# AIR CANVAS USING LIBRARY MEDIA PIPE

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**Abstract**: Air Canvas represents a paradigm shift in the way we engage with digital content. It leverages gesture-based interaction and augmented reality to enable users to draw, write, or interact with virtual elements without physical touch or traditional input devices. The core idea is to create a digital canvas in the air, providing a dynamic, intuitive, and immersive experience for users.

The existing project which allows us to draw just by waving hand uses technology or methodology which takes a lot of process and time. Avoiding or decreasing these limitations we came up with this project that uses new technologies and easy methodologies. System Camera is used to track the hand and create drawings.

**Keywords – Air Canvas, Media Pipe, NumPy, Hand Tracking.**

## I. INTRODUCTION

The advent of "Air Canvas" emerges as a compelling response to this challenge. This technology reimagines how users create digital art or conduct presentations, using hand gestures and augmented reality to forge a seamless connection between human expression and the digital realm. Air Canvas opens up a realm of possibilities where users can craft, design, and communicate in three-dimensional, dynamic spaces, all without the constraints of physical touch or traditional input devices.

1. **Air Canvas:** The central concept of this technology, where users can create digital content in the air through hand gestures and motion sensing.

2. **Gesture-Based Interaction:** The method of using hand movements and gestures to control digital environments, offering a more natural and intuitive form of interaction.

3. **Augmented Reality:** The technology that superimposes computer-generated information onto the real world, often using AR glasses or mobile devices.

4. **Digital Art:** The creation of visual art in a digital format, encompassing a wide range of artistic expressions, from drawing and painting to 3D modeling.

5. **Technology:** The application of scientific knowledge for practical purposes, such as the development of the Air Canvas system.

6. **Human-Computer Interaction:** The study and design of the interaction between humans and computers, focusing on making this interaction more user-friendly and efficient.

7. **Motion Sensing:** The process of detecting and tracking the movement of objects or individuals using sensors, often used in Air Canvas for gesture recognition.

8. **Augmented Reality Applications:** Various uses of augmented reality technology across different fields, including gaming, education, and healthcare.

## II. RESEARCH METHODOLOGY

This methodology needs a lot of data to be stored and sometimes it leads to wrong prediction due to background difference or skin color difference. Some of the existing papers followed the process of image processing using threshold values and database data of different images. To overcome all these limitations and drawbacks, we proposed a system using mediapipe. In the proposed system hand tracking is done using a media pipe which first detects hand landmarks and then obtains positions according to it.

Figure 1 describes the flow of a system or the process of project in which it works. This is the complete workflow that occurs to execute the system and draw images just by waving hands in efficient manner.
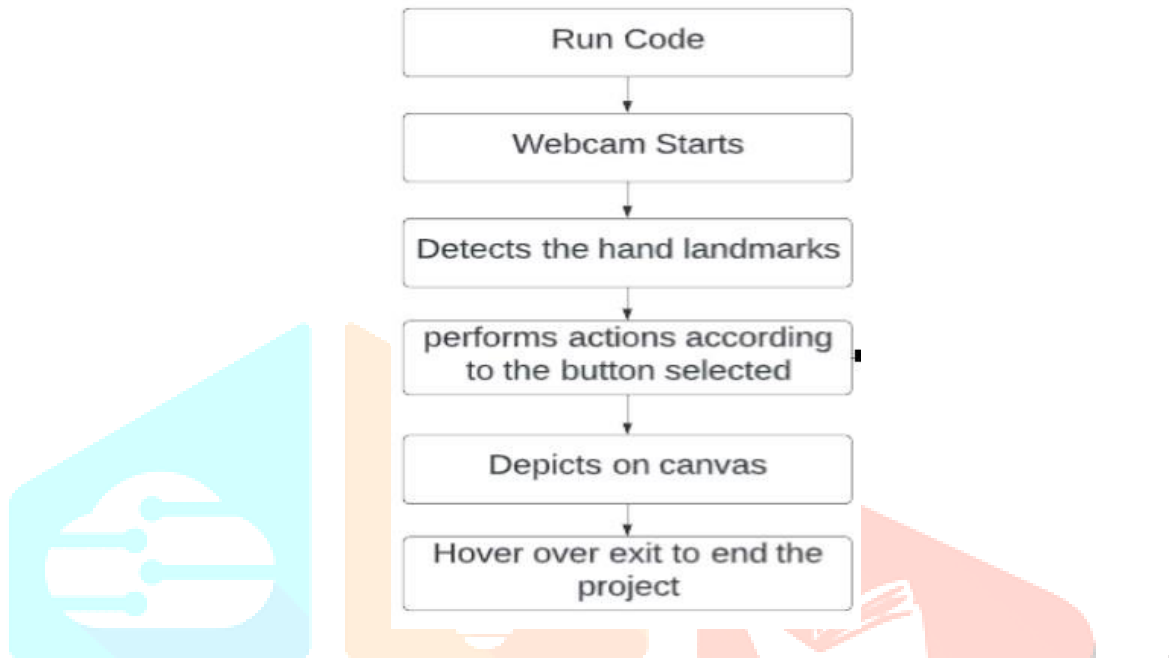


