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Smart Art Board Using AI

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Abstract: Smart Art Board using AI, utilizes the power of Artificial Intelligence and Machine Learning to enable users to create virtual sketches and drawings through hand gestures, without the need for a mouse, keyboard, pointer or touch screen. We distinguish between automation-focused applications like robotics and the broader potential of recent advancements in deep learning to act as a general-purpose invention method. Our research indicates a significant shift towards application- oriented learning and development. By leveraging the capabilities of AI, we can achieve greater efficiency in the economy and potentially revolutionize the innovation process and R&D organization through a new general-purpose "method of invention." We aim to create an immersive virtual meeting experience similar to Zoom, where we will showcase our AI Virtual Art Board and Augmented Reality features. Our interactive whiteboard fosters hands-on and collaborative learning. our interactive board allows creators to work hands-on, collaborative learning. Artificial intelligence (AI) is advancing the capabilities of automated systems. The progress of advanced education is closely tied to advancements in technology and computing power of intelligent machines. With the rapid progress in artificial intelligence, new opportunities and challenges are arising for tutoring and literacy in advanced education. This could also potentially cause changes in the way institutions of advanced education are governed and structured.

Index Terms **- Smart Art Board, Artificial Intelligence, Machine Learning, Smart Board**

I. INTRODUCTION

The way humans engage with technology has been fundamentally changed by artificial intelligence (AI). AI is gradually playing a central role in our lives, from self-driving cars to personal assistants like Siri and Alexa. As technology develops, AI is being incorporated into a wider variety of gadgets, allowing them to carry out functions that were previously regarded to be the sole preserve of humans. AIenabled gadgets are capable of understanding speech, recognize things, making choices, and even picking up new skills. The influence of this technology, which is altering the way we work and live, will only grow in the ensuing years. In light of this, this essay will examine how AI is altering the technological environment as well as its advantages and disadvantages.

The Educational System has been significantly impacted by artificial intelligence, which has changed how humans teach and learn. Educational institutions may adapt the learning experience for each student based on their unique requirements and learning preferences using AI-powered technology. AI tools may also assist instructors in monitoring student development and identifying areas that require further attention. In addition, AI has made it feasible for students to access learning materials at any time and from any location, allowing them to progress at their own speed. Moreover, AIpowered technologies like chatbots and virtual assistants are being utilized to give students quick help and respond to their questions, which lightens the strain on teachers.

II. NEED OF THE STUDY.

There are now several types of smart digital board software available on the market that can be utilized with a mouse and other hardware devices. However, if there are hardware faults, we must suspend our current task, such as taking notes or creating art, until replacement gadgets arrive. Traditional smart boards are likewise becoming dull due to the lack of new content. As a result, we are developing an AI Virtual Smart Board that can be used to take notes or create art using hand gestures caught by a camera (Webcam). Artificial Intelligence (AI) has the potential to enhance the capabilities of smart boards, making them even more valuable tools in the classroom. Smart boards controlled by hand gestures are an exciting application of artificial intelligence in education. With gesture recognition technology, smart boards can recognize and respond to hand gestures, allowing teachers and students to interact with the content in a more intuitive and natural way.

III. LITERATURE REVIEW

[1] In 2019, Xabdul Halim Abdullah, Mahani Mokhtar, Zakiah Mohamad Ashari, Norazrena proposed a study which reviewed on how students' ability to deal with the world's rapid change depends on their ability to develop Higher Order Thinking Skills (HOTS).

[2] In 2018, Stefan A. D. Popenici and Sharon Ker presented a study about the use of technology in higher education should not be limited to distributing, controlling, and assessing materials. Rather, it should enhance and support human thinking.

[3] In 2018, Iain M. Cockburn Rebecca Henderson Scott Stern proposed a study that AI art is indeed creative and that those who are interested in exploring it have the opportunity to experiment with new technologies and discover new forms of art. The paper emphasizes the potential of computational abstraction processes in re-creating the human psychological process of creating art.

[4] In 2007, Linda Mechling David L Gast presented a study that aims to investigate the effectiveness of using computer- assisted instruction with SMART Board technology to teach sight words to a small group of students with disabilities.

[5] In 2020, Dr.Bushra Saadoon Mohammed Alnoori, Noor Qassim Muhammad presented a study which aims to investigate the effectiveness of using smart board technology in teaching foreign language to schools and universities students.

