



# INTELLIGENTLY AUTOMATING COMPUTING DEVICES USING HAND GESTURE RECOGNITION

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## ABSTRACT

In this project, we aim to use hand gesture recognition to perform various functionalities on a device and give the user complete automation over the machine.

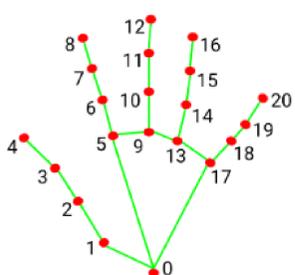
The target is to adjust the volume of the device, brightness of the device, control the mouse and keyboard, use hand gestures for American sign language, and deliver presentations using gesture recognition.

Through this implementation, we will study AI, Machine Learning, Computer Vision, and the associated python libraries in detail. Once the objective is attained, we can dive into the future scopes of the project.

## INTRODUCTION

Artificial intelligence is a branch of computer science that aims to create a computer system that can think like a human. Recognition of hand shape and motion can help improve user experience across a wide range of technological disciplines and platforms. It can, for example, be used to understand sign language and regulate hand movements, as well as to enable the overlay of digital content and information over the physical world in augmented reality.

The research objective is to deliver machine functionalities to create an environment of automation for the device in use. We aim to host some basic features and some advanced features. With the advancements in Computer Vision and Machine Learning, a device could be turned completely automatic.



- 0. WRIST
- 1. THUMB\_CMC
- 2. THUMB\_MCP
- 3. THUMB\_IP
- 4. THUMB\_TIP
- 5. INDEX\_FINGER\_MCP
- 6. INDEX\_FINGER\_PIP
- 7. INDEX\_FINGER\_DIP
- 8. INDEX\_FINGER\_TIP
- 9. MIDDLE\_FINGER\_MCP
- 10. MIDDLE\_FINGER\_PIP
- 11. MIDDLE\_FINGER\_DIP
- 12. MIDDLE\_FINGER\_TIP
- 13. RING\_FINGER\_MCP
- 14. RING\_FINGER\_PIP
- 15. RING\_FINGER\_DIP
- 16. RING\_FINGER\_TIP
- 17. PINKY\_MCP
- 18. PINKY\_PIP
- 19. PINKY\_DIP
- 20. PINKY\_TIP

## CONCLUSION

The application incorporates various features and aspects of Artificial Intelligence and Machine Learning. The application uses hand gesture recognition and palm detection models.

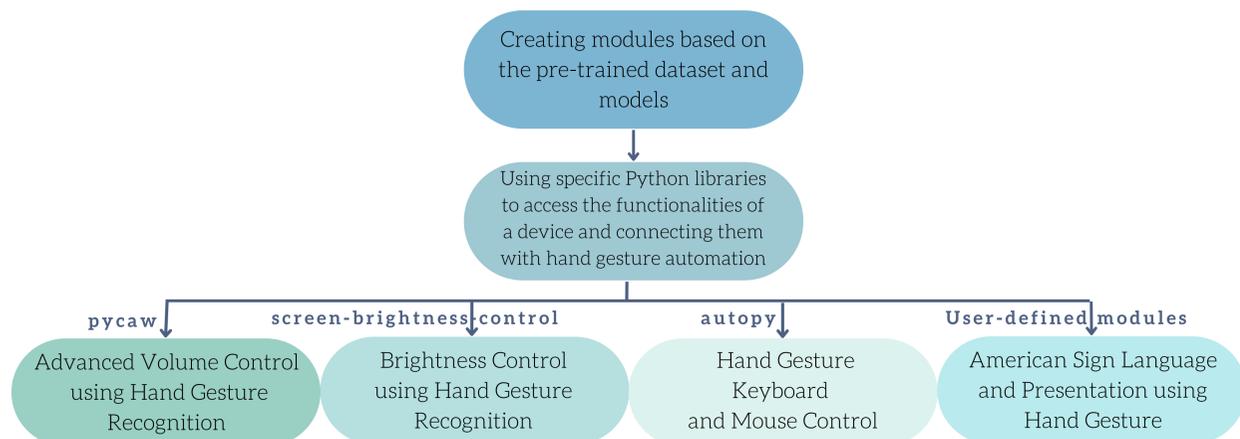
The application shows a high potential for being incorporated with more advanced AI and ML aspects. In addition to hand gesture recognition, the implementation of facial recognition and fingerprint detection can help execute various new features. For example, we can unlock the device, mute or unmute the microphone, access apps, enable gesture recognition for various functionalities and games, and make choices.

## METHODOLOGY

In this project, we have used various concepts of Artificial Intelligence and Machine Learning to control the volume of a given device using hand gesture recognition. Various in-built and self-made python libraries were used to execute the same.

The methodology of this project is based on the implementation of the following major components:

- Hand Landmark and Tracking Module
- Volume Control Basics using Hand Gesture Recognition
- Advanced Volume Control using Hand Gesture Recognition
- Brightness Control using Hand Gesture Recognition
- Hand Gesture Mouse Control
- Hand Gesture Keyboard Control
- American Signal Language with Hand Tracking
- Presentation using Hand Tracking



## RESULTS AND DISCUSSION

The undertaken project was successfully completed and is fully functional to perform a number of functions on a device using hand gesture recognition. Our application was able to access the video capture, recognize hands, and set landmarks with ease.

HAND NUMBER: 1	HAND NUMBER: 2
WRIST: x: 479.69844818115234 y: 575.2140619754791 z: -0.08852521888911724	WRIST: x: 704.9327087402344 y: 688.7345607280731 z: -0.031493548303842545
THUMB_CMC: x: 533.4352493286133 y: 550.7612864375114 z: 12.357069253921509	THUMB_CMC: x: 653.7275695800781 y: 683.7052963972092 z: 3.531612455844879



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