ALPHA THE WONDER CAR!

★ CORE MEMBERS :

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★ WORK :

- **ALPHA** -A Multi-Mode car .

We came up with the idea of building a multi-purpose car able to solve a real world safety issue.

We have also added extra features to enjoy robotics with what we have learned in this camp so far!!!

- **Main modes**:
  - ➔ ***Normal Mode*** -Car to be run by up,down ,left ,right arrow keys to run in respective directions .
  - ➔ ***Visual/Hand Gesture Mode***-Direction to car can be given through hands position .
  - ➔ ***Autonomous Mode*** - Self governing mode whose speciality is to protect and Warn people from danger.

★ PROBLEM ADDRESSED:

- **The shrinking forest area has forced some wild carnivores to come out and enter human occupied terrain!!!**

  Because of which frequency of attacks on humans by these animals is on the rise.

- **The major problem we are focusing on is that the life of forest officers is also at great risk!! Working alongside such dangerous animals .**

THE STORY:

Let us suppose our animal is Cheetah-- a hunting machine !!!!!!!

Let our forest officer be denoted by something!! Or just assume it to be a non-moving block here for simplicity purposes. And also assume his car or driving vehicle is parked far away .

The cheetah comes close to the officer and now the life of the officer is in severe danger!!!!!!!

TRACKING CHEETAH-

We can easily track the position of a cheetah if it comes nearby enough to be sensed by any kind of the sensor added in our car .

Example sensors-Thermal sensors can detect living beings nearby,Ultrasonic sensors can detect position accurately ,PIR sensor.

★ OUR APPROACH:

AUTONOMOUS MODE--

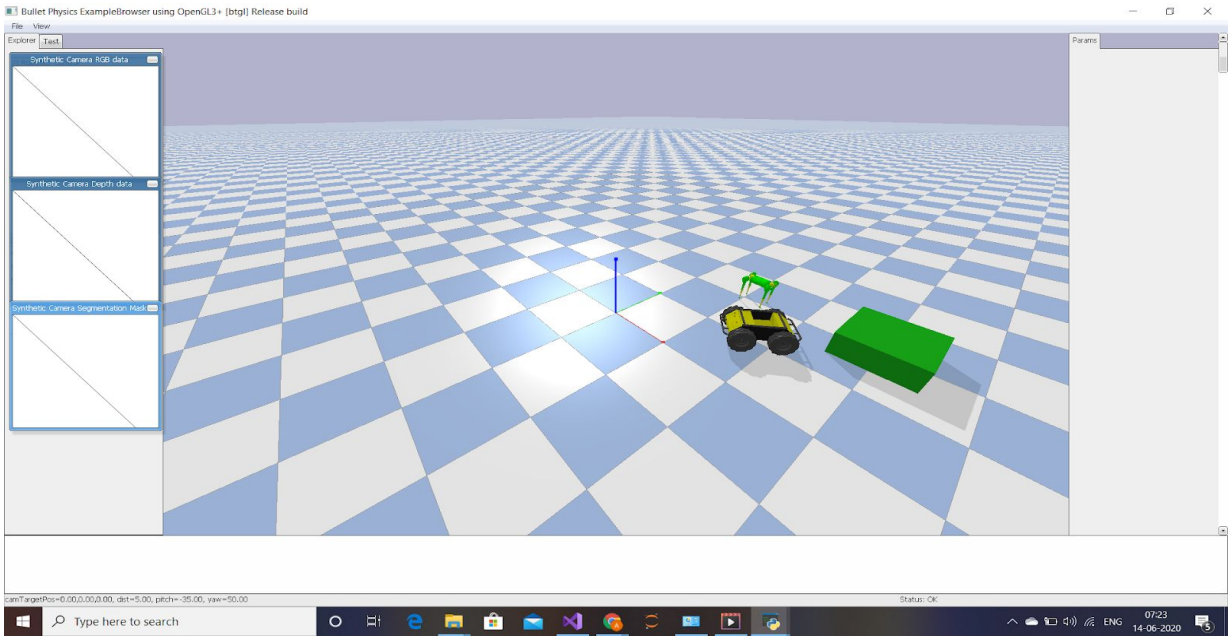
- Our Approach is focused on somehow providing a kind of warning + safety system..

  With constraints of having few inbuilt pybullet models we had to ponder for creating a dynamic warning system which is mobile and has the ability to protect its target!!

HOW OUR APPROACH IS GOING TO SAVE THE LIFE OF FOREST OFFICER IN THE STORY???

