SMART GAMER

ELECTRONICS CLUB

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ABSTRACT/INTRODUCTION

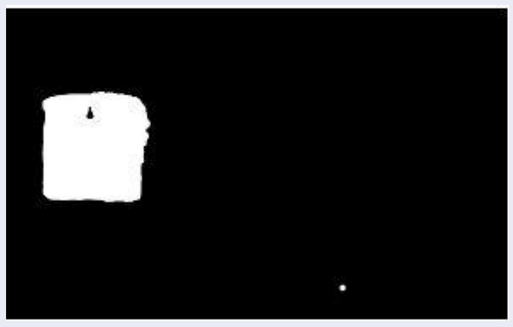
Computer Games are a popular consumer electronics item. The game players find it captivating to interact with games via joysticks, buttons, trackballs, or wired gloves. A computer vision-based user interface could provide these capabilities. Computer games represent a possible mass-market application for computer vision.

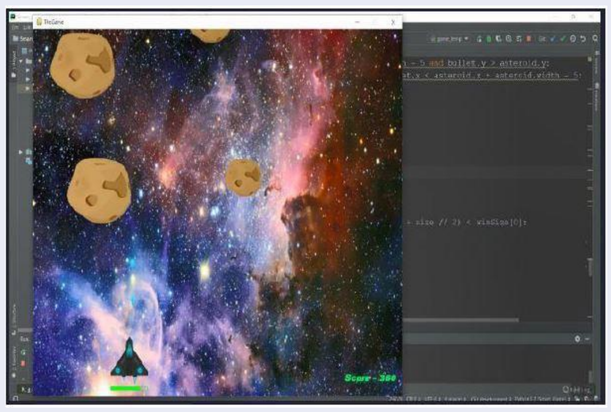
In this project we exploit this mass-market application and try to build and interactive game which can be controlled using a particular object and also build an AI which can play the game on its own.

Hardware Used: Intel RealSense D435i
The Intel RealSense Depth Camera calculates depth and adds depth perception capability to prototype development.

METHODOLOGY

1.Object Detection using OpenCV to control actions in the game using a particular object for which the

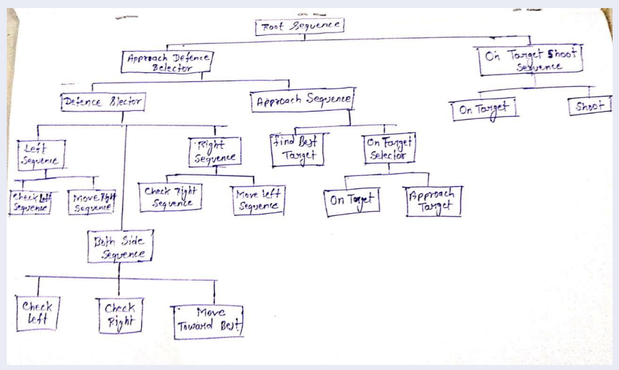


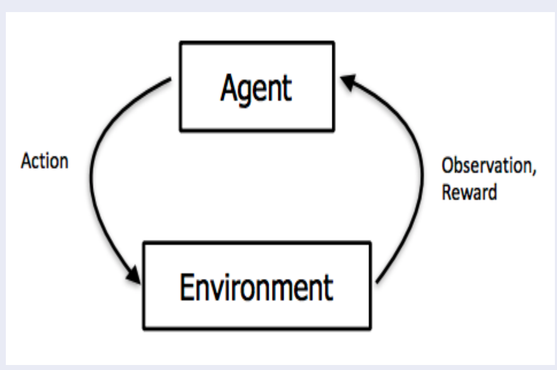


2.**Game Development** using PyGame, which is a good library to make simple 2-D games like space shooter etc.

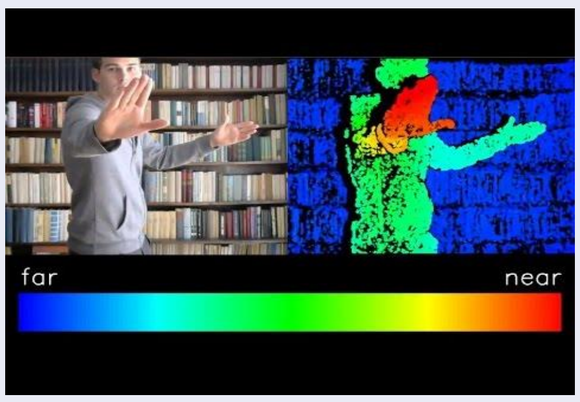
3.Game AI-Behavior Tree:
Mathematical model of plan execution which describes switching between a finite set of tasks in a modular fashion.

