 Students’ Placement Office, IIT Kanpur

**Project Verification Form**

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| **Title of the Project** | Vision based inspection using CNN |
| **Commencement Date** | 12-08-23 |
| **Completion Date** | 28-10-23 |
| **Project Supervisor** | Prof. Mohit Law |
| **Organization/Institution where the Project was accomplished** | IIT Kanpur |
| **Project Description** (You can use extra A4 sheets in case you run out of space however the extra sheets should  also have the seal & signature of the Project Supervisor or the relevant authority ) | |
| The project is aimed to create solutions for industries in terms of reducing human involvement in repetitive but time-taking task of inspection of the manufactured items. This is accomplished using Convolutional Neural Networks through which an object can be inspected within milliseconds. The details of the project are-  **Developed an Autoencoder-based Anomaly Detection System**:   * **Approach**: Built and fine-tuned a deep autoencoder model using Keras, designed with multiple convolutional layers for both encoding and decoding stages. Trained the model exclusively on normal images to ensure accurate anomaly detection through reconstruction errors. Generated dataset of normal and anomalous images using different lighting conditions, texture orientation using Blender to for better learning of model. * **Impact**: Achieved significant reduction in mean reconstruction error for normal images (~0.018), effectively establishing a robust threshold (0.05) for anomaly detection. * **Results**: The model consistently classified anomalous images with high accuracy of 98.8%, significantly improving early fault detection capabilities. * **Technical Implementation**: Utilized a large dataset of images resized to 768x768 pixels, implemented 5-layer deep convolutional architecture, and trained the model over 25 epochs with a batch size of 32. * **Performance Metrics**: Loss function stabilized towards the end of training, indicating effective learning. Used MSE as the metric. The project demonstrated the potential of deep learning for real-time anomaly detection in image datasets.   **Tools & Technologies**: Python, TensorFlow, Keras, Autoencoders, Convolutional Neural Networks (CNNs). | |

**By appending your signatures to this form you acknowledge and agree that:**

* This form along with the certificate would serve as the official document between the project supervisor and Students Placement Office, IIT Kanpur regarding verification of the student’s project worThe student will provide additional information and documentation relevant to his/her project upon request by

the Students’ Placement Office

* The student has clearly defined his/her individual role in projects done in cooperation with other students, faculty, groups or company personnel.
* Incorrectly over-stating the reach, impact and/or quantitative/qualitative results of a project is unethical.
* In case of violation of any of the above rules, Students’ Placement Office, IIT Kanpur reserves the right to take necessary action including de-registering the student from the placement season and reporting the misconduct to the Institute Authorities.

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| **Submitted by:-** | **Project Supervisor Details:-** |
| Name: Medha Srivastava | Name: Prof. Mohit Law |
| Roll No: 210603 | Designation: Associate Professor |
| Signature: | Signature: |