**Project Title:** Creating an assembly of parts using a team of robots

**Team Members:**

- Pancham Kamdar

- Sanket Kavathekar

**Objective:**

In this project we aim to use the multi robot system to simultaneously/sequentially perform the tasks allocated to individual robots. We plan to apply object rearrangement for manufacturing a product made up of smaller parts by assembling them and implementing the locking/groove mechanisms (Similar to Lego construction). The project aim is to evolve into building complex assemblies of industrial systems or machines using multi robot systems with precision placement. The idea is that the individual robots will follow unique paths with an allocated task at a rendezvous point, where it interacts with other robots to sequence the assembly operations.

**Methodology:**

The aim is to have proper task assignment, co-operation in transport of parts and their assembly (by use of fasteners or locking mechanisms).[2] We plan to be inspired from the processes similar in the Ikeabot furniture assembly system,[1] meaning every individual robot will be allocated either the transport of part or part assembly task based on the system. Although the assembled product may not be as complex, the assembly requires a multitude of operations coordinated with each other to achieve the desired goal. Gazebo will be used as the simulator and the number of robots will be 6. The possible methodologies that will be explored will be conformant planning[5], specifically learning belief- space transition models, hierarchical planning approach[2], geometric symbolic planner[1], a novel resource based task allocation algorithm[4], and one will be chosen amongst them to be implemented based on the object we choose to manipulate for demonstration purposes.

**REFERENCES**

[1] R.A. Knepper, T. Layton et al. Ikeabot: An autonomous Multi Robot coordinated furniture assembly system, International Conference of Robotics and Automation, May 2013.

[2] M. Dogar et al. Multiscale Assembly with Robot Teams, International Journal of Robotics research, October 2015

[3] F.W. Heger. Assembly Planning in Constrained Environments: Building Structures with Multiple Mobile Robots, Carnegie Mellon University, Robotics Institute, August 2010.

[4] D. Lee. Resource-based task allocation for multi-robot systems, Kumoh Institute of technology, March 2018

[5] Ariel Anders et al. Planning Robust Strategies for Constructing Multi-object Arrangements, Computer Science and Artificial Intelligence Laboratory Technical Report. MIT, January 2017