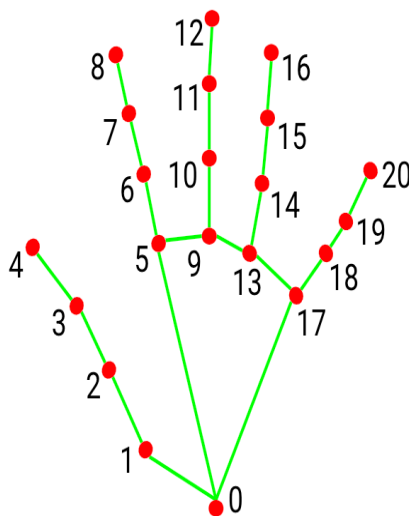# PROJECT REPORT

CS100/CS101 - Class Projects - 2021-2022
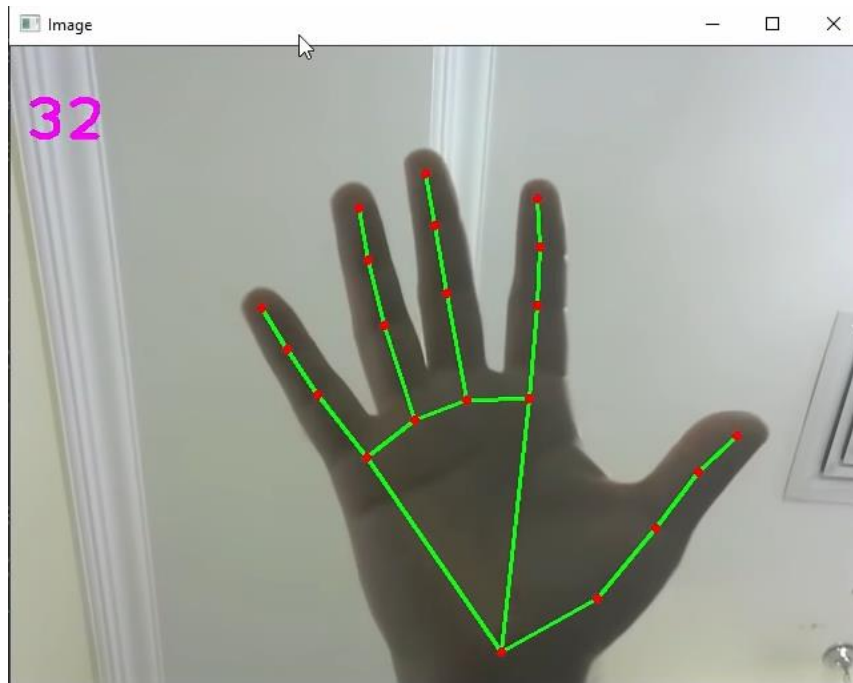### TOPIC: Hand tracking / Finger counting

Sub Topics: Hand Tracking Module, Finger Counter, Multi-HandTracking.

