

VIRTUAL SKETCH ON AIR

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Abstract

It is been simply difficult to train students on an online platform and make the lesson thrilling during the COVID-19 pandemic. As a end result, there was a need for a dust free study room for kids. the usage of Media Pipe and OpenCV, this project provides a unique paint application that identifies hand moves and tracks hand joints.

Keywords: Media Pipe, OpenCV, Canvas

I. INTRODUCTION

Digital drawing is where in you may draw with the hand of recording hand moves with the digi cam. The monochromatic item on your fingertip is especially used as a marker. OpenCV works on robot systems. pick out up letters, identify objects on the conveyor belt and support self-riding vehicles. The language required for this project is python, which has a greater whole library and easy to apply syntax and know-how of the basics and may be carried out in any open-supply language cv help. The colour monitoring and detection approach changed into used to achieve the goals of this project. the colored markers used here are detected and a mask is generated. computer imaginative and prescient is an interdisciplinary field of era that studies the manner to construct computer systems to achieve excessive level.

The facts of virtual photographs or films. it's miles utilized in applications that promote protection in mines, save you drowning in swimming pools, technique Google maps and road photographs, and set up Google X robotics. OpenCV has been rebuilt from C. into a modern module likeminded with STL and boost. currently, human beings and machines engage broadly speaking through direct touch strategies such as the mouse, keyboard, far off manipulate, contact display screen, and different comparable devices, while people communicate primarily thru herbal and intuitive non-contact strategies which includes sound and bodily motions. Many researchers have tried to assist the laptop pick out other intentions and data using non-touch methods like as voice, facial expressions, physical motions, and gestures. A gesture is the maximum critical factor of mortal language, and gestures also play a substantial position in mortal verbal exchange. they are taken into consideration to be the simplest way for people and computer systems to communicate. signal language recognition, robotics, and other packages fall under the class of gesture popularity. two techniques are usually used for Gesture reputation for HCI applications. the primary is primarily based on wearable or direct bodily methods, even as the second one is based on pc vision and does no longer require any sensors to be worn. The information-glove, that is made up of sensors to capture hand motion and place, is used in the wearable o r direct contact technique. The vision-based totally method uses the camera to offer contactless verbal exchange among human beings and machines. laptop vision cameras are simple to perform and inexpensive. but, due to variations in hand sizes, hand role, hand orientation, lighting fixtures conditions, and other factors, this approach has positive boundaries.

