

AI Screen Presence

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Abstract – With the coming of crisis paradigm change in pattern of education came, offline teaching became online, and so with it came several problems for traditional teaching system. Classroom trained teachers were not able to adjust to online teaching without chalk and duster. This paper proposes a solution using Hand Tracking, Object Detection, Visualize Writing and Visualize Typing methods. We have developed a project which lets the user write and type without touching the screen. It tracks and detects the Hand Movement of the user. The user can select from various given modes, it has writing mode, several shapes like line, circle and rectangle, eraser mode and keyboard mode. User can draw, write or type in air using different selection modes. This project is developed using python libraries such as OpenCV, Mediapipe, Pynput and Numpy and is developed in python 3.10 version. It can be used for teaching, writing messages. It can also be developed for communication of specially abled, people, reduction of usage of semiconductor devices like mobile and laptops to write and can reduce wastage of paper.

Key Words: Virtual Writer, Virtual Keyboard, Hand Detection, Shape Drawing, Character Recognition

1. INTRODUCTION

Necessity is the mother of invention, very rightly said. From the stone age man to the Modern age man, we have improved with our difficulties and challenges and have fought so far with invention and improvements. Through the times with many occurring challenges, there has been an improvement in technology. From using computers on vacuum tubes of room size capacity to getting the computer in size of the wrist. This evolution so changed the pattern of education from learning in the classroom to gaining knowledge online. With the coming of the Pandemic the change in education was quick and changes were made, and so it came to the online education system. But the difficulty was still faced when the classroom trained teachers were not able to adjust on webcam teaching. Because of not being accustomed to explaining without writing on board or using sloppy apps to write. This problem is solved by our project which uses the Hand Detection method to gain the movement of the hand and let the user write and type with keyboard using their hand as if they are writing with a pen or chalk or writing on an actual keyboard. It uses many libraries like OpenCV,

Mediapipe to capture the hand movement and let the user choose different type of shapes like line, circle and rectangle and also has eraser mode.

2. PROBLEM STATEMENT

This project can solve various problems – 1. Help in online teaching without pen, paper, touch screen or mouse 2. Virtual Keyboard can reduce dependency on laptop keyboard 3. Message Writing can be done 4. Drawing and Painting can be done virtually 5. Young children can be taught interactive and fun activities 6. Can be Used For Signatures 7. Help people with hearing problems in daily life. 8. Avoid the wastage of Paper 9. Help prevent overuse of smartphone.

3. METHODOLOGY

The high-level architecture of our proposed solution could be separated into five parts. First, is Hand gesture detection and Tracking, which happens with the use of the Open CV library and Mediapipe, the hand is detected with the use of coordinates and we have a standard set of defined coordinates for our fingers and thumbs. The coordinates are detected to let the program know which part of the hand is being used. The Second Part is we give Visualize Writing mode. In this part with coordinates detected we form a specified mode of writing and erasing. In the writing part, we detected the motion of the index finger and let the user choose the size of the pen and erasing mode. In Third Part Shape Mode the coordinate detected are given specified formulas for making different shapes. In Fourth part, we add the Virtual Keyboard to our system. The virtual keyboard when selected opens in new window. In Fifth Part, we combine all the parts with additional designs and features to make the whole project work as one. In this project we have improved the efficiency by combining hand detection system with writing mode and virtual keyboard.

4. LITERATURE REVIEW

In [1] they took the use of large scale dataset and achieved fingertip detection at about 12.22 pixel in a 640px by 480px. They tested 24 frames in different environment to foresee the complexity and errors. The overlap rate of hand detection came to be about 80 %. They used a faster R-CNN based method for hand detection.

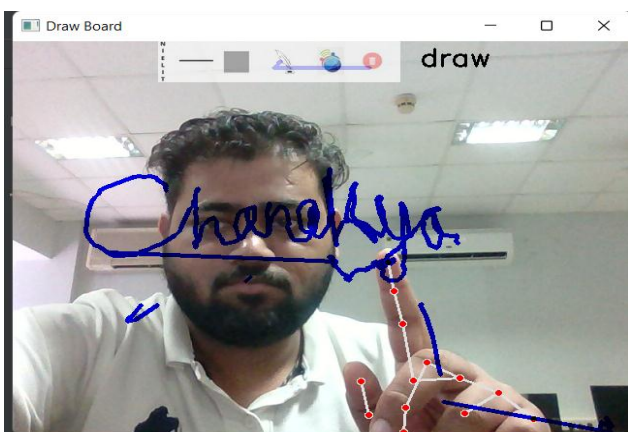
In [2] from the finger dataset from Leap Motion Controller they proposed method for writing in air, also the Leap Motion Controller was able to detect the words and characters written in air thus overcoming the problem from pen up and pen down. Also they proposed search algorithm using dynamic time warping and its optimization for simple matching.

