

## **Introduction**

The purpose of this development project is to create an interactive system that recognizes hand gestures in real-time using the MediaPipe framework and applies corresponding visual effects to the video feed captured from a webcam. The project implements gesture recognition for six distinct hand gestures: Thumb Up, Thumb Down, Peace Sign, Horn Sign, Open Palm, and Closed Fist. The system utilizes computer vision techniques from OpenCV and MediaPipe to achieve real-time gesture recognition and effect application.

## **Implementation**

### **Gesture Recognition**

The gesture recognition component is based on the MediaPipe framework, specifically the vision `GestureRecognizer` class. The pretrained model for gesture recognition is loaded from the 'gesture\_recognizer.task' asset, and real-time video frames are captured from the webcam. The frames are then processed by the recognizer to identify gestures within the video stream.

### **Visual Effects Application**

The script defines a set of visual effects corresponding to each recognized gesture. These effects are applied to the video frames to create an engaging and interactive experience. The visual effects include overlays, color maps, and additional graphical elements drawn onto the frames.

## Gestures and Visual Effects

### Thumb Up

A visual representation of a thumb-up gesture is overlaid onto the video feed with accompanying graphical elements, including a green color map, thought bubbles, and image of the associated hand gesture.



Visual Effect: Thumb Up hand gesture effect

## Thumb Down

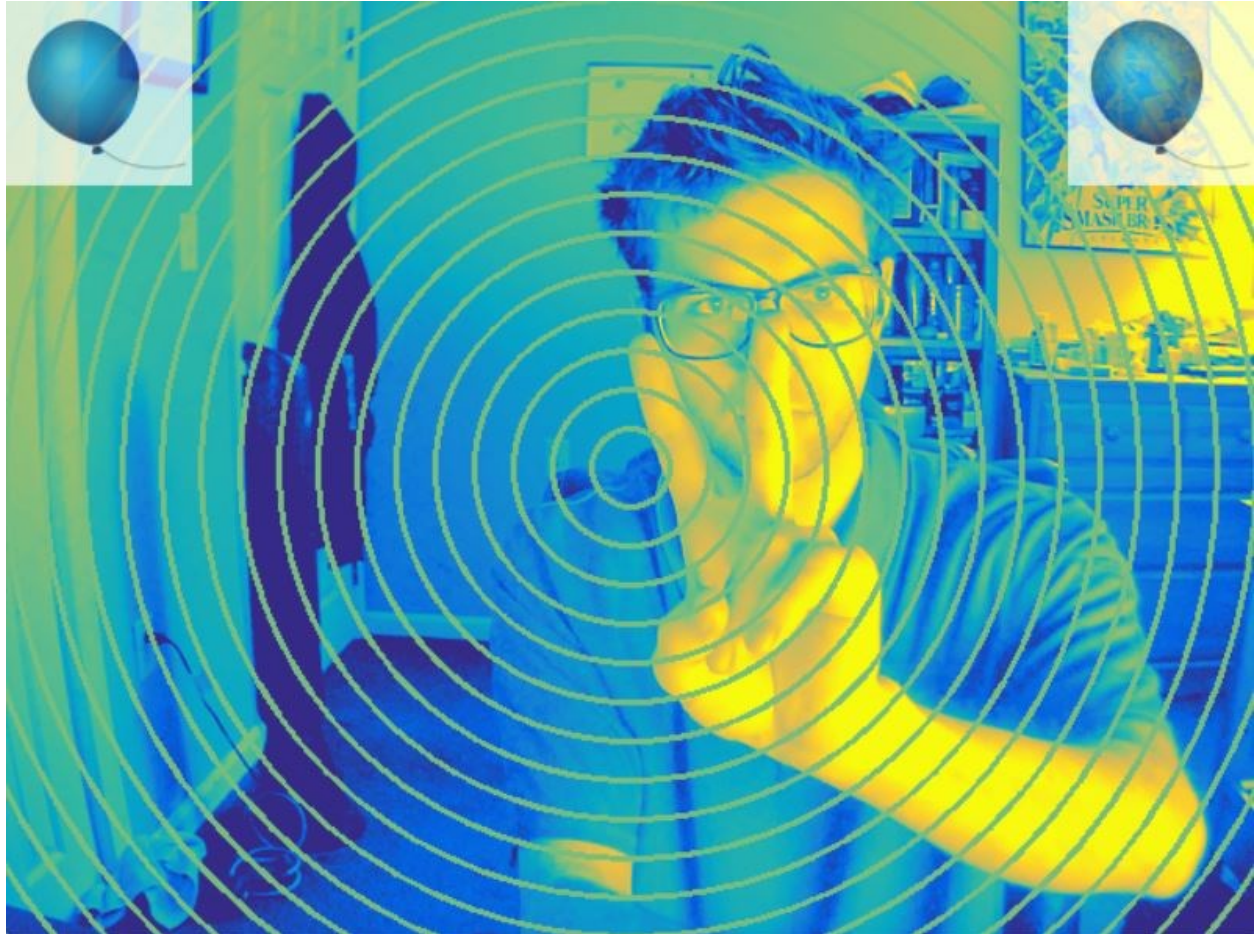
Similar to Thumb Up, this effect represents a thumb-down gesture, overlaid onto the video feed with additional graphical elements, including a red color map, thought bubbles, and image of the associated hand gesture.



Visual Effect: Thumb Down hand gesture effect

## Peace Sign

The system applies a peace sign effect, overlaying balloon images onto specific regions of the video frame and drawing many circles of different sizes at the center of the frame.



Visual Effect: Peace sign hand gesture effect



## Horn Sign

A dynamic effect is applied, overlaying images of an explosion and drawing jagged lines onto the frame to represent the horn hand gesture.



Visual Effect: Horn sign hand gesture effect

## Open Palm

The script applies a visual effect for an open palm gesture, overlaying an image of a happy face at the center of the video frame.



Visual Effect: Open Palm hand gesture effect

## Closed Fist

Similarly, a visual effect representing a closed fist is applied, overlaying an image of a sad face at the center of the video frame.



Visual Effect: Closed Fist hand gesture effect

## Conclusion

This project successfully combines gesture recognition and visual effects to create an interactive system capable of recognizing and responding to six distinct hand gestures in real-time. The integration of the MediaPipe framework, OpenCV, and creative visual effects contributes to a compelling user experience. The script can serve as a foundation for further exploration and development of gesture-based interactive applications.