REPORT FOR INTERNATIONAL INTERNSHIP	
STUDENT NAME:	Madhukar Thalore
PROGRAM NAME:	-
UNIVERSITY:	National University of Singapore
DEPARTMENT:	Mechanical Engineering
PROJECT TOPIC:	Development of Autonomous Mobile Manipulator
IITKGP DEPT./SCHOOL/CENTER AND DEGREE PROGRAM:	Civil Engineering, Dual Degree
DURATION OF INTERNSHIP:	9 Weeks
SUPERVISOR NAME:	Prof. Marcelo H. Ang. Jr.

PROJECT DETAILS, OUTCOMES AND SUMMARY (3-4 BULLET POINTS OF WHAT YOU LEARNED AND HOW IT IS GOING TO APPLY TO REAL LIFE):

The end goal of the project was to develop an Autonomous Mobile Manipulator that can collaborate with a human to achieve a certain task. To achieve this, the project will follow an approach based on the Atomic Action Task Generation Framework (AATGF). The frame work consists of four successive stages in which I focused on last stage which consisted of two atomic actions, **Object Recognition and Motion Planning** that included following steps:

- Learning ROS (Robot Operating System) and manipulating ROS package named *ar_track_alvar* for using the library that computes projective transformations and spits out the tag's position with respect to the given frame. These tags were pasted over different objects in our environment for recognizing them and establishing successful Object Recognition.
- For Motion Planning, I configured an Omnidirectional platform for controlling it with a gamepad joystick through ROS which involved following steps:
    - Writing a node to translate the Joy messages (coming through gamepad) into Twist messages and transmit it to the PC104 using UDP packets
    - Writing a C code at PC104 to receive and use the twist messages through Forward Kinematics coming as UDP packets to move the platform in unstructured environment
- The future prospects of the project include controlling the omnidirectional platform through gamepad for creating map of laboratory environment. The same environment will be used for autonomous navigation.
- The end result of this project will be used for performing different tasks in collaboration with human, e.g., making a coffee in a kitchen environment or stacking up things in factory outlets.

OTHER ACTIVITES:

In addition to performing research at Advanced Robotics Center, National University of Singapore, I attended innovation festival **Innovfest Unbound 2019** where I interacted with different people from robotics world about their research ideas, research work (exhibited in the festival) and state-of-art in robotics.