[6] In 2022, Mingyong Cheng presented a study that aims to define a category of AI art by exploring whether machines can engage in creative processes, demonstrate artistic abilities, and produce results that are considered artistic.

[7] In 2017, Yelin Kim, Tolga Soyata, and Reza Feyzi Behnagh presented a study that proposes a smart classroom system that uses real-time sensing and machine intelligence to enhance learning experiences and communication between students and teachers.

[8] In 2008, Michiel Renger, Gwendolyn L. Kolfschoten and Gert-Jan de Vreede put forward a study that provides an initial overview of the advantages and disadvantages of using interactive whiteboards in collaborative modeling and suggests a research agenda to explore how process support can enhance the efficiency gains of this technology in collaborative modeling.

[9] In 2020, Gabatshwane Tsayang, Tshepo Batane and Aaron Majuta conducted a study in Botswana which showed that the use of SMART boards had a positive impact on student learning across all three domains of Bloom's taxonomy. The study also highlighted the importance of developing digital skills and knowledge, which are crucial for building a knowledge-based economy.

[10] In 2019, Geeta Sharma and Divya Nambiar presented research which indicates that college students generally prefer a combination of traditional and smart board teaching methods to better understand concepts. While students find smart board teaching easy to use and like it, it is not the only factor that aids in recalling content. Teachers' direction and perception also play a crucial role in comprehending various concepts.

[11] In 2011, Melanie K. Handler purposed a study to evaluate the effectiveness of SMART Board technology by examining rates of participation by students, and evaluating the students' ability to complete their work. The study focuses on students with disabilities, including attention deficit hyperactive disorder and other health related disabilities.

[12] In 2020, Hüseyin Akar purposed the study that aims to understand the effect of using smart board on academic achievement. For this purpose, mixed method like quantitative and qualitative methods are combined and used.

IV. Proposed System

The "Smart Art Board Using AI" project is based on Python and its libraries, allowing users to produce artwork using hand gestures on a smart board. The system uses a webcam to track hand gestures and includes libraries such as time, Mediapipe, Open CV2, and Numpy. The project was constructed using the PyChram IDE and will use Kaggle datasets as needed. The use of artificial intelligence has significant effects on both the economy and society as a whole, with rapid developments in the field influencing various industries. The user interface that is made available to the user is how the system interacts, allowing the camera to recognise the user's actions. The gesture recognition process begins when the camera records the trajectory of the user's hand and monitors the fingertip points in accordance to identify the gesture the user made to carry out a particular function.

Following Fig. 3 represents the block diagram of Smart Art Board using AI;

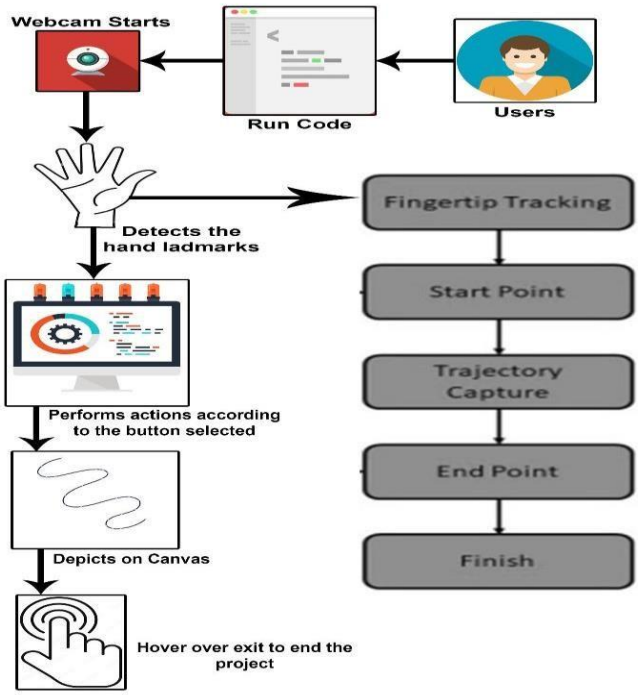

Fig 3: block diagram of the proposed system

3.1 Mediapipe:

It is an open-source framework for building pipelines to perform computer vision inference over arbitrary sensory data such as video or audio. Using MediaPipe, such a perception pipeline can be built as a graph of modular components. This Proposed system uses MediaPipe for High-fidelity hand and finger tracking of user. Machine learning (ML) is used to extrapolate 21 3D landmarks of a hand from just one frame. Whereas current state-of-the-art algorithms generally rely on robust desktop settings for inference, our method delivers real-time performance on a mobile phone and even scales to several hands. We anticipate that making this hand perception capabilities available to a wider audience of research and development professionals will lead to the emergence of innovative use cases, igniting fresh research directions and new application possibilities

