconds.
- **REQ-DL3:** The Data Layer shall provide the aircraft's current altitude as a filtered integral value.
    - **REQ-DL4:** The Data Layer shall log the aircraft's current altitude in the range from 0 feet to 50,000 feet.
        - Commercial airliners mostly fly between 33,000 feet and 42,000 feet which means that the range does not have to exceed 50,000 feet.
    - **REQ-DL5:** The Data Layer shall filter the aircraft's current altitude to feet from the raw data.
- **REQ-DL6:** The Data Layer shall provide a boolean value indicating whether the aircraft's current pitch is excessive based on a user-configurable threshold.
    - **REQ-DL7:** The Data Layer shall provide the PFD with a Boolean value of "Safe pitch" and "NOT SAFE pitch" after it has determined this from the heading.
- **REQ-DL8:** The Data Layer will filter the aircraft's heading Boolean value using hysteresis so that the indication doesn't continuously flash "Safe Pitch" and "NOT SAFE Pitch"
- **REQ-DL9:** The Data Layer will filter the aircraft's altitude using a Moving Average so that the altitude doesn't continuously fluctuate up or down by 1 foot.

Type: Functional Requirement

2.4 SUBSYS: User Interface

[SRS-24]

- **REQ-UI1**: The User Interface shall provide an indication of the aircrafts current airspeed. **(***Trace Link* **REQ-PFD1)**
    - **REQ-UI2:** The User Interface shall display the aircraft's current airspeed in knots
        - Example: User Interface shows that the aircraft is currently going 530 knots
- **REQ-UI3:** The User Interface shall provide an indication of the aircrafts current heading.
    - **REQ-UI4:** The User Interface shall display the aircrafts current heading in compass directions such as North, South, East, West.
        - Example: PFD shows that the aircraft is currently heading Northbound which means that the nose is pointed toward the sky.

Type: Interface Requirement