

HEAD POSE DETECTION

TEAM - 4

Problem Statement

Head pose detection is the task of estimating the orientation and position of a person's head in 3D space relative to a camera or other reference point. It is an important problem in computer vision, with applications in a variety of fields such as robotics, virtual and augmented reality, human-computer interaction, and security systems.



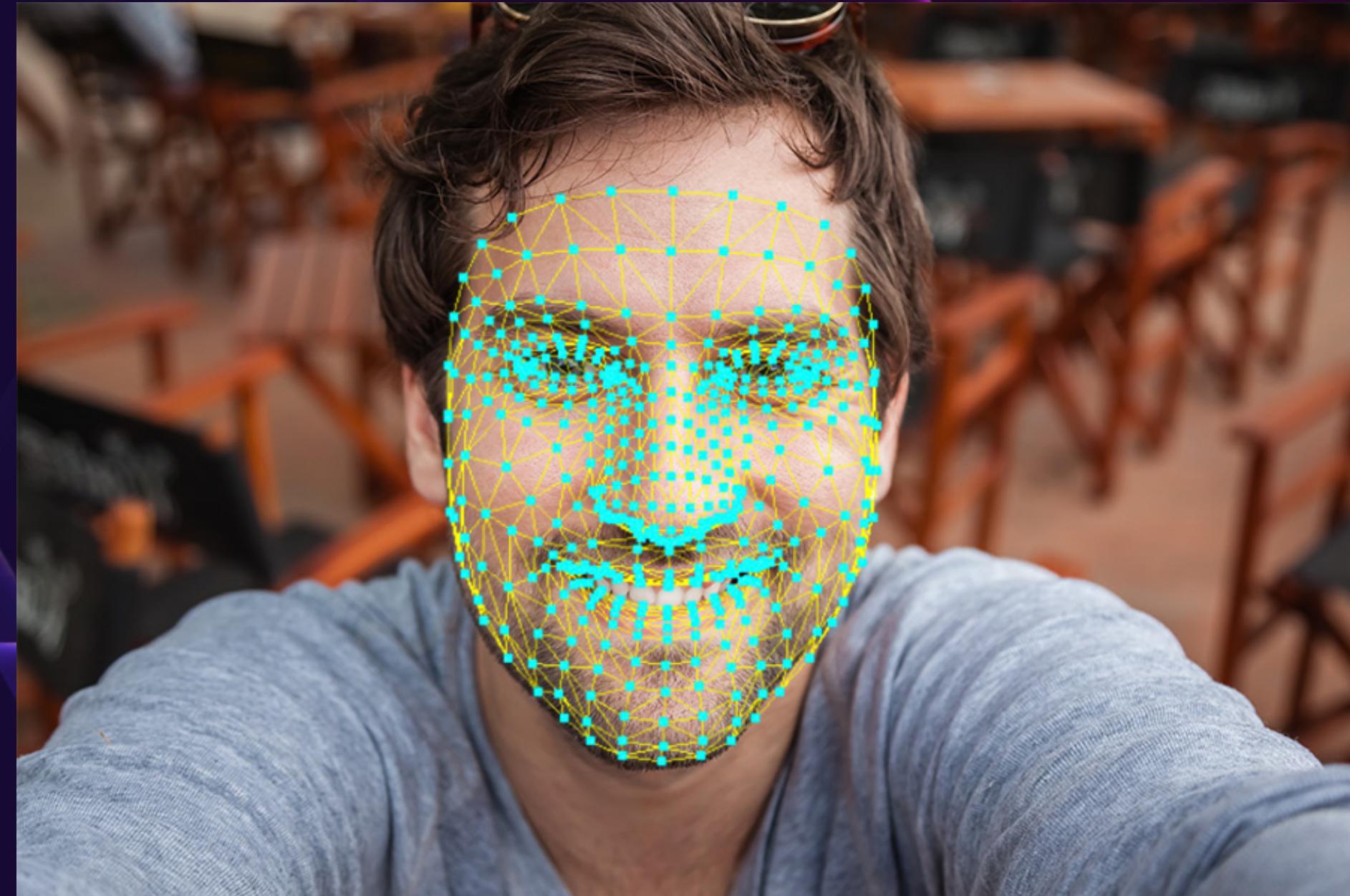


The Solution -What?