3.2 OpenCV:

It is a library of Python bindings designed to solve computer vision problems. Python is a general purpose programming language started by Guido van Rossum that became very popular very quickly, mainly because of its simplicity and code readability. This Propsed system the VideoCapture() function in OpenCV Library to interact with the camera. What we can accomplish is: • Video can be read, shown, and saved. • display the image that the camera captured. An easy-to-use interface provided by OpenCV makes it possible to record live video from the camera (webcam). It displays video that has been converted to grayscale. To record a video, we first build a VideoCapture object. Either the device index or the filename of a movie can be used. The term "device index" refers to a number that identifies the camera. By passing the argument O or 1, we can choose the camera. The video can then be recorded frame-by-frame after that.

3.3 Numpy:

It is a Python library used for working with arrays. It also has functions for working in domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open-source project and you can use it freely. NumPy stands for Numerical Python. This Propsed system uses the host's hardware of Numpy for the system tick timer is initialised using the time init() function.

IV. IMPLEMENTATION

A user interface is provided by the Smart Art Board so that users can access the system. The system has a variety of features that allow users to engage with it and complete tasks that are required of them. The user can choose from a variety of forms to suit their needs, and the erase option enables them to start over by wiping the screen clean**.**

Following are some of the screenshots of the system:

Fig.4 (a) and Fig.4(b) shows the tracking of points for gesture recognition which allows to use different functionalities.

