3002 Final Project

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Project Title

AI-Based Detection and 3D Visualization of rust and cracks in Motors using TensorFlow and Python.

Aim:

Develop an AI system to detect rust and cracks in motors and visualize these defects on 3D models.

Objectives:

1. Collect and preprocess image data of motors (normal, rusted and cracked)
2. Get rid of corrupted images
3. Train convolutional neural network (CNN) using Tensorflow and Keras.
4. Integrate the results into 3D motor model (recommended by supervisor)
5. Produce working prototype demonstrating both detection and visualization

Methodology

1. Data Preparation
    - Collect datasets (custom csv files or images)
    - Annotate damage areas
    - Apply preprocessing and augmentation

2. AI Model Development
    - Implement a CNN model using Tensorflow/Keras
    - Train and validate
    - Compare model performance (accuracy, precision, recall , F1 score) with sklearn

3. 3D Modelling and Visualization
    - Import a 3D motor model
    - Map detected regions onto 3D mesh (opencv)
    - Highlight damaged areas visually (red boxes)

4. Evaluation
    - Test system on unseen images or scans
    - Gather feedback from supervisor

Expected Outcomes:

- A well trained AI model capable of detecting surface defects
- A visual 3D representation of a motor showing areas of rust/cracks

Potential Challenges

- Time management
- Limited availability of labelled defect images
- Time-intensive model training and 3D integration

Resources Required

- Python, Tensorflow (Keras, OpenCV)
- Image dataset of motors
- 3D Visualization
- Github for VCS
- Time

This project will be recorded on Github RotorAI, https://github.com/ZEHUEI/RotorAI

If Github not accessible, https://ze-huei.vercel.app/ then click on Github Icon.