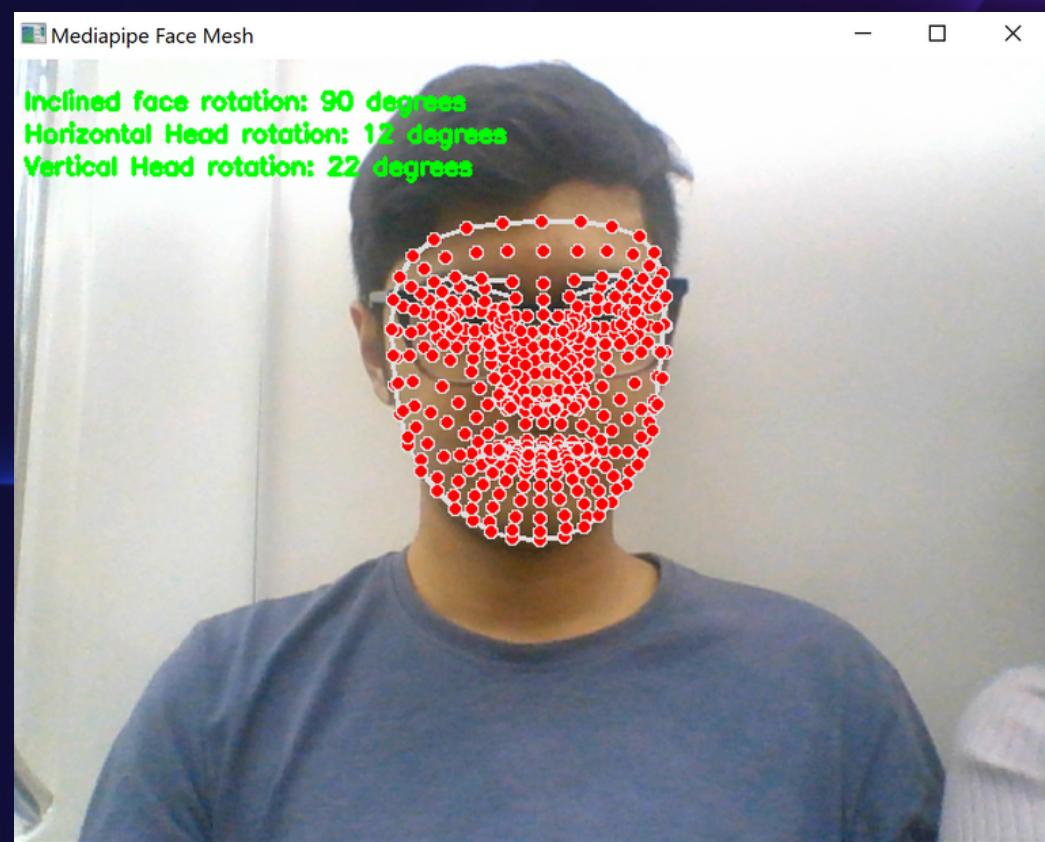
Our head pose detector using OpenCV computer vision and image processing in Python, along with MediaPipe technology, provides a powerful and efficient solution for real-time detection of head tilt in individuals. By analyzing facial point parameters, our system accurately measures the degree of head tilt, horizontal rotation and vertical rotation enabling a wide range of applications in fields such as healthcare, sports training, and gaming.