Air Canvas using Mediapipe, Opencv is the proposed system that improves the efficiency for the existing system. Each stage of the flowchart and its methodologies are explained in detailed below. The methodologies or the stages of the proposed system are discussed below:

1. **Run Or Execute the Code**
   Execute the code once all the libraries are installed, this leads to turning the camera on automatically and the OpenCV frame with buttons displaying various shapes, colors, size, save, clear, erase etc.

2. **Webcam Starts**
   Webcam starts recording and converts the video each frame and sends the frame to hand tracker class to track or detect the positions of finger. Figure 2 displays the buttons and frame which records video.
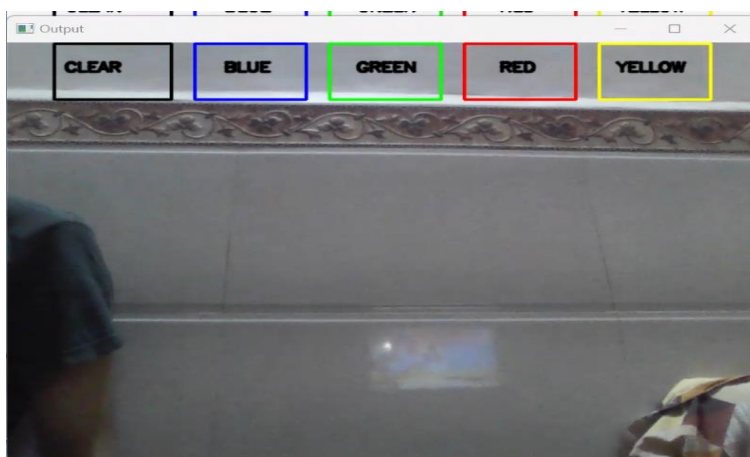
3. **Detects Hand Landmarks**

Each frame received is compared with media pipe hand landmarks i.e, the Figure and positions of finger are found using getPositions() and which finger is opened using getupFingers() functions of hand tracker class. These 2 functions are part of the Handtracker class.
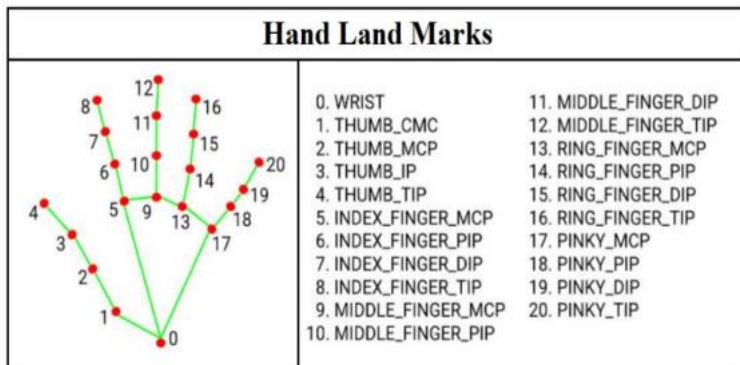


4. **Perform actions according to button**

Different buttons are chosen with the help of index finger hover over those buttons. Each button has its own functionality to perform over. If colors are chosen, then functionalities are performed on the canvas. Figure 4 shows the hand landmarks and colors options.
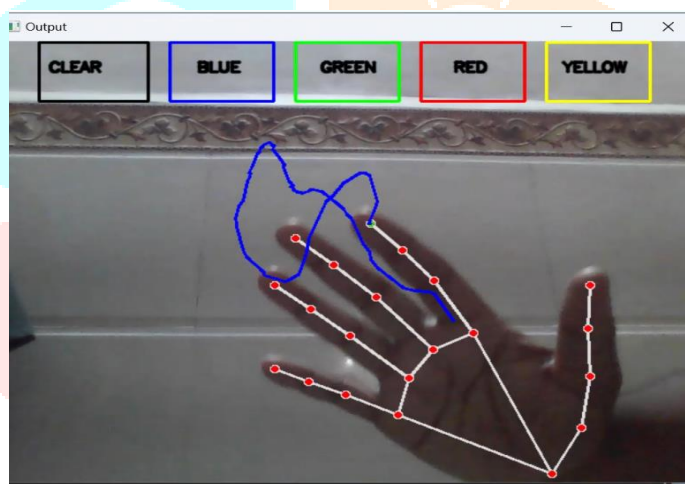


