

# Progress Presentation-II

e-Yantra Summer Internship-2018

## A System for Solving Jigsaw Puzzle using Multiple Robots

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Kiran Suvas Patil

Mentors:  
Abhinav Sarkar, Kalind Karia

IIT Bombay

June 22, 2018

# Overview of Project

## Progress Presentation-II

Aniket Ananraj  
Navlur  
Ashis kumar  
Maharana  
Kiran Suvas Patil

Mentors:  
Abhinav Sarkar,  
Kalind Karia

## Overview of Project

## Overview of Task

## Task Accomplished

## Challenges Faced

## Future Plans

## Thank You

- **Project Name:** A System for Solving Jigsaw Puzzle using Multiple Robots
- **Objective:**
  - To develop an autonomous system that can solve any Jigsaw Puzzle given its image using multiple robots
- **Deliverables:**
  - 1 Go-to-Goal controller for robot in a given frame
  - 2 Autonomous solving of any Jigsaw Puzzle given just its image
  - 3 Proper documentation and report on solution of the system

# Overview of Task

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Task No.	Task	Status
1	Python, OpenCV, Firebird V Intro, XBee Communication	Done
2	Pose and orientation calculation of 2 Firebird robots using color/Aruco markers	Done
3	Programming the Go-To-Goal Controller for single Firebird V robot. Tuning the PID values to perfection	Done
4	Implementing path planning with Firebird V where obstacles have been placed in arena	Done
5	Detection of jigsaw puzzle blocks using Template Matching	Done
6	Pick and place of blocks - gripper mechanism building	Ongoing
7	Implementing the entire solution for a given jigsaw puzzle	Ongoing
8	Documentation and reporting results	Pending

# Task Accomplished

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- Template matching
  - without rotation
  - with rotation

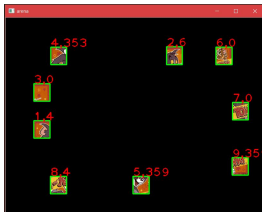


Figure 1: Puzzle block identified with orientation

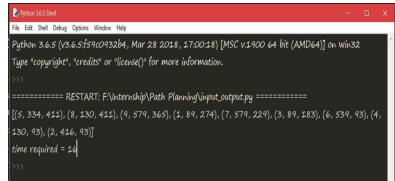


Figure 2: Puzzle blocks with their center

- Introduction to CAD software
  - Fusion360
  - OpenSCAD
- Gripper Mechanism
- Path Planning with collision avoidance between Robots

# First 3D design

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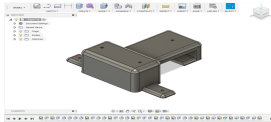


Figure 3: Base

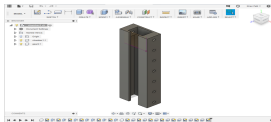


Figure 4: Chamber

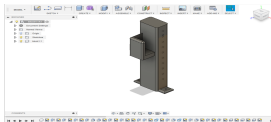


Figure 5: Column

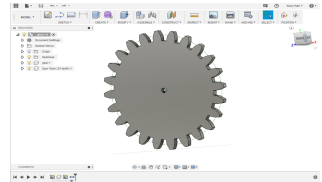


Figure 6: Gear

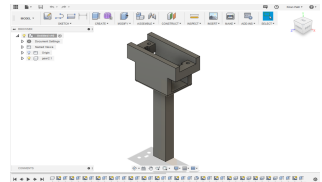


Figure 7: Rack with Servo slot

# Second 3D design

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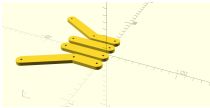


Figure 8: Arms

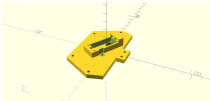


Figure 9: BottomPlate



Figure 10: Claw



Figure 11: Gears

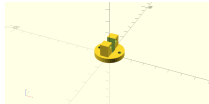


Figure 12:  
ServoMount

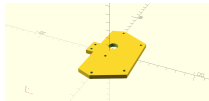


Figure 13: TopPlate



Figure 14:  
GripperPlate

# Latest Design

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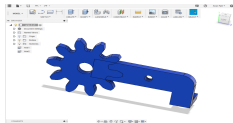


Figure 15: Right Gear

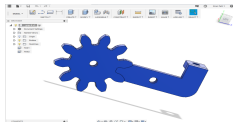


Figure 16: Left Gear



Figure 17: Servo Mount

# Challenges Faced

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Future Plans

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- Right gripper mechanism for the problem
- Block size and arm height(with 3 DOF)
- The size of arena captured from the camera



# Future Plans

## Progress

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- Implementation of whole of the solution to solve a puzzle
- Documentation

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THANK YOU !!!