How it works and Demo

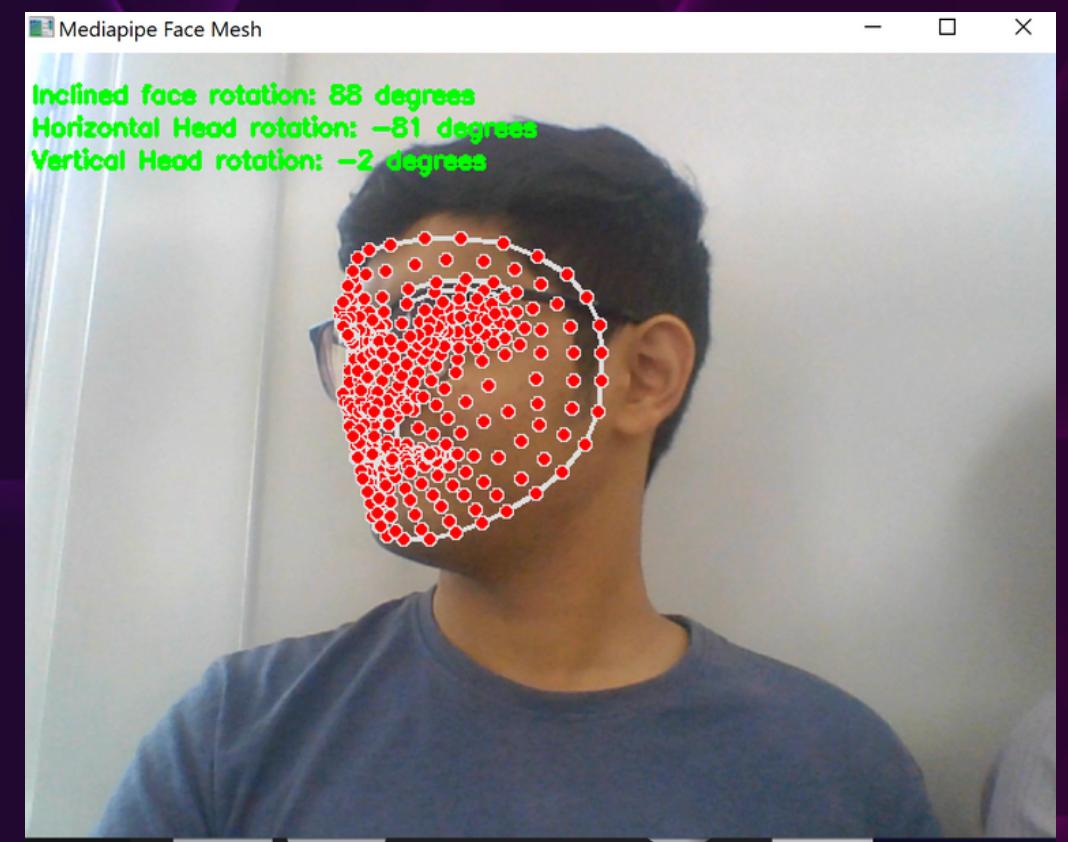
We use the mediapipe facemesh to find the feature points on a persons face. With the use of specific points we are able to calculate the head tilt in either the left-right or the up-down axis.