5. **Depict on canvas**

We can clear or erase the content on the canvas.
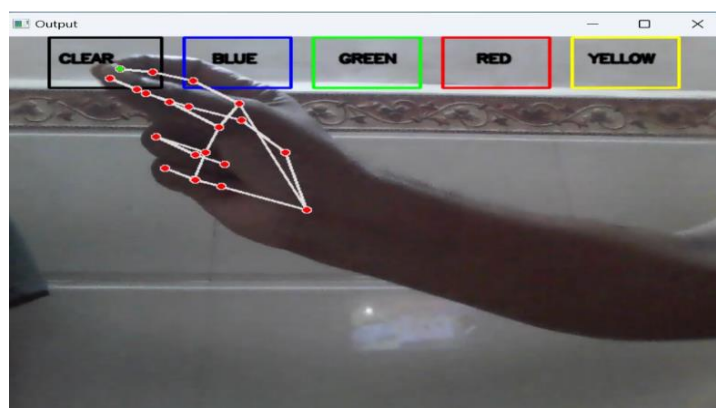


6. **Exit**

By hovering index finger over exit closes the frame.

## III. Data and Sources of Data

### a) Input Data:
In Air Canvas, input data is generated by users' movements and gestures. This data includes information from motion tracking systems, depth sensors, and cameras. These devices capture the user's hand movements, body position, and interactions with the virtual canvas.

### b) Artistic Data :
Artists use digital tools to create and manipulate elements on the virtual canvas. This data includes 3D models, textures, and visual effects. The artistic data may be pre-designed or dynamically generated as part of the interaction.

### c) Interaction Data :
The interaction data encompasses how users engage with the virtual canvas. This includes data on the speed, direction, and style of their gestures. This data is vital for rendering the digital artwork in response to the user's actions.

### d) Environmental Data :
Depending on the implementation of Air Canvas, environmental data might be integrated. This could involve data related

to the physical surroundings, such as lighting conditions, room dimensions, and other factors that affect the user's experience

### e) User-Generated Data:
Air Canvas may collect user-generated data, including the history of interactions, saved artworks, and user preferences. This data can be valuable for personalization, analysis, and providing a customized experience.

## IV. RESULTS AND DISCUSSION

### 4.1 Results of Study Variables
Table 4.1: Descriptive Statics

| S.No | Description | Input | Expected Value | Actual Value | Result |
|------|-------------|-------|----------------|--------------|--------|
| 1 | To draw free style of required colour on the board with the help of hand | Hand Tracking through webcam | Line of required colour is obtained from set of available colours | Line of required colour is obtained from set of available colours | PASS |
| 2 | To clear the board with the help of hand tracking through clear button | Hand Tracking through webcam | Board gets cleared i.e. all the shapes drawn are erased | Board gets cleared i.e. all the shapes drawn are erased | PASS |
| 3 | To erase the unwanted parts on canvas | Hand Tracking through webcam | The pixels on canvas at index fingertip gets erased | The pixels on canvas at index fingertip gets erased | PASS |
| 4 | Trying to draw on canvas using middle finger | Hand Tracking through webcam | Drawing is not possible i.e., no changes will be depicted on canvas | Drawing is not possible i.e., no changes will be depicted on canvas | PASS |

## V. CONCLUSION

To avoid the use of mouse and difficulty to draw using it in the existing systems , this project Air Canvas helps us a lot. We can easily draw or present our imagination just by waving our hand . This uses the easy methods or libraries like mediapipe making the project efficient than existing one. In this system we have implemented an air canvas system using mediapipe which is efficient way to track hand positions . Mediapipe also helps us to reduce the process of image processing to detect the positions of fingers . This can be used in different aspects like teaching, drawing etc. This helps us to reduce the use of hardware components like mouse, touch screen etc. This can also be used as base project for various system that require hand tracking. The project discussed in this paper also helps to improve creativity in people. This helps us to teach and draw easily than earlier. In future, we can also use this project as base project for many other hand tracking projects. we can also use this in sign language detection , virtual mouse etc.

## VI. ACKNOWLEDGEMENT

## VII. REFERENCES

1. Rekimoto, J. (2002). SmartSkin: An Infrastructure for Freehand Manipulation on Interactive Surfaces. In Proceedings of the ACM Symposium on User Interface Software and Technology (UIST).
2. Geroimenko, V. (Ed.). (2014). Augmented and Virtual Reality. Springer.
3. Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. Presence: Teleoperators and Virtual Environments, 7(3), 225-240.