**SE Project Proposal Spring 2021**

Project Title:

Abstract/Introduction (~250 words)

Problem Statement

Solution

Techniques that will be used (e.g., Java)

Product Features

**Project Title**

**DigiKalam**

**Abstract**

The pandemic and lockdown have led to many hardships in the society. One of the major victims has been the education system. The conventional way of teaching and learning is not possible to replicate completely in the virtual mode. This issue is a much bigger problem for people living in remote areas with lack of resources and infrastructure for hosting online classes. Our aim with this project is to help the various stakeholders – teachers, students, schools – with one of the major problems that they face – holding effective virtual classes.

By providing an easily accessible, light on requirements, and efficient system that will allow teachers to write on a plain white sheet of paper and record it with a smartphone camera our platform would display the handwritten notes to the students, in real-time, as if they have been written using a stylus on a digital pen tablet. Based on image processing algorithms our web application takes in image sequences extracted from live video as input and digitizes and vectorizes in real-time to display it on the screen at students end. We plan to integrate the system with all the major online class hosting platforms such as MS Teams and Zoom to decrease the overhead of using multiple services and making the entire process frictionless.

**Problem Statement**

Many subjects such as math and science cannot be taught effectively by slides and other static content. Though there are many forms of dynamic e-learning content available on the internet such as animation and quiz-based-learning, they take away the interactive and human nature of education and it is often not feasible to make them for every other concept due to time and money issues. While there are gadgets and software available that let the users digitize their writing and give live classes; they are often too expensive and require a certain amount of technical expertise.

**Solution**

DigiKalam solves this problem by eliminating the need of specialized hardware, making it accessible for faculty and students that are not of technical background or cannot afford the hardware solutions. By using a pen, paper and an ordinary smartphone the user would be able to make their handwritten notes digitized and vectorized through our platform. The live video feed from the user’s smartphone that captures their handwriting will be processed as a sequence of image from things like which change in the background, colour and strokes will be extracted, stored and displayed until the next set of images are processed. The platform will also provide the users additional features that are not possible or very demanding using paper-pen. These are features like choosing the colour, size and boldness of the strokes, erasing parts of the screen and many more. With the integration of our system with popular video conferencing platforms like MS-Teams and Zoom the users will be able to use DigiKalam with what they are comfortable with.

**Techniques Used**

DigiKalam has two parts that will be implemented separately

1) Realtime Image processing and computing

DigiKalam’s computing part would rely on Python and its associated libraries for e.g., SciPy, matplotlib etc. We would be using OpenCV for image and video processing

2) Writing canvas and web-platform hosting

For this we would be using ReactJS for developing the frontend of the website, NodeJS and Express JS for development of the backend and MongoDB for the database

**Product Features**

DigiKalam would have the following features:

1. Realtime paper-pen to digital handwritten note making and live broadcasting
2. Integration with popular online video conferencing solutions (MS-Teams, Zoom, etc.)
3. Greater control over the appearance of the notes relative to just using pen-and-paper with features like colour picker, writing instrument choices (pen, pencil, brushes, etc.)
4. Saving and sharing notes
5. Handwriting to digital text using OCR for indexing and searching material
6. Accounts for teachers and students to access their notes library and more