II. LITERATURE REVIEW

Many strategies are used for hand gesture reputation in real-time. The proposed system is a approach of HCI (Human-laptop interplay), that makes use of marker detection and monitoring method. alternatively of getting a mouse or touchpad, two colored markers are worn on the pointers of the hands to generate eight hand moves to offer commands to a desktop or pc pc with a client-grade camera [1]. they have extensively utilized the "Template matching" algorithm for the detection of markers and Kalman filter for tracking. In [2] the evolved device uses a records glove-primarily based approach to recognize real-time dynamic hand gestures. The facts glove has ten smooth sensors integrated in it that measure the joint angles of five palms and are used to accumulate gesture facts. real-time gestures are recognized the usage of strategies which includes gesture spotting, gesture collection simplification, and gesture reputation. Shomi Khan, M. Elieas Ali, Sree Sourav Das have developed a machine that uses a pores and skin shade detection set of rules to transform ASL (American sign Language) into text from real-time video [3]. due to the fact skin coloration and hand shape vary from individual to man or woman, detecting the hand is probably hard. The era uses neural networks to triumph over this. The SCD (Scalable colour descriptor) neural community is the primary. The picture pixels are fed into the SCD neural network, which determines whether or not or not they're skin pixels. the second is HGR (Hand gesture reputation) neural network to which the extracted features may be supplied. The features can be extracted through distinct algorithms specifically finding the fingertip and Pixel segmentation. Pavitra Ramasamy and Prabhu G [4] have proposed a progressive generation wherein the consumer can write the alphabet or kind whatever he or she wishes by means of merely waving his or her finger over a colorful LED mild supply. handiest the colour of the LED is tracked to extract the motion of the finger sketching the alphabet. The colour of the tracked item is modified to white, whilst the history is modified to black. The black and white frames are stitched together to create a single black and white image of the alphabet that the consumer wanted to attract. [5] to accomplish mouse actions inclusive of shifting the mouse cursor, clicking left, and clicking proper with hand gestures, an intangible interface is conceived and carried out utilizing vision-based totally actual-time dynamic hand gestures. MATLAB is used for the implementation of the gadget. S. Belgam war and S. Agrawal [6] have advanced a new HCI method that incorporates a digicam, an accelerometer, a pair of Arduino microcontrollers, an Ultrasonic Distance Sensors. The number one concept at the back of this interface is to capture motions the usage of Ultrasonic Distance Sensors. the gap among the hand and the space sensor is calculated to document the gestures. For three-D hand gesture detection, Quentin De Smedt, Hazem Wannous, and Jean-Philippe Vandeborre [8] used a skeleton based model. They used the geometric form of the hand to attain an effective descriptor from the Intel real-sense depth digital camera's hand skeleton linked joints. The skeleton-based method is higher than the depth-based totally method. In Prajakta Vidhate, Revati Khadse, and Saina Rasal have evolved a virtual paint application that makes use of ball-tracking era to see the hand gestures and write at the screen. they have used a glove with a ping pong ball attached to it as a contour. The project supplied a customizable airbrush version that uses the leap movement Controller, which can tune hands, to create an immersive freehand painting revel in.

III. ALGORITHM USED

MEDIA PIPE

Media Pipe is a Google open-source framework that built-in built-in first of all released built-in 2019. Media Pipe has a few laptop image built integrated and integrated built-in integrated skills. A built-in integrated built-inference pixel built-one is applied to the built-in Media Pipe. ML integrated ference is the system of log built integrated actual facts integrated. The Media Pipe framework is used to solve AI demand built integrated that built integrated built-in video and audio stream integrated . Media Pipe is multimodal and platform impartial. As a end result, move-platform apps are created built-in the use of the framework. Face detection, multi-hand monitoring, hair segmentation, item detection, and tracking are only some of the programs that Media Pipe has to provide. Media Pipe is a framework with a

high stage of constancy. Low latency performance is furnished via the Media Pipe framework. It is a built-in fee of synchronized time-series built integrated.

The Media Pipe framework has been used to design and built-in systems use built integrated graphs, built-in to develop integrated systems for utility purposes. built-in the pixel built-one configuration, all of the gadget's steps are accomplished. The pixel built-one that turned built integrated designed can run on a spread of platforms and might scale across desktops and mobile gadgets. overall performance evaluation, sensor built-information retrieval, and a group of components are all a part of the Media Pipe framework. Calculators are the elements of the built-in. The Media Pipe framework uses a built-ingles integrated-shot detector model for real-time detection and reputation of a hand or palm. it's far first built-in for the palm detection model built-in integrated hand detection module built-ing the fact that fingers are less difficult to integrated. It Designates a hand landmark built-in integrated hand area, built-includes 21 built-in or knuckle coordintegrated as shown built-in integrated.

OPENCV

The laptop imaginative and prescient library OpenCV is a have to-have for anyone who works with computer systems. It includes item detection image-processing strategies. OpenCV is a python package deal for creating real-time laptop imaginative and prescient programs. picture and video processing and analysis are handled by using the OpenCV library.

IV. OVERVIEW OF WORK SCHEDULE

Below cited modules carried out in our project

HAND LAND MARK DETECTION

Finding joints at the finger and finger suggestions on an image is the process that is involved. Basically, this module generates 22 crucial points, 21 of which are on the hand or palm, and the remaining factor is regarded as the past..