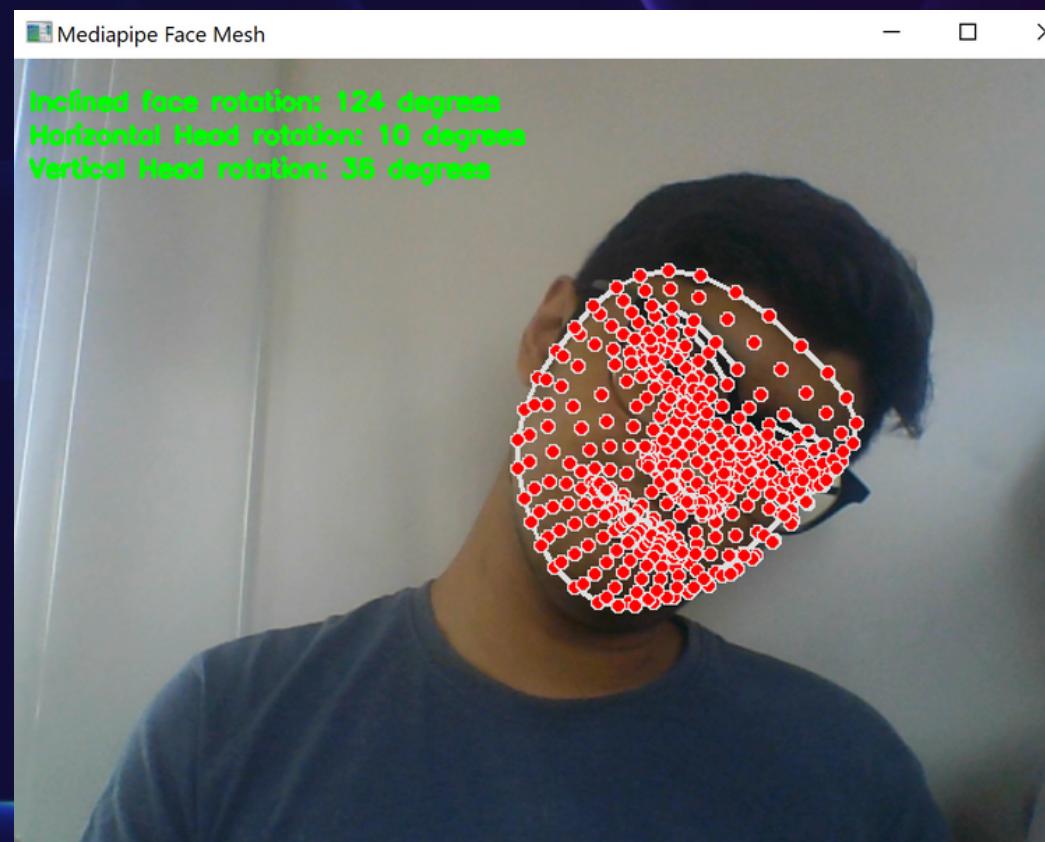
Output



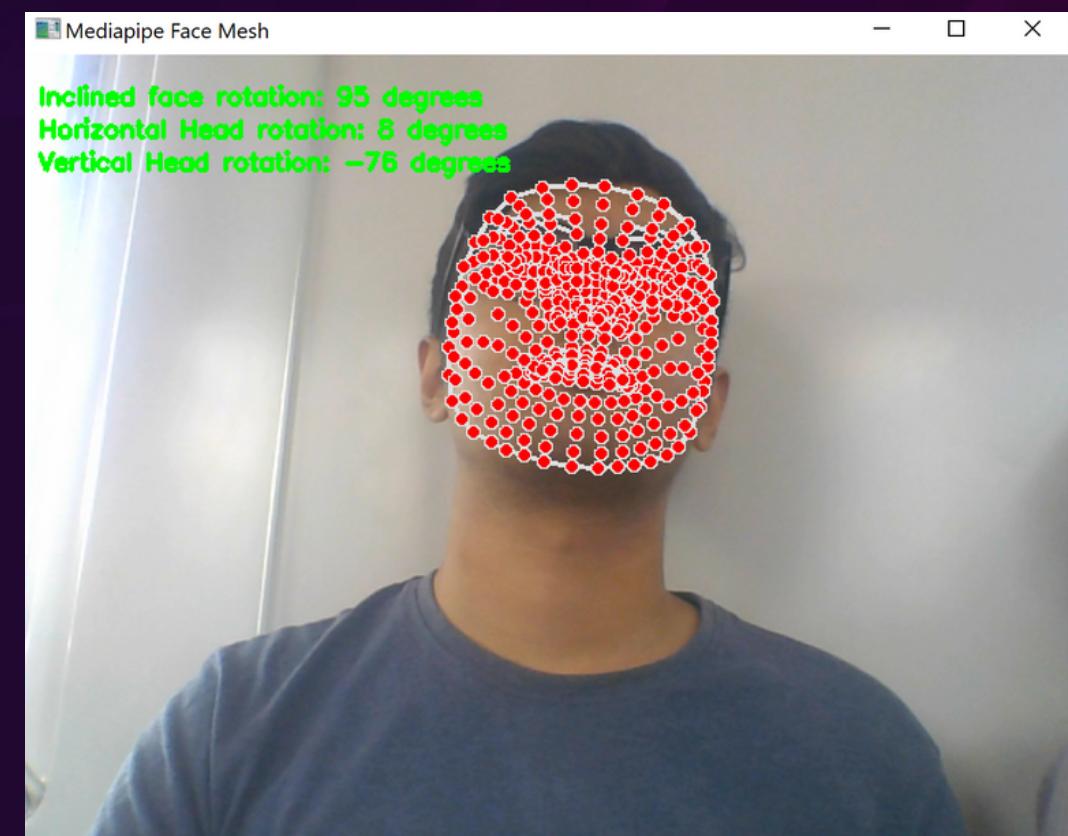
Front Facing



Right Facing
(Horizontal
