

AI Screen Presence

Chanakya Sharma¹, Sahil Sukhadeve², Md. Izhar Ahmed³, Yogesh Kumar⁴,
Shashank Kumar Singh⁵

^{1,2,3} B.Tech(ESE), National Institute Of Electronics And Information Technology, Aurangabad, Maharashtra, India

^{4,5} Scientist B, National Institute Of Electronics And Information Technology, Aurangabad, Maharashtra, India

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

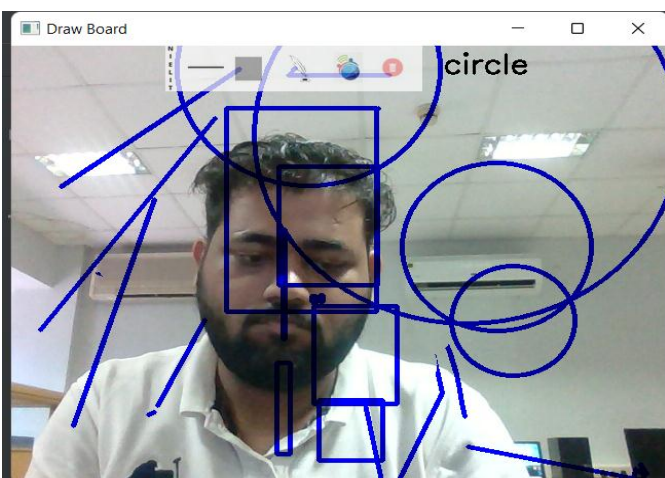
Now we show the result obtained by combing all the parts of the project. And there success in working.

5.1 Selection Mode



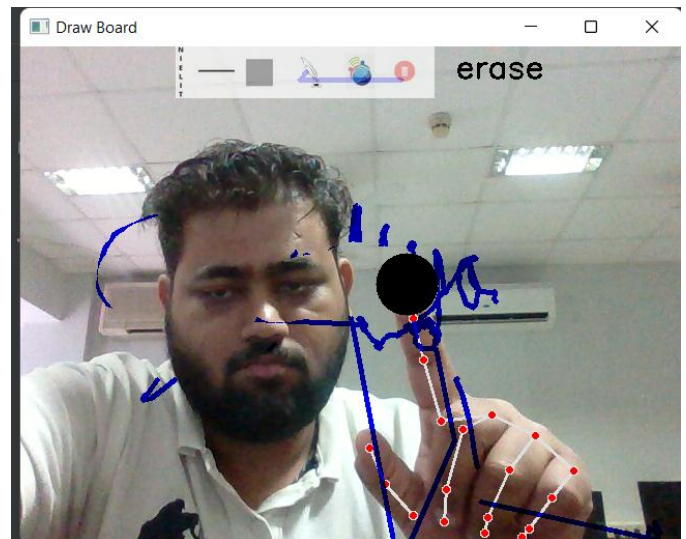
Name of the selected mode is showing with draw mode on.

5.2 Drawing Of Shapes



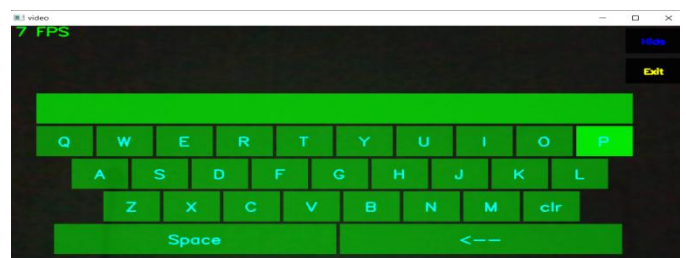
Some shapes like Line, Circle and Rectangle are drawn using their selection mode.

5.3 Eraser Mode



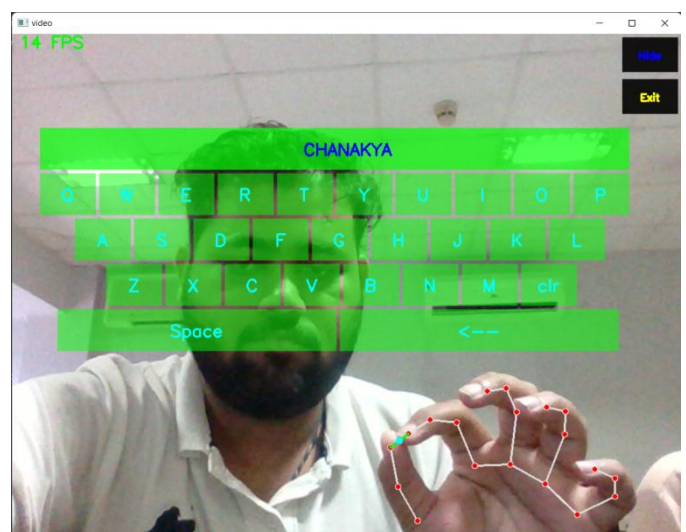
The drawn name is erased using the eraser mode.