In [3] they developed a ground breaking technology in which the user is able to write by waving hands over a LED light source. The tracking was done by LED color and movement of the finger was extracted for sketching the character. A mixed image of both white and black frame is formed together to show the character that the user draw.

5. IMPLEMENTATION

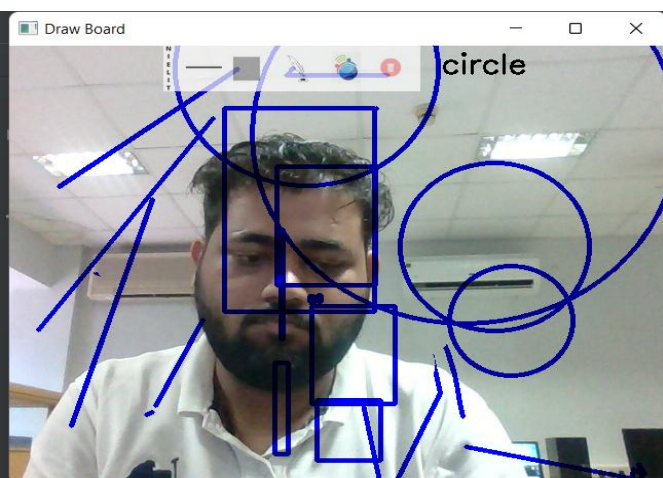
Now we show the result obtained by combing all the parts of the project. And there success in working.

5.1 Selection Mode



Name of the selected mode is showing with draw mode on.

5.2 Drawing Of Shapes



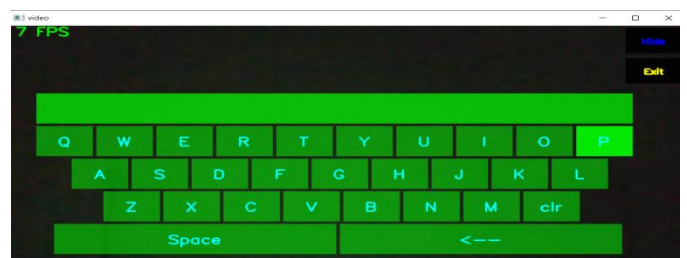
Some shapes like Line, Circle and Rectangle are drawn using their selection mode.

5.3 Eraser Mode



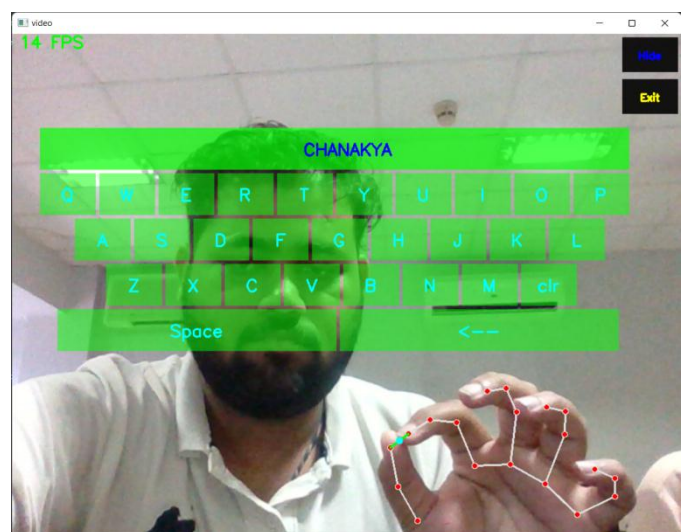
The drawn name is erased using the eraser mode.

5.4 Keyboard Mode



Keyboard mode is selected a new window is opened.

5.5 Keyboard Mode Typing



Joining the index finger and thumb we can select the words from the keyboard.