Rotation)



Left Tilt
(Inclinded face
rotation)



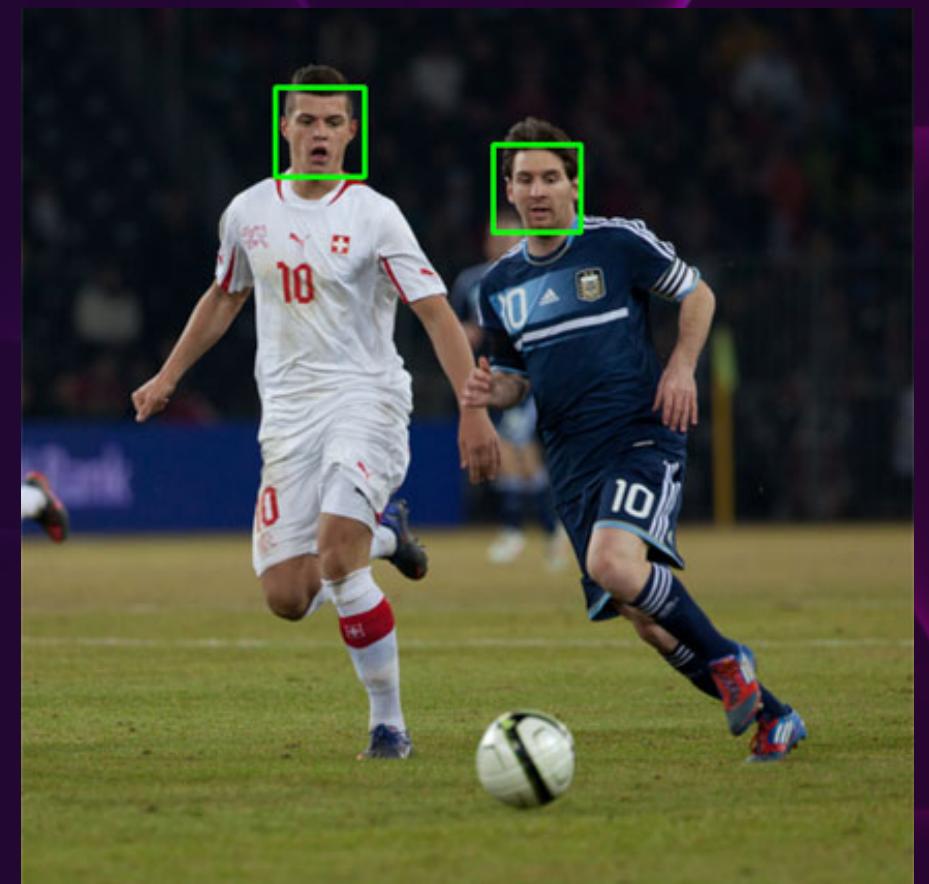
Upwards
(Vertical Rotation)

APPLICATIONS - WHERE?