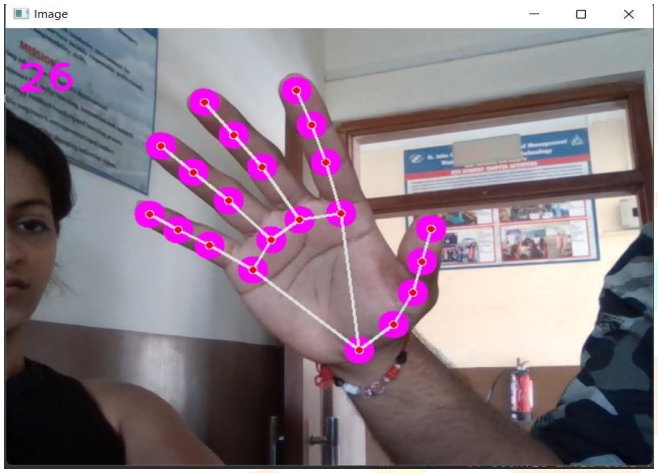

Fig.4 (a): Hand Gesture

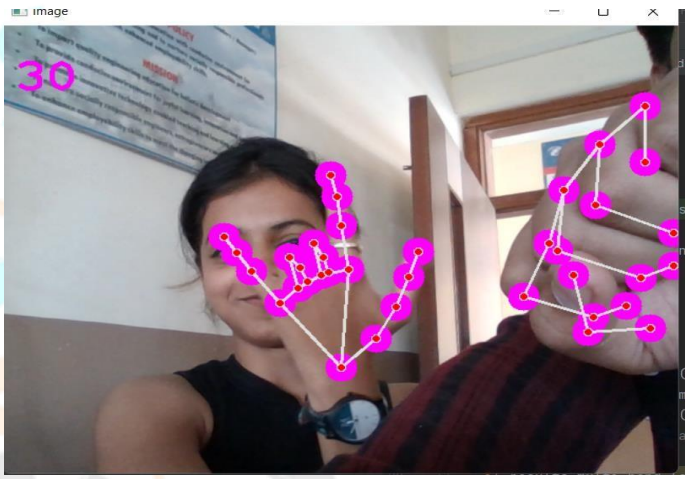

Fig.4 (b): Gesture Tracking

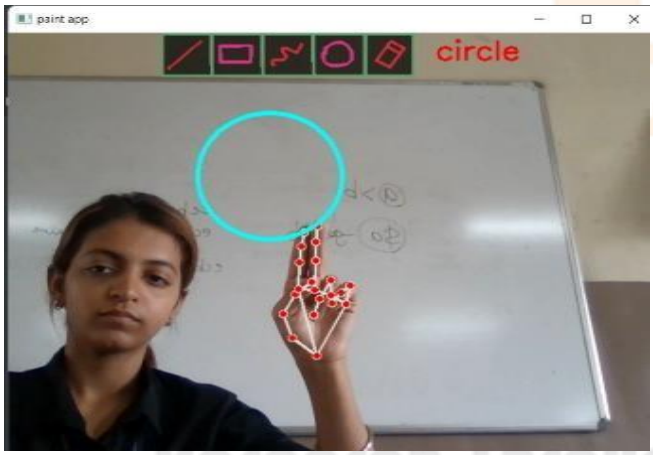

Fig.4 (c): Object selection

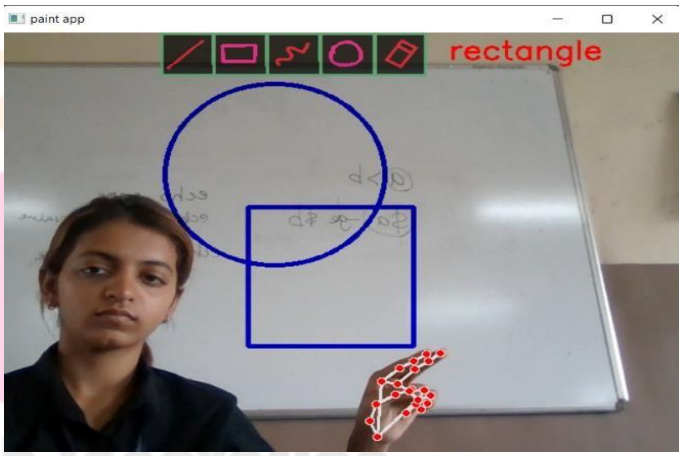

Fig.4 (d): Object outcome

Fig.4 (c) and Fig.4 (d) shows the selection of one of the function and using that function to draw figures

4.1 Creating Cantants

In cantants different variables are initialised by the script, including the current tool, the radius of the circle drawn when picking a tool, and the thickness of the lines generated by the drawing tools. Other variables include the maximum x and y positions for the tool icons. Also, it loads a picture of the tool icons and makes a blank mask that can be used to add artwork over the collected frames. The following Code 01 depicts the variable:

```
ml = 150
max_x, max_y = 250+ml, 50
curr_tool = "select tool"
time_init = True
rad = 40
var_inits = False
thick = 4
prevx, prevy = 0,0
```

code 1: *creating cantants*

4.2 Creating drawing tools

The getTool function, can make marks on the screen by moving their index finger while the tip of the finger is in the camera's field of view. The user can also draw straight lines, rectangles, or circles on the screen by raising their index finger while the "line," "rectangle," or "circle" tool is selected. The getTool function is depicted in the below Code 02:

```
def getTool(x):
if x < 50 + ml:
return "line"

elif x<100 + ml:
return "rectangle"

elif x < 150 + ml:
return"draw"

elif x<200 + ml:
return "circle"

else:
return "erase"
```

code 2: *creating drawing tools*

V. RESULTS AND DISCUSSION

Our "Smart Art Board for Creators and Enthusiasts" project is built on Python and their library, which allows us to create artwork using hand gestures on a smart board. The system will use the webcam to track our hand gestures so we may sketch by waving our hands in the air. Numpy, Open CV2, Mediapipe, and time libraries were employed. This project was created in the PyChram IDE.

We successfully implemented the project i.e., Hand gestures or and tracking are recognised by the trajectory points specified and they are Human hand trajectories have been recorded and analyzed in an experimental supervisory control interface. There are multitudinous gatherings and websites that intend to help preceptors by giving Smart Board studies and exercises. There are multitudinous ways that a Smart Board can be employed as a part of a classroom.

VI. CONCLUSION

With the literature review and the research gaps we have proposed a system in which The Smart Board can admit and can be recognized by the application. Application will allow you to write and move things around without actually touching the screen. Mediapipe library is use to mark the trajectory points of the hands. Initially the project is an art board which is controlled through hand gestures in air using AI and ML. Multiple other libraries are used to calculate the time of the time frames of the trajectory points. The production and qualities of a wide range of goods and services could be directly impacted by these advancements, with significant effects on competition, employment, and productivity. However, as significant as these effects are expected to be, artificial intelligence also has the power to

alter the invention process itself, with implications that could be just as significant and that could eventually eclipse the direct influence.

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