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.

6. CONCLUSIONS

This project has the potential to deal with all classical problems of writing drawing and typing . It will reduce the usage of semiconductor devices like smartphones and laptops further it can be developed into wearable devices . It can be integrated with the online teaching devices and apps and can be used for the benefits of the specially abled people. It will serve as a great tool for future purpose. In this model we were successful in integrating the writing mode with the virtual keyboard system. We also improved its efficiency by changing the system from contour detection system to hand detection system and further improved it by changing the two finger algorithm to one finger algorithm. It can be used a wearable in near future. The virtual reality system developed may come live and reduction in usage of laptop and devices can reduce. There are also some problems which can be improved in near future Firstly, writing will become more faster and efficient. Secondly, a pause method can be introduced the actual world crisis. Secondly, its motion blur anomaly can be reduced with the improvement in web camera. Third, its detection speed can be improved. Fourth, human skin detection can be improved with usage of large number of dataset for training.

7. ACKNOWLEDGEMENT

We are thankful to our Project Guide Mr. Yogesh Kumar, Scientist B and Mr. Shashank Kumar Singh, Scientist B for the constant source of encouragement, support and motivation that helped us through out our project phase, and helped us to break our limits of education and learning.

8. REFERENCES

- [1] Y. Huang, X. Liu, X. Zhang, and L. Jin, "A Pointing Gesture Based Egocentric Interaction System: Dataset, Approach, and Application," 2016 IEEE Conference on Computer Vision and Pattern Recognition Workshops (CVPRW), Las Vegas, NV, pp. 370-377, 2016.
- [2] S. Vikram, L. Li, and S. Russell, "Handwriting and gestures in the air, recognizing on the fly," in Proceedings of the CHI, vol. 13, 2013, pp. 1179-1184.
- [3] P. Ramasamy, G. Prabhu and R. Srinivasan, "An economical air writing system converting finger movements to text using web camera," 2016 International Conference on Recent Trends in Information Technology (ICRTIT), 2016, pp. 1-6, doi: 10.1109/ICRTIT.2016.7569563.
- [4] T. Grossman, R. Balakrishnan, G. Kurtenbach, G. Fitzmaurice, A. Khan, and B. Buxton, "Creating Principal 3D Curves with Digital Tape Drawing," Proc. Conf. Human Factors Computing Systems (CHI' 02), pp. 121- 128, 2002.

[5] W. Makela, "Working 3D Meshes and Particles with Finger Tips, towards an Immersive Artists' Interface," Proc. IEEE Virtual Reality Workshop, pp. 77-80, 2005.

[6] A.D. Gregory, S.A. Ehmann, and M.C. Lin, "inTouch: Interactive Multiresolution Modeling and 3D Painting with a Haptic Interface," Proc. IEEE Virtual Reality (VR' 02), pp. 45-52, 2000.

[7] P. Ramasamy, G. Prabhu and R. Srinivasan, "An economical air writing system converting finger movements to text using web camera," 2016 International Conference on Recent Trends in Information Technology (ICRTIT), 2016, pp. 1-6, doi: 10.1109/ICRTIT.2016.7569563. [6] S. Belgamwar and S. Agrawal, "An Arduino Based Gesture Control System for Human-Computer Interface," 2018 Fourth International Conference on Computing Communication Control and Automation (ICCUBEA), 2018, pp. 1-3, doi: 10.1109/ICCUBEA.2018.8697673.

BIOGRAPHIES



Chanakya Sharma, B.Tech, National Institute of Electronics & Information Technology, Aurangabad, India



Sahil Sukhadeve, B.Tech, National Institute of Electronics & Information Technology, Aurangabad, India

NAME- SAHIL V. SUKHADEVE
DATE- 27/01/2022



Md. Izhar Ahmed, B.Tech, National Institute of Electronics & Information Technology, Aurangabad, India



Yogesh Kumar, Project Guide, Scientist B, National Institute of Electronics & Information Technology, Aurangabad, India



Shashank Kumar Singh, Project Guide ,Scientist B, National Institute of Electronics & Information Technology, Aurangabad, India