**Project Initialization and Planning Phase**

|  |  |
| --- | --- |
| Date | 19 June 2025 |
| Team ID | SWTID1749821186 |
| Project Title | Enhancing Product Reliability: Leveraging Transfer Learning for Fault Detection |
| Maximum Marks | 3 Marks |

**Project Proposal**

|  |  |
| --- | --- |
| **Project Overview** | |
| Objective | To automate the detection of casting defects in manufacturing products using a deep learning model integrated into a web-based interface. |
| Scope | The project focuses on binary classification of casting products (defective vs. Good) using image data. It includes model training, evaluation and deployment through Flask-based web application. |
| **Problem Statement** | |
| Description | Manual inspection of casting products is time-consuming, inconsistent and prone to human error. This can lead to undetected defects, rejected orders and financial losses in manufacturing. |
| Impact | Automating the inspection process improves accuracy, reduces inspection time, minimizes human error and helps maintain product quality ultimately reducing waste and increasing customer satisfaction. |
| **Proposed Solution** | |
| Approach | Use transfer learning to classify casting product images. The trained model is deployed via a Flask web app, allowing users to upload images for prediction. |
| Key Features | * Deep learning model trained on real industrial casting data * Binary classification: detects defective vs. good products * Transfer learning for efficient training * Flask-based web application for real-time image prediction * Tailwind CSS for responsive and modern UI * Upload form with error handling and result display * Modular structure for easy maintenance and scalability |

**Resource Requirements**

|  |  |  |
| --- | --- | --- |
| **Resource Type** | **Description** | **Specification/Allocation** |
| **Hardware** | | |
| Computing Resources | CPU/GPU for model training | 2 x NVIDIA V100 GPUs or equaivalent |
| Memory | RAM for training and inference | 8 GB RAM |
| Storage | Disk space for data and models | 1 TB SSD |
| **Software** | | |
| Frameworks | Python web framework | Flask |
| Libraries | Deep learning and utilities | Tensorflow, Keras, Numpy, PIL |
| Development Environment | IDE and version control | Google colab, VS code, Git |
| **Data** | | |
| Data | Source, size and format | Kaggle dataset, 7348 images |