

**Project Design Phase-I**  
**Proposed Solution Template**

Date	19 September 2022
Team ID	PNT2022TMID45729
Project Name	Project - A novel Method For Handwritten Digit Recognition System.
Maximum Marks	2 Marks

**Proposed Solution Template:**

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Handwriting recognition is one of the compelling research works going on because every individual in this world has their own style of writing. It is the capability of the computer to identify and understand handwritten digits or characters automatically. Because of the progress in the field of science and technology, everything is being digitized to reduce human effort. Hence, there comes a need for handwritten digit recognition in many real-time applications. The user interacts with the UI (User Interface) to upload the image as input. The uploaded image is analyzed by the model which is integrated. Once the model analyses the uploaded image, the prediction is showcased on the UI.
2.	Idea / Solution description	Convolutional Neural Networks (CNN) has become one of the most appealing approaches and has been an ultimate factor in a variety of recent success and challenging machine learning applications. In our model we use <b>AlexNet</b> , which is one of the CNN architectures . AlexNet allows for multi-GPU training by putting half of the model's neurons on one GPU and the other half on another GPU. Not only does this mean that a bigger model can be trained, but it also cuts down on the training time. It also reduces the overfitting problem by Data Augmentation and Dropout.
3.	Novelty / Uniqueness	Handwritten Digit Recognition is the capability of a computer to fete the mortal handwritten integers from different sources like images, papers,touch defenses, etc. And classify them into 10 predefined classes(0-9).This is the existing method along with this we add some features to make our project unique among them.
4.	Social Impact / Customer Satisfaction	Even the unclear or blurred digits can be recognized after the removal of noise and data preprocessing .One such application is a handwritten digit recognition system that can be used in postal mail sorting, bank check processing, form data entry, etc.,

5.	Business Model (Revenue Model)	<p>Handwritten digit recognition is necessary because everything is digitalized. The benefits of handwritten digit recognizer is high. In the banking sector, it is very efficient. It is used to recognize the figures written on cheques. So, Varied handwriting of each and every person in the cheque can be identified.</p> <p>Handwritten addresses are difficult to sort by machine, not necessarily because of sloppy handwriting, but because people write all over the envelope. We have hard time segmenting handwritten addresses into their components, such as ZIP code or street address, because very few people print addresses neatly in a prescribed format. So, this problem can be solved using Handwritten digit recognition system.</p>
6.	Scalability of the Solution	<p>In our model, AlexNet significantly outperformed as it is trained on a GTX 580 GPU with only 3 GB of memory which couldn't fit the entire network. So the network was split across 2 GPUs, with half of the neurons (feature maps) on each GPU. So, a greater accuracy can be attained by allowing multi-GPU training by putting half of the model's neurons on one GPU and the other half on another GPU.</p>