DRAWING TOOLS MODULE

On this, we developed a tool selection characteristic that includes a curve, a straight line, a circle, a rectangle, and an eraser. In addition to the aforementioned module, we also delivered an audio module that allows us to receive audio from the device we have selected. With lower configuration, this module has a negative impact on the system, but we are confident that it will sound great with a device with higher configuration.

HAND TRACKING

A Single Shot Detector model that is utilized similarly to the face recognition model in Media Pipe Face Mesh to detect initial hand positions has been developed by us. It is tailored for Real-time mobile application. It is incredibly difficult to recognize hands because our light model and full model must be able to detect occluded and auto-occluded hands, as well as a wide range of hand sizes with a huge scale interval of relative to the frame. It is somewhat challenging to consistently identify hands based just on their visual characteristics, as opposed to faces where high-contrast patterns around the eyes and lips are present. Instead, offer more information by mentioning characteristics of the arm, torso, or person when locating the hand.

VIRTUAL PAINTER

A painter creates a piece of art on a computer-generated canvas. A painter employs tools when making a piece of art to aid in the process. Similar to how artificial intelligence (AI) operates, artists employ technologies to assist them in producing their art. Tools are used by AI to create its work and to aid in its learning. A automated version of this technique is typically considerably quicker and more accurate than when a human generates the same thing. A virtual canvas is a collaborative environment where users may create and modify 3D artwork. In this area, artists are free to create any kind of image they like. In that both allow users to interact with and modify their images, virtual canvases are similar to actual ones.

VIRTUAL SHAPES

In order to see a preview of the rounded edges, drag the corner widgets as far as feasible. Toggle between corner styles like Round, Reverse Round, and Chamfer by holding down the Alt or Option key while clicking or dragging the corner widget on Windows or Mac, respectively. To access a menu of corners to change look and fillet properties,

double-click the widget while using the Direct Selection Tool. For further information, please see Work with Live Corners. Use the Direct Selection tool to choose a corner separately, then click the corner's anchor point to modify it.