With our head pose detector, healthcare professionals can use real-time feedback to ensure patients are properly positioned during medical procedures, reducing the risk of injury or discomfort.

Sports coaches can use our system to monitor head tilt of athletes during training, optimizing technique and reducing the risk of injury.

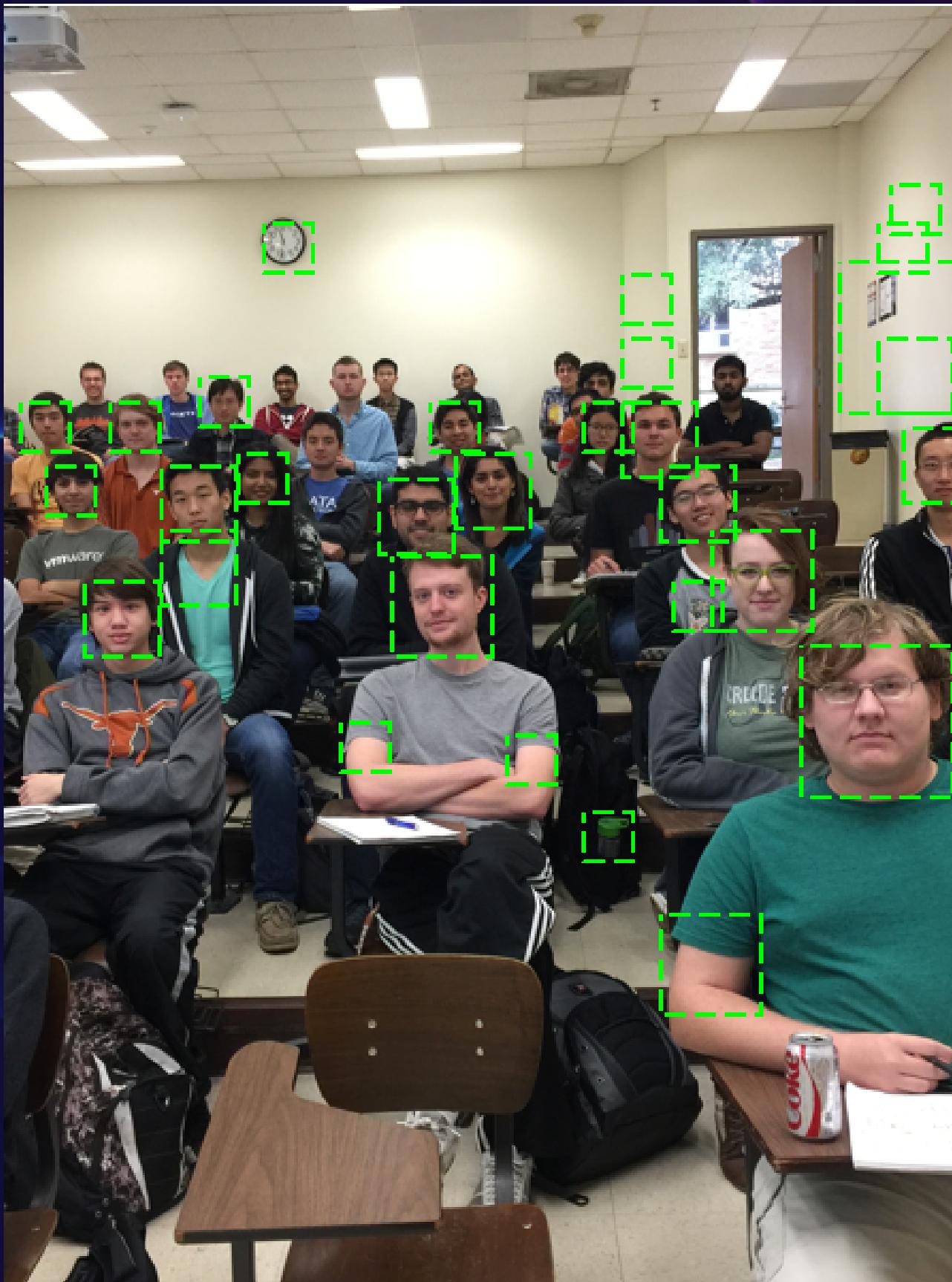
Gamers can benefit from our technology to enhance immersive experiences and enable better gameplay.



