# Progress Presentation-I

e-Yantra Summer Internship-2018

**A System for Solving Jigsaw Puzzle using Multiple Robots**

Aniket Anantraj Navlur
Ashis kumar Maharana
Kiran S Patil
Mentor: Abhinav Sarkar , Kalind Karia

IIT Bombay

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# Overview of Project



Aniket Anantraj Navlur
Ashis kumar Maharana
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- A System for Solving Jigsaw Puzzle using Multiple Robots

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- Objective: The prime motive of this project is to develop a multi Robot based Puzzle Solver system that can solve a Jigsaw puzzle.

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  1. Solving any Jigsaw puzzle (building a complete solution)

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  3. Documentation (Software/Hardware)

# Overview of Task



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

# Task Accomplished



- Task no.1(Python, OpenCV, Firebird V, Xbee Communication)
  - Python and Python libraries ( pyserial, xbee )
  - Xbee configuration and communication in XCTU
- Task no.2 Robot pose and orientation using Aruco marker
- Cropping the arena of interest(using Aruco markers)
- Sending data packets to firebird robots and parsing the different values from that
  - The data packet is formed by the following values...
    $< T|tar_x|tar_y|P|kp|ki|kd|R|head_x|head_y|tail_x|tail_y|A|deg >$
- Task no.3 Go-To-Goal Controller and PID tuning
- Task no.5 template matching

# Challenges Faced



- finding the right angle(slope) with math library(python,c)
- finding the right library for serial communication(serial,pyserial,xbee,digi-xbee)
- understanding parameters of Xbee ('MY')
- LCD printing the data received on FireBird V

# Future Plans



- Two robots push a single box to take it to its destination

# Thank You



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THANK YOU !!!