To,

IITD-AIA Foundation of Smart Manufacturing

Subject: **Weekly Progress Report for Week 1**

Dear Sir,

Based on my understanding and the topics covered, I have prepared the following progress report that addresses the relevant objectives of the project.

What happened last week – Week0 :

- Gaining a deeper understanding about the libraries like NumPy, Pandas and Matplotlib
- OpenCV implementation
- Image Processing
- Object Detection.
- Convolution operations and CNN architectures

What's happening this week – W1:

- Deep Learning in Computer Vision Basics
- Convolution operation, padding, strided convolutions, and convolutions over three-dimensional volumes.
- Learned about OpenCV and Pillow.
- Image manipulation with Pillow and OpenCV, Pixel Transformations, Geometric Operations.
- Tenosrflow Data Input Pipeline.

Weekly Progress:

June 05:

I am primarily focused on acquiring a strong understanding of the concepts related to the project.

I am exploring research papers to gain a basic approach on how to solve defects in PCB using computer vision.

I have been practicing similar defect detection projects on Kaggle to enhance my skills and knowledge in this domain.

June 06:

Learned about machine learning libraries like Tesnsorflow, scikit-learn. Tensorflow provides a flexible framework for building and training neural networks.scikit-learn It offers implementations of popular machine learning algorithms, such as decision trees, support vector machines, random forests, and neural networks.

June 07:

Learned about KNN for object recognition. KNN can be used for image classification tasks. Given a new image, KNN classifies it by comparing it with the labeled images in the training dataset. It calculates the distance between the new image and the training images and assigns the class label based on the majority vote of the K nearest neighbors.

June 08:

Today I learned the basics of Convolutional Neural Networks. I focused on learning key concepts such as the convolution operation, padding, strided convolutions, and convolutions over three-dimensional volumes.

I revisited some important topics in machine learning like Supervised learning, Unsupervised learning, Feature extraction and selection, Model evaluation, Overfitting and underfitting.

I started by exploring OpenCV. I learned how to load images, apply various filters, perform image transformations.

June 09:

Then I started learning about Pillow ,a library present in python. It allowed me to perform a wide range of image operations, such as cropping, resizing, rotating, and adjusting image properties like brightness, contrast, and saturation. It provided a interface to handle images effectively.

Implementation:

Using both of this OpenCV and Pillow, I was able to accomplish complex tasks, including image restoration, noise reduction.

June 10:

I learned about Image manipulation with Pillow and OpenCV, Pixel Transformations, Geometric Operations.

Discovered a similar dataset on Kaggle and resize all of the images within it.

June 11:

Learned about Tenosrflow Data Input Pipeline.Also explored about Image classification using CNN. Before applying my knowledge to the actual dataset, I gained hands-on experience by practicing what I had learned on a similar dataset.

Plotted the image with the labels (Perfect and defected).