4.Game AI-RL:
Applying Reinforcement-Learning to model Q & DQ-Network for the game



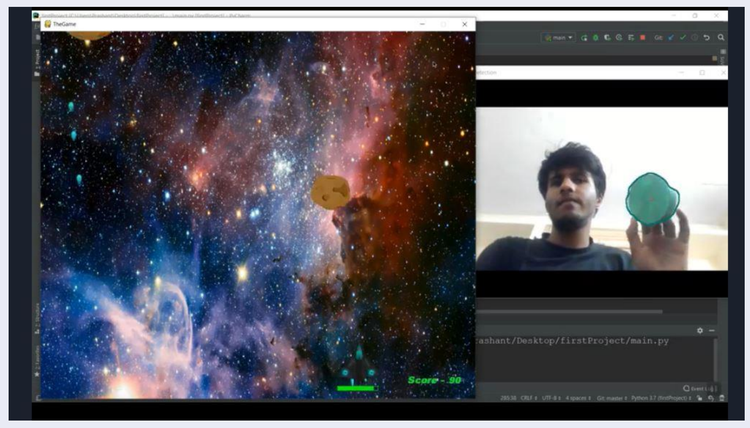


5.Depth Sensing using Intel RealSense camera which tracks the 3-D movements and helps play game using our gestures

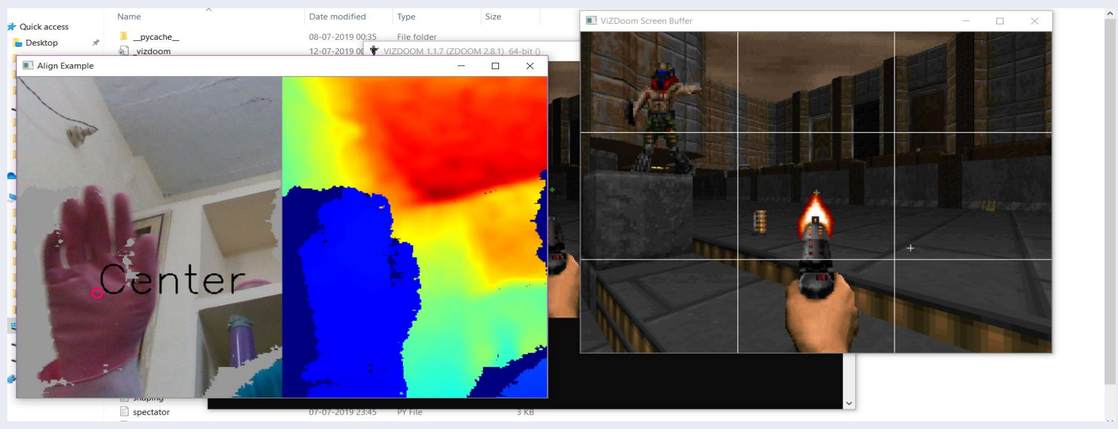


RESULTS

- Using Object Detection with OpenCV we are able to play the shooting game developed with the help of a particular object.



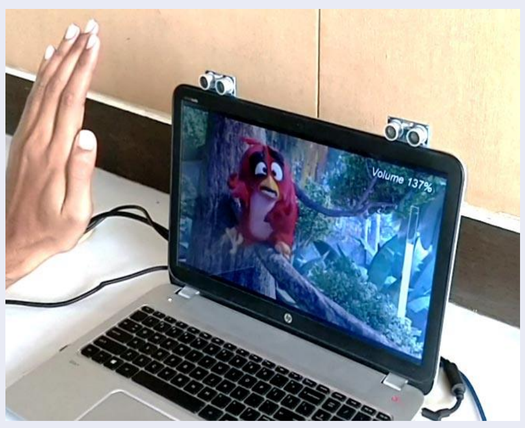
- Depth Sensing camera allows us to play the game using our gestures. We tested this on an open source game ViZDoom.



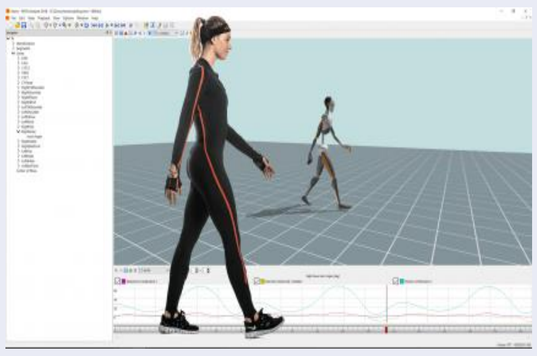
FUTURE SCOPE

- Fine tuning the RL model developed for the game for both Q-Network and DQ-Network

- Controlling game using gestures can also be brought about using Electronic sensors such as Accelerometer and Ultrasonic Transducer.



- Using full body tracking to track the gesture motion of different body parts which can allow us to play the games more interactively.



SKILLS ACQUIRED

- OpenCV
- PyGame
- Reinforcement Learning : Q-Network
- Reinforcement Learning : Deep Q-Network
- Depth Sensing

REFERENCES

- ViZDoom Documentation
https://github.com/mwydmuch/ViZDoom

- PyRealSense2 documentation of Intel RealSense
https://github.com/IntelRealSense/librealsense/tree/master/wrappers/python