Task 3.2 Problem Statement

In this task, you will detect the ArUco marker using the ROS packages and USB Camera on Raspberry Pi. This file contains instructions for Aruco marker detection and preparing video for submission.

1. First, make sure that all components (camera and wifi dongle) are connected to Raspberry Pi.
2. Setup SSH connection between Raspberry Pi and PC/Laptop; follow the instruction given in task2 to setup SSH connection.
3. Go to **catkin_ws/src** folder in Raspberry Pi and type the following command in terminal to clone the packages from git:
   a) *git clone* *https://github.com/simubhangu/pal_vision_segmentation*
   b) *git clone* *https://github.com/simubhangu/marker_pose_detection*
   c) *git clone* *https://github.com/pal-robotics/aruco_ros*
4. After successful cloning of packages, navigate pal_vision_segmentation folder and change the git branch to hydro-devel. Type the following command in "pal_vision_segmentation" folder:

   git checkout hydro-devel

5. Navigate to *marker_pose_detection* package to launch the file:

   cd ~/catkin_ws/marker_pose_detection/launch

   roslaunch view viewpoint_estimation_genius_f100.launch

   The above command will launch the node to detect the Aruco marker and publish the ID and orientation of marker on topic "Estimated_marker"

NOTE: Make sure usb_cam node is running for provide camera image to /viewpoint_estimation"

Connection setup on ROS between Raspberry Pi and PC/Laptop:

Setup connection such that Raspberry Pi will be ROS master and PC/Laptop will be a client. Follow the instruction given in task2 to setup connection.

Given-Database:

Marker ID	Information stored in ID
200	Sandy
201	Clay
202	Silty sand
203	Rain Water
204	Ice
205	Snow water
206	Sedimentary
207	Metamorphic
208	Igneous
209	Oxides
210	Carbonates
211	Phosphates
212	Sulfides
213	Native Element
214	Silicates

Problem Statement:

1. Create a python script inside scripts folder of marker_pose_detection package

   cd ~/catkin_ws/src/marker_pose_detection

   sudo mkdir scripts

2. Navigate to scripts folder and create a python file with name " task_3_aruco.py"

You are supposed to write a python scripts to accomplish following:

1. Subscribe the *rostopic* having ID of ArUco marker after launching the "Aruco marker detection" node. Extract information of ArUco ID from that.

2. After extracting ArUco ID from topic, you have to match the ArUco marker ID to data base given above and print the information stored at detected ArUco marker ID.

3. If detected marker ID is not present in the database, print " **No record found of this marker**"

Hint: You can use "rostopic info" to read out the message type

Procedure to complete task:

1. Generate the Aruco marker- open this link and read the information carefully given in this page.
2. You can generate the marker by passing ID of marker. Enter the marker ID to generate the ArUco marker of that ID. Marker size and marker padding must be as:
   Marker Size = 40 mm
   Marker Padding =30mm
3. Click to generate button and this site will generate the Aruco marker of entered ID.
4. Take a print out of entire HTML page. Do not save the image this will change the dimension of marker size and padding.
5. Follow the procedure mention above to launch the marker detection node in Raspberry Pi.
6. Run your python scripts as mentioned in problem statement.
7. One by one place the marker in front of USB camera and check the output in terminal.

Sample video of ArUco marker detection and printing value on terminal is shown in this video.

Hint: We recommend you to test above procedure on your PC first before implementing it on the raspberry pi.

Submissions:

● Create a screen recoding video of **PC (after SSH)** terminal showing output of the scripts. Save the video as <Team_ID>_ArUco_detection.mp4. Upload it in your YouTube account as unlisted video. Upload the YouTube link in Video Submission box in the Task 3 tab.

● After completing the given task **save** your **python script** into **Task-3 folder** with name **<team_id>_task3.py**. Compress this folder in zip format and upload it on the portal.

   Note: Your script will be passed from the several test cases for evaluation. Make it generic

Further, instructions for uploading the video link are provided on portal.