V. *SYSTEM ARCHITECTURE*

ARCHITECTURE DIAGRAM

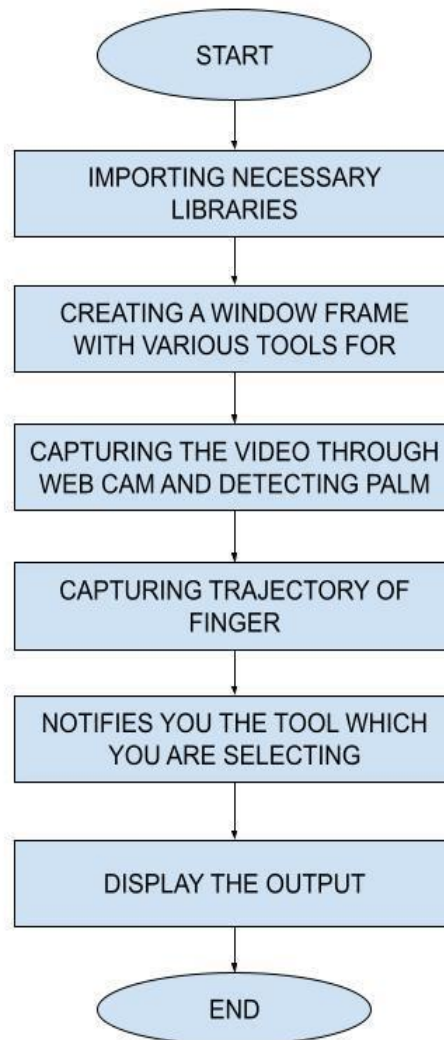


FIG 1 ARCHITECTURE DIAGRAM

ACTIVITY DIAGRAM

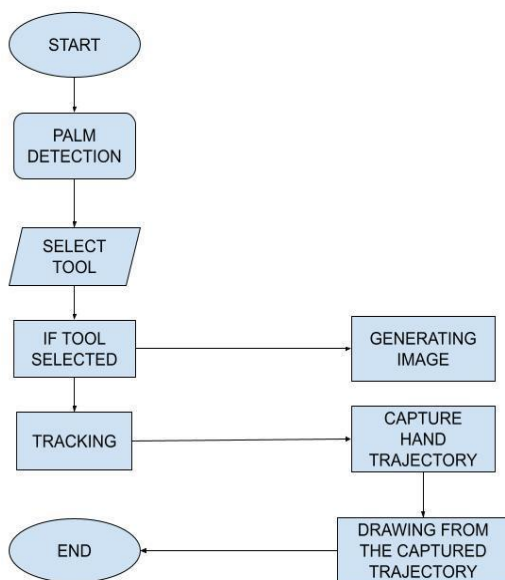


FIG 2 ACTIVITY DIAGRAM

UML DIAGRAM

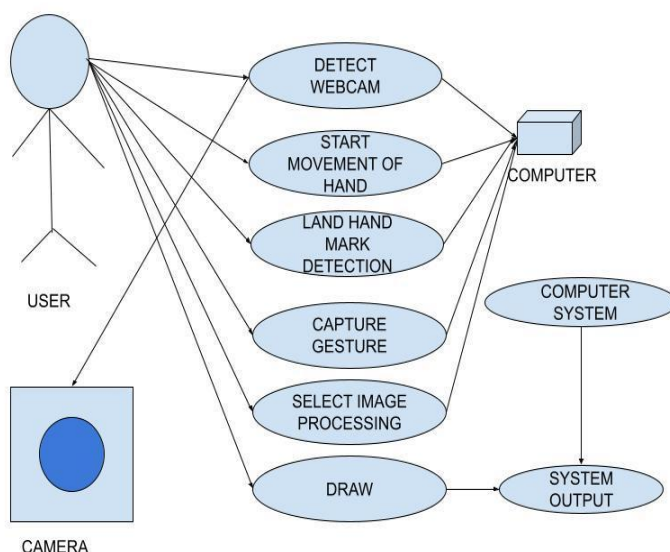


FIG 3 USE CASE DIAGRAM

VI. OUTPUT

RUN OR EXECUTE THE CODE

After installing all necessary libraries, run the code to activate the opencv frame with buttons that display a variety of forms, colours, sizes, save and clear.

WEBCAM STARTS

Webcam begins recording, converts each frame of the video, and sends the frame to the hand tracker class for tracking or detecting the positions of the fingers.

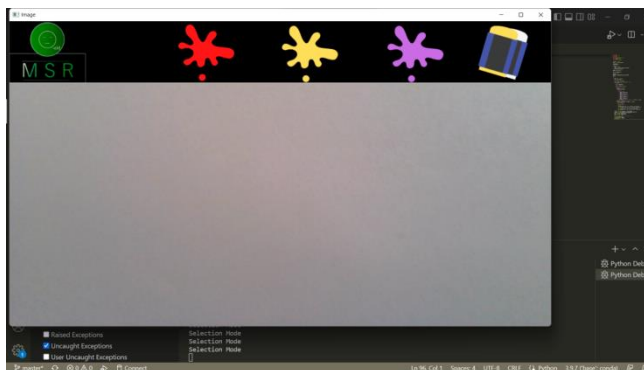


FIG 4 DISPLAYS THE BUTTONS AND FRAME WHICH RECORDS VIDEO

DETECTS HAND LANDMARKS

Each frame that is received is compared to the media pipe hand landmarks, shown in Figure 3, and the get Positions() and get Up Fingers() functions of the hand tracker class are used to determine which finger is opened and its position.

