PROJECT REPORT

Touché - Virtual Whiteboard

PREPARED FOR

Prof. Harshul Yagnik
Artificial Intelligence
Department of ICT

PREPARED BY

Josh Trivedi
josh.trivedi105874@marwadiuniversity.ac.in

I. OVERVIEW

There has always been a dire need of either a mouse or a good trackpad to perform annotation while in business meetings or class, but not it is not convenient for many people, and thus I have proposed a way to use your hand gestures, as an alternative to using your mouse, trackpad or stylus.

I. OVERVIEW
ABOUT: The project would be developed using OpenCV in python.
PROBLEMS: There are different kinds of hand gesture databases which can be used but in order for this to work according to us, we have to train the model ourselves.
GOALS/OBJECTIVES: To implement a solution in the given time, which is easy to use and uses some of the concepts taught in class.
SCHEDULE & COST ESTIMATES: One month, and no cost estimate as it will be an open-source project, later to be uploaded on GitHub.

II. BACKGROUND

My mission is to train myself in the Data Science domain and build my portfolio as much as possible so as to apply for a master's degree with a specialization in Data Science and Artificial Intelligence.

II. BACKGROUND
ABOUT ME: I am Josh Trivedi, currently in my 7th semester of pursuing my Bachelors of Technology in ICT, I am a data science enthusiast and have had multiple projects in this domain.
ACHIEVEMENTS: Multiple projects, and international work experience.

III.   PROBLEM/NEEDS

We need an alternative to the stylus or mouse for a digital whiteboard, and for that we need to address each test case separately and train the model accordingly.

III. PROBLEM/NEEDS
PROBLEM 1: Competing with the Market
LENGTH OF TIME IN EXISTENCE: The project has not yet started
IMPACT: This will enable users to have a much easier interaction with their machines, as we introduce Computer Vision into their daily lives.
ADDRESSED BEFORE?   YES
IF YES, OUTCOME: The previous models weren't used much and were discontinued due to lack of popularity, however we have recently seen many applications like making a peace sign to take a selfie on a phone.
ADDITIONAL INFORMATION: The upbringing of Computer Vision in the field of IT and health sector is taking the market by storm, hence any input method we could provide for people who are unable to use their mouse or trackpad while performing some activities like cooking or performing an operation can be very helpful.

IV.   GOALS & OBJECTIVES

IV. GOALS & OBJECTIVES

DESCRIPTION	BENEFITS
Using OpenCV modules for hand gestures to find the best fit model.	Will save a lot of time.
Making the project UI interactive.	Makes the learning curve easier for new users every time.
Being able to implement this on the department level to begin with/	Recognition for the project.
Migrating from Project to Product.	Being able to turn it from open source to a potential source of monetization.
Being able to implement a Virtual Keyboard in future iterations.	Diversity in interaction options.

V.   SCOPE OF WORK

V. SCOPE OF WORK

SUMMARY: First we created a UI for our application using a graphics builder like Canva, the idea here was to create a design to make it look appealing before we begin, as we want to make it look as professional as we can. After that I worked with media-pipe and open CV on the overlay we made to carry forward the project. The project will first start with object detection phase where it detects our hand, then we would go for finger detection and then gesture mapping where for example one finger would mean write on the whiteboard and two fingers means pause.

VI.   RISKS

| VI. RISKS	
RISK 1	Time taken would be more if the hardware specs are not up to the mark. (for building the model)
RISK 2	Everyone has a different skin color, background color and lighting, that might affect our project and it may not recognize the user.
RISK 3	Need for recalibration every time it boots in case of outliers.

SIGNATURES:

Josh Trivedi

VII.   STAKEHOLDERS

Just like all the other education related programs and projects, the primary stakeholders of these are: Education Industry / Institutions, this has some scope in the field of Augmented Reality and Art, where people can draw without having the hassle of wires or cables.

