How to Launch the files.

1. cd cat_ws
2. source devel/setup.zsh

3. In 1st terminal : **roslaunch minion_robot gazebo.launch**
   It will start gazebo with customized simple world from *minion_world.world*
   You can choose *heightmap.world* by modifying *gazebo.launch* file.

4. If you have choosen *minion_world.launch* then, in 2nd terminal: **roslaunch minion_robot arena.launch**
   Two type of arena are available. Choose by commenting/uncommenting in *arena.launch* file

5. In 3rd terminal : **roslaunch minion_robot robots.launch**
   It will launch the number of minion robots and their originating coordinates.

6. In 4th terminal : **roslaunch minion_robot payload.launch**
   Payload will be placed on the robots.

7. In 5th terminal: **rosrun minion_robot multi.py**
   All robot will start moving and piston will move up/down to maintain the horizontal position of payload. It will suscribe the payload orientation information from "**ns**/gazebo/model_states" and publish the piston position to "**ns**/effort_controllers/ command"

Note:

- <max_contacts>200</max_contacts> in _.world file. Default value is 20, but increased for frictional force contact between payload and piston plate.
- <real_time_update_rate>25</real_time_update_rate> in _.world file. Default is 100, which slides the robots by vibrations. Gazebo limitation.
- In *minion.urdf* a spherical ball joint is made between piston plate and rod's end by placing 3 mutual perpendicular revolute joints. (Junta1, Junta2, Jumta3)
- For the piston, type: "joint_state_controller/JointStateController" and <hardwareInterface>hardware_interface/PositionJointInterface</hardwareInterface> is used.