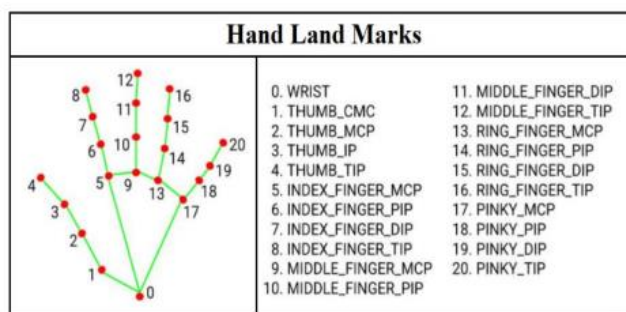


FIG 5 REPRESENTATION OF POSITION OF FINGERS

PERFORM ACTIONS ACCORDING TO BUTTON

By hovering the index finger over the buttons, different ones can be selected. Unique shapes are chosen in this approach. Each button has a unique set of functions that it can carry out. Functionalities are carried out at the canvas based on the selection of shapes, colours or length.

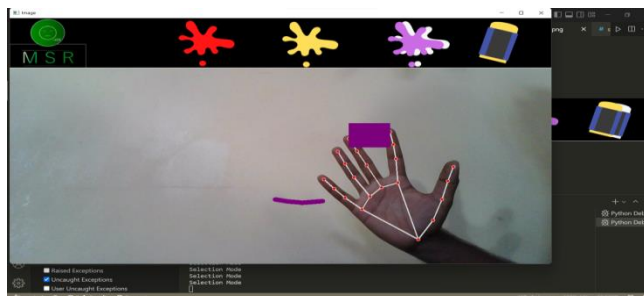


FIG 6 REPRESENTATION OF BUTTON WORKING

DEPICT ON CANVAS

On the canvas, there are representations of shapes like rectangles, circles, ellipses, lines, and loose patterns. Additionally, the content on the canvas can be cleaned up or deleted. Additionally saved on canvas. Drawing shapes involves imagining the space between the thumb and index finger as the diagonal period for a rectangle, the radius for a circle, the period for a line, and the arrowhead line. How a "hello" is portrayed on the painting is shown in Figure.

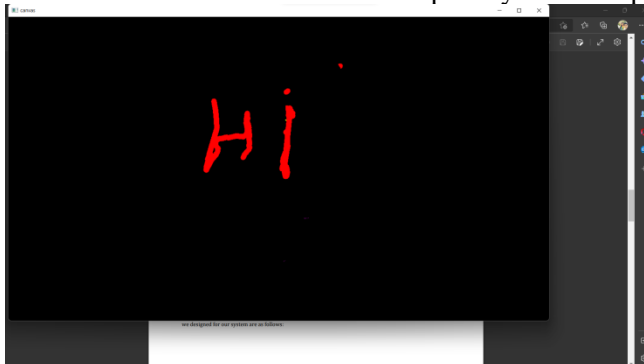


FIG 7 HI IS DEPICTED ON CANVAS

VII. CONCLUSION

Traditional writing/coaching methods can be projected by the system. The final goal is to provide an educational tool for computer vision systems that supports Human-device interaction, often known as human-computer interaction, refers to the relationship between the human and the computer or, more specifically, the device. Device functionality is defined as the set of functions or offerings provided to customers by the device, even while the device can successfully fulfil specific consumer hobbies like digital painting. The main objective of the digital paint software is to provide users with an AI-based tool that enables them to handily draw anything on a screen. Additionally, this system allows the user to choose any tool from the toolbar.

VIII. FUTURE WORK

Similar advancements can be made in this painting by experimenting with various interpolation techniques, such as Py Game, which contains a line-drawing method that can assist create cleaner and smoother traces. In the same vein, different brush shapes and textures can be used to make this utility more robust. The instructional software that teachers typically use could be replaced with this device. If taken to its logical conclusion, many video games that are entirely virtual will be created. A mechanism for directing a robot through hand gestures was offered as one of the fascinating programmers in this field. Orders could be provided to a robot to carry out the project.

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