Solution ⇔ In Autonomous mode of our Alpha car we have provided a feature which will commence once the enemy has crossed the critical safety distance .The Car will come in between them by self

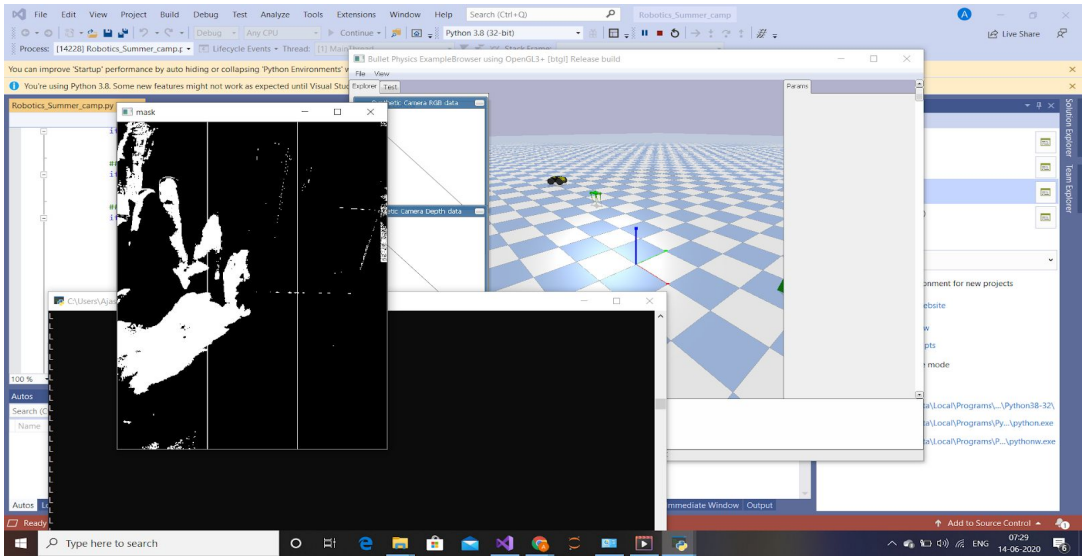
driving itself infront of cheetah's way which will also acts as a warning + saftey system ..As the officer has been warned beforehand he can drive back home happily!!!!!



GESTURE MODE--

The screen of the car is splitted into three parts!

!! Car turns according to the position of the hand in front of the screen!!



❖ HOW TO USE-

NORMAL MODE-

- PRESS→ TO TURN RIGHT
- PRESS ← TO TURN LEFT
- PRESS ↑ TO MOVE FORWARD
- PRESS ↓ TO MOVE BACKWARD

GESTURE MODE-

- PRESS "m" to switch to visual/gesture mode.
- Move the hand on the screen inorder to turn the car.

AUTONOMOUS MODE-

- Press "c" to turn on PID or start autonomous mode
- Press "r" to turn off PID

#Press " p" to take a picture from driver's view

❖ KEY CONCEPTS USED--

NORMAL MODE-

- PYbullet basics

GESTURE MODE -

- Opencv ,numpy
- The screen is splitted into three parts and a mask is created for hand skin color.
- The part in which our hand occupies the most area, the car is turned in that direction.

AUTONOMOUS MODE-

- INVERSE KINEMATICS was used to imitate cheetahs movements on a straight path.
- PID was used to accelerate and decelerate the car which provided stability and also reduced overshooting of the car from desired position.

❖ CONCLUSION :

Our model is just one of the many ways to solve a problem .

And the reality gap is immense as we don't know how a cheetah is going to react to this act of appearing Car!!!

We have gained success in normal mode and gesture mode..

Much more success would be achievable if we finished the "FUTURE WORK POSSIBILITIES" mentioned below ;-)

GESTURE MODE:

In gesture mode if we add droid cam and take video feed of our hand from mobile then the quality of instructions will improve significantly.

PLUS it gives us the facility to control the car by just hand gestures !!

We recommend it to be used at dark places !!!

FUTURE WORK POSSIBILITIES::

- We could add VISION PS to simply avoid any kind of disturbance or unwanted obstacles.
- Deep reinforcement learning could be used to imitate real cheetah's movements.
- Machine learning could be used for better self driving and avoiding obstacles.
- This project could be modified by adding many more obstacles to test its accuracy.

❖ REFERENCES -

ANOTHER FEATURE --

We can add a more lavish feature to control our car that is the **VOICE CONTROL !!!**

From childhood we all wanted to control a car from just our voice commands.

Its implementation is simple -just convert your speech into text and then Car follows the spoken words direction!! The code for this conversion can be taken from here.

➔ Opencv related stuff can be found here.

➔ Pybullet documentation.

THINKING HOW FUN IT WOULD BE IF OUR CAR PARKED SOMEWHERE AUTO DRIVES ITSELF TO REACH US WITH JUST VOICE CONTROL LOL!