VIII.   METHODS

The initial thought process was todesign header files which would help choose the color of the pen, so for that the graphics were designed in Canva, which is an online resource to make graphic designs:
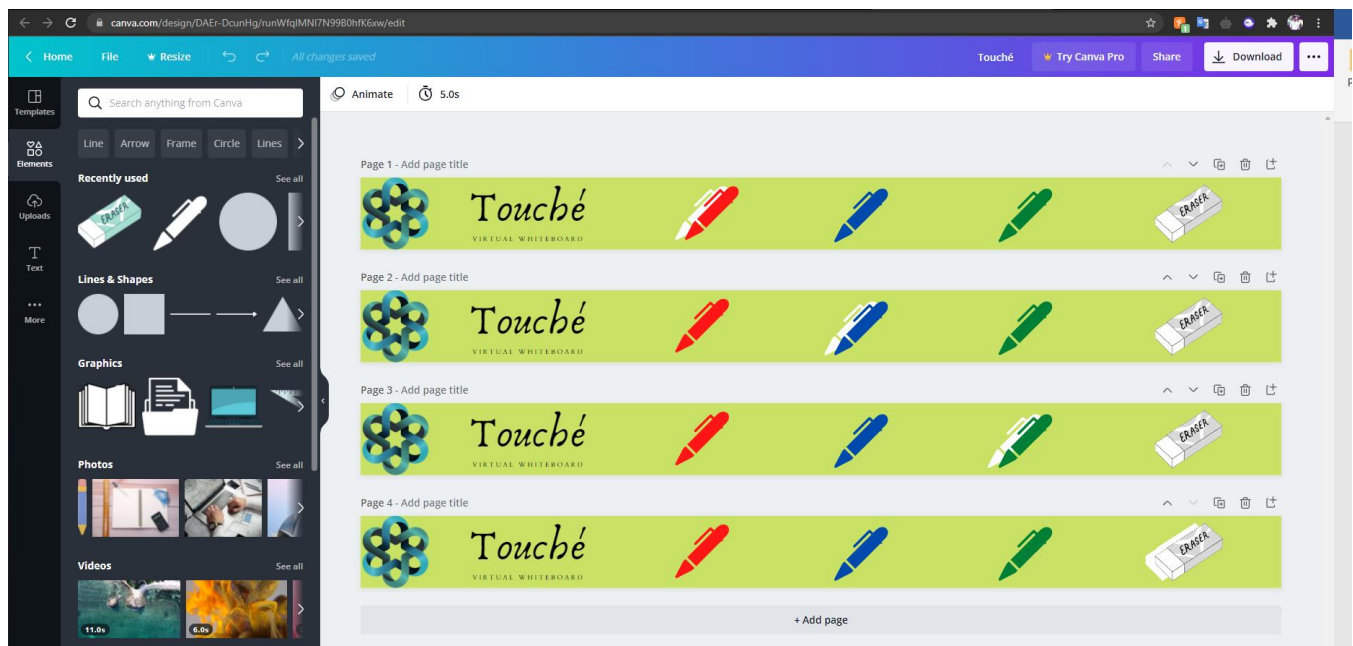
Next up was to make a virtual environment to write the code in, which was provided by the integrated shell of PyCharm Edu.
The code has the following stages:

- Loading the camera, checking if it works.
- Adding header files to the camera capture.
- Declaring the Hand Detection Module using cv2.
- Bifurcating Hand Detection module to mark landmarks on the hand.
- Mapping the header file icons placement to our hand landmark placement.
- Check whether the Fingers are up or down.
- Write conditions for Selection and Drawing modes.
- Declare the colors according to the graphic design.
- Making a blackscreen canvas to correspondingly draw based on finger placement.
- Merge the two screens using an overlay.

IX.   CONCLUSION / OUTCOME OF THE PROJECT:

The Projects deems useful to draw and explain concepts during a zoom class, the faculty can change their camera to screen share and run the application directly, so that their face would be visible, as well as they could draw shapes and write things accordingly mid sessions without the need to get a digital pen or a stylus.