Future Improvements

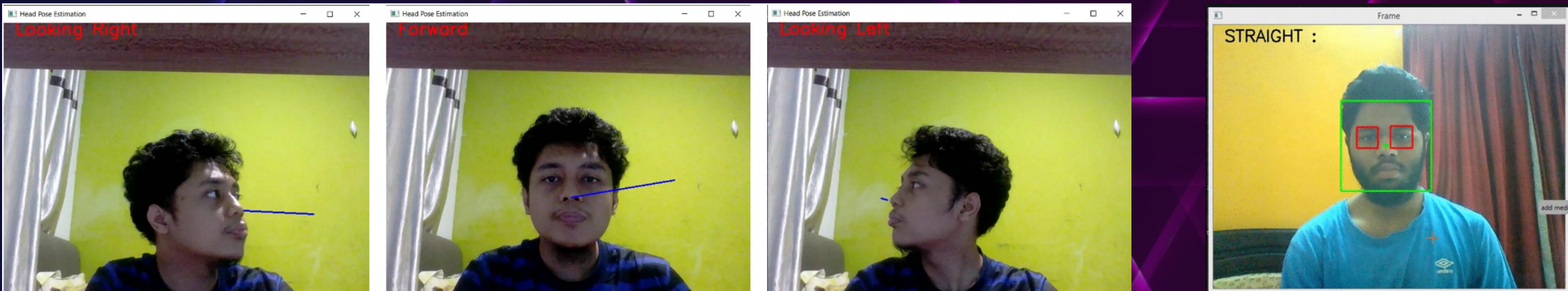
Our system can be modified to track multiple faces simultaneously which would make it ideal for anti-cheat systems in examinations, whether they are in-person or remote.

Further enhancements could include incorporating machine learning algorithms to improve the accuracy of the head pose detection and tracking, as well as integrating other biometric data such as eye-tracking and facial expressions



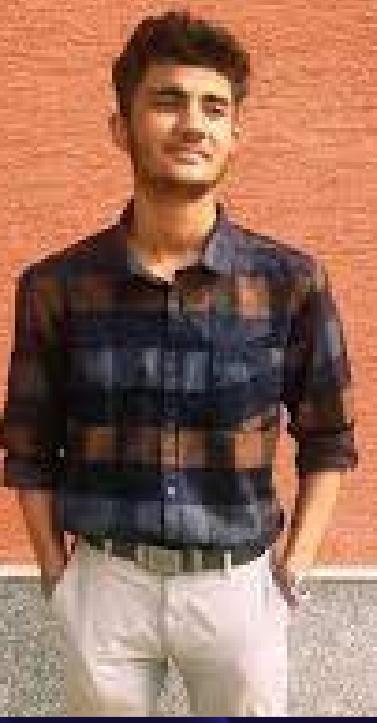
References

-<https://towardsdatascience.com/head-pose-estimation-using-python-d165d3541600>
An article about head pose estimation using python and media pipe, uses various features points and puts it in a matrix to estimate head pose - left, right or forward



-<https://www.geeksforgeeks.org/determine-the-face-tilt-using-opencv-python/>
Determines the head tilt by finding the slope of left eye and right eye feature point coordinates.

THE TEAM



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THANK YOU
