DPR (Detailed Project Report)

**PBA FAULT SECTION IDENTIFICATION**

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5. **Introduction:**

This project is developed to address one of the major issues faced in aerospace testing & manufacturing industry. It is a long continuous process to inspect each section and component of a circuit board and fix the complete system and deliver it to customer so to avoid this long process, aerospace companies replace the complete circuit board. Hence this created a pile of hardware inventory which awaits a long queue to reach the testing and fixing stage.

This is an in-house project proposed to predict the issues in various kinds of circuit boards and provide support to technical team to identify the faulty sections in the board and let them fix in less time and thereby deliver the refurbished product to customer in time and save huge amount of time and money.

* 1. **Objective**

The objective of the project is to identify/predict the faulty sections in the PBA (Printed Board Assembly) of aircraft section by making use of the available database with already fixed circuit boards and their resolution information.

* 1. **features of the system**

The system is developed to identify the faults in the PBAs from various systems of aircraft such as VCRU (Vapor Cycle Refrigeration system), SRADA (Smart Ram Air Door Actuator), CDM (coolant distribution module) & PMMC (permanent magnet motor controller) individually. Hence the system has to train the model separately for each system of aircraft separately.

* 1. **feasibility study**

This a VPD pilot project and the feasibility was studied based on the expertise from the technical team.

* 1. **scope of the system**

The system scope is to develop a machine model which identify the faulty sections in a PBA given the information such as error messages, alarms, warnings and faults that were logged, faulty sections identified during testing of other PBAs from past.

1. **Detailed Summary**
   1. **Proposed System**

PBA is generally partitioned in to various sections such as load section, interface section etc and when the boards stops functioning or goes bad then it is removed from service. The PBA then undergoes full diagnosis from section by section until the testing team finds out which section has exactly has the problem. After that a separate team or the same team will fix the circuitry and send it back to service.

As part of above exercise the previous PBA testing data is collected and provided to us. The PBA datasets has following information:

The list of error messages/faults occurred before PBA was removed from service

The readings of certain monitor parameters of the PBA

The results of the diagnosis pointing out the section that went faulty in the PBA

Example:

Load section

Power source section

Controller section

Interface section

Safety section

Controls section

Matrix section

Monitoring section

etc

So the objective is to develop a machine model to indentify the faulty section of the PBA given the list of other details of the PBA. So each section of the PBA shall be given a label (number) and then train the machine model with all the features available and develop the predicting model. The proposal is to clean-up the datasets and arrange them as per our requirement and develop machine models for each type of PBAs.

* 1. **Dataflow Diagram**

1. **System Specification**
   1. Hardware requirements:

The output expected by the technical team has to be clearly described.

The expected result shall be available as output in the provided datasets.

* 1. Software Requirements

Perform the coding in python to develop the machine model

Develop individual models for each type of circuit boards

Provide a summary of output about the sections that has gone bad

1. **Implementation**

Following steps are performed in sequence

* 1. Exporting the database
  2. Performed data pre-processing
     1. Identified & dealt with null values
     2. Performed standard scalar
     3. Scaled down the values
  3. Perform EDA and identified outliers
  4. Selecting a model
     1. Decision Tree was selected
  5. Model development
     1. Training the model
     2. Testing the model
     3. Validating the model