❖ Hand Tracking Module: In this hand tracking program I have created the program to track your hands in real time using your laptop/PC webcam and it locates hand landmarks and connects it using mediapipe and opencv and provides you the (X, Y) coordinates of each hand landmark and its corresponding hand landmark number with reference to mediapipe solution_base.Then this program has been converted into a module so it can be used in future projects.
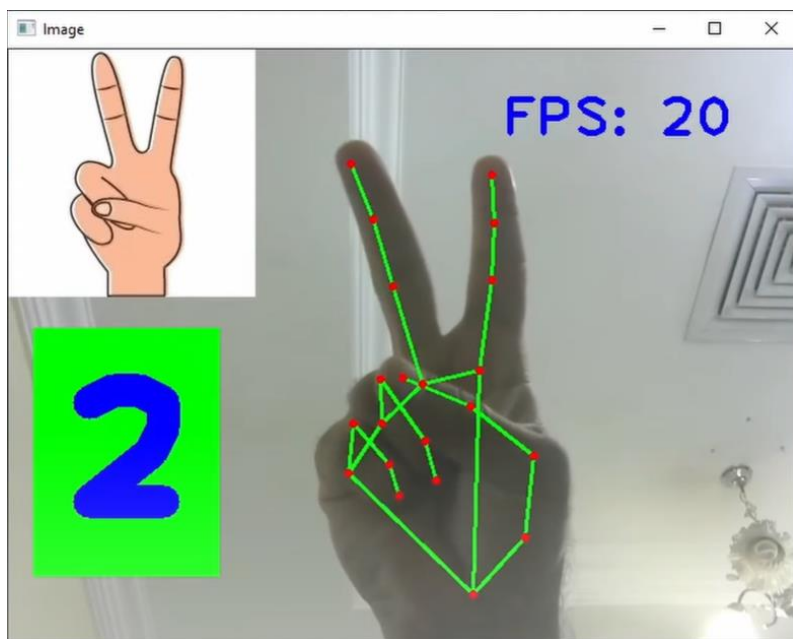
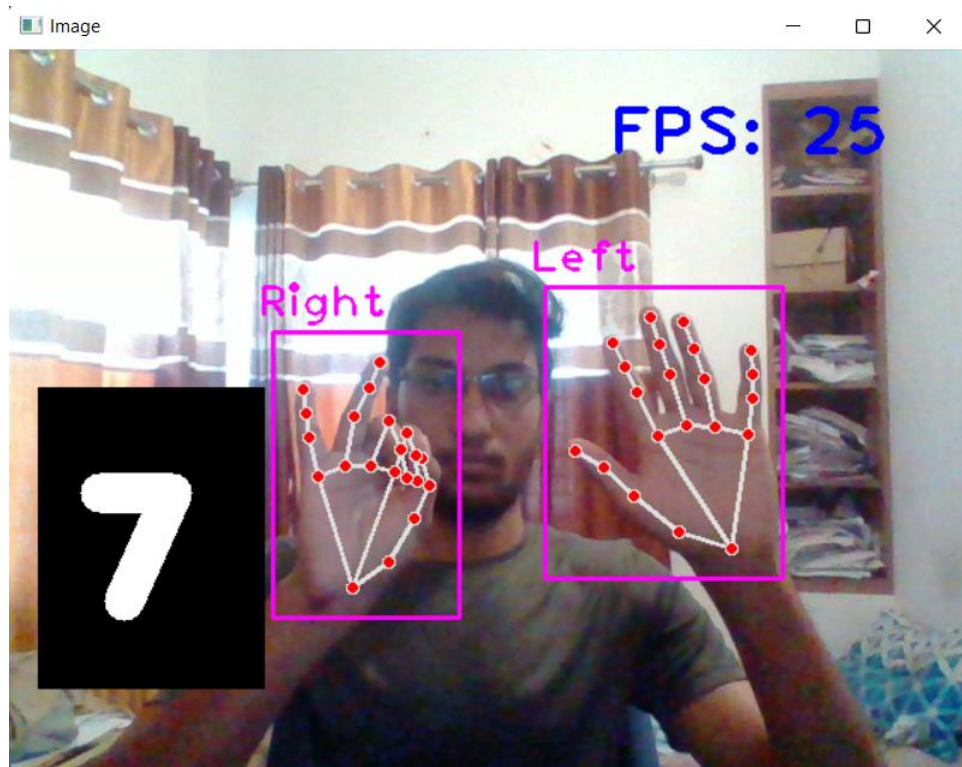|	
0. WRIST	11. MIDDLE_FINGER_DIP
1. THUMB_CMC	12. MIDDLE_FINGER_TIP
2. THUMB_MCP	13. RING_FINGER_MCP
3. THUMB_IP	14. RING_FINGER_PIP
4. THUMB_TIP	15. RING_FINGER_DIP
5. INDEX_FINGER_MCP	16. RING_FINGER_TIP
6. INDEX_FINGER_PIP	17. PINKY_MCP
7. INDEX_FINGER_DIP	18. PINKY_PIP
8. INDEX_FINGER_TIP	19. PINKY_DIP
9. MIDDLE_FINGER_MCP	20. PINKY_TIP
10. MIDDLE_FINGER_PIP	

Hand Landmarks

Tracked Hands

❖ Finger Counter: This program uses the above-mentioned hand tracking module to detect hands and uses the relative coordinates of the hand landmarks to detect which fingers are closed and open and based on this it counts the number of fingers open and displays the number based on the number of fingers open. The program along with number displays the real time FPS (Frames per second) with respect to your webcam quality and resolution using Time module in python. The program also displays an animated image with respect to detected hands.

Finger Counter

❖ Multi-Hand Tracking: This program tracks multiple hands and distinguish them as left and right in real time and finally count the number of fingers open in both hands and a graphical image of the number is displayed on the screen along with client FPS.

Multi-Hand Tracking

Modules Used: Opencv, Mediapipe, Time, OS.

Current status of project:

The project is completed and all the working model can be accessed at my github repository (link given below).

Github link: https://github.com/Launnish2001/Hand-Tracking.git

References: https://www.youtube.com/channel/UCYUjYU5FveRAscQ8V21w81A