Project Title: Cooperative Transport Using Multi-robot System

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Project Group No.: **PES13FYP16**

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Project Overview

About

Goal

Scope

About

Cooperative Transport using Multi-Robot System includes multiple robots, a Master robot and many Slave robots.

To develop cooperative action using one Master robot and many Slave robot, we started our project with one Master robot and one Slave robot, to make sure it is working and multiple slave robots can be used in future.

Goal

We wish to show the cooperative action in a multi-robot system to accomplish a specific task, to search and detect pellets on a platform and deliver the pellet from zone 1 to zone 2 or vice-versa in a game called the robot colony game.

Scope

This project will be a platform for research and learning in multi-robot systems.

System Requirements

Hardware

Software

Hardware Requirement

Arduino Mega

Arduino Uno

Ultrasonic sensor

Ir sensor

Motor driver

Dc motor

Servo motor

Rf Tx and Rx

Batteries

Chassis and castor wheel

Software Requirement

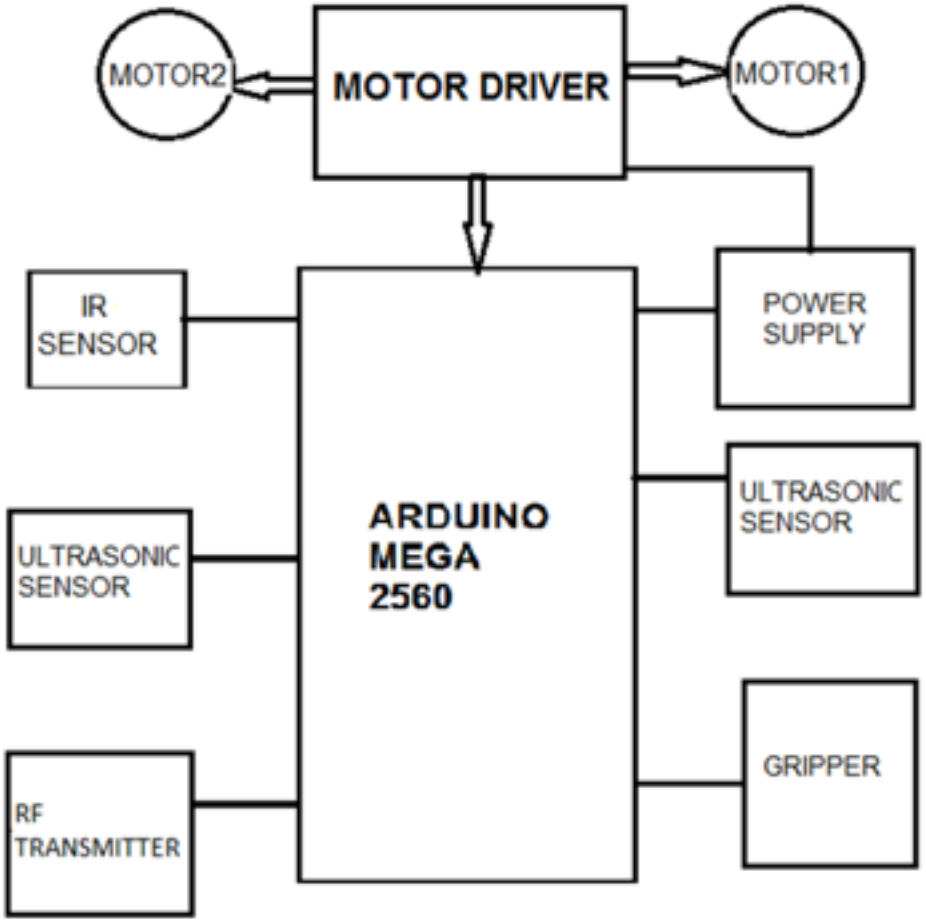
Arduino IDE

Block Diagram

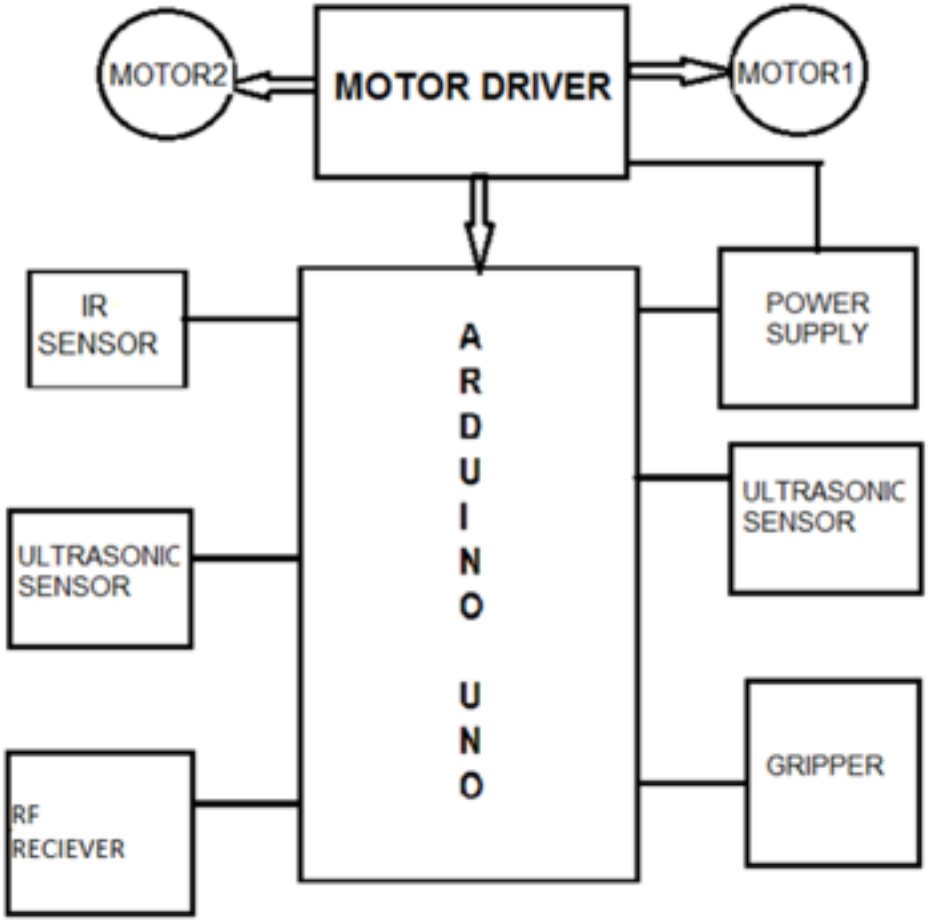
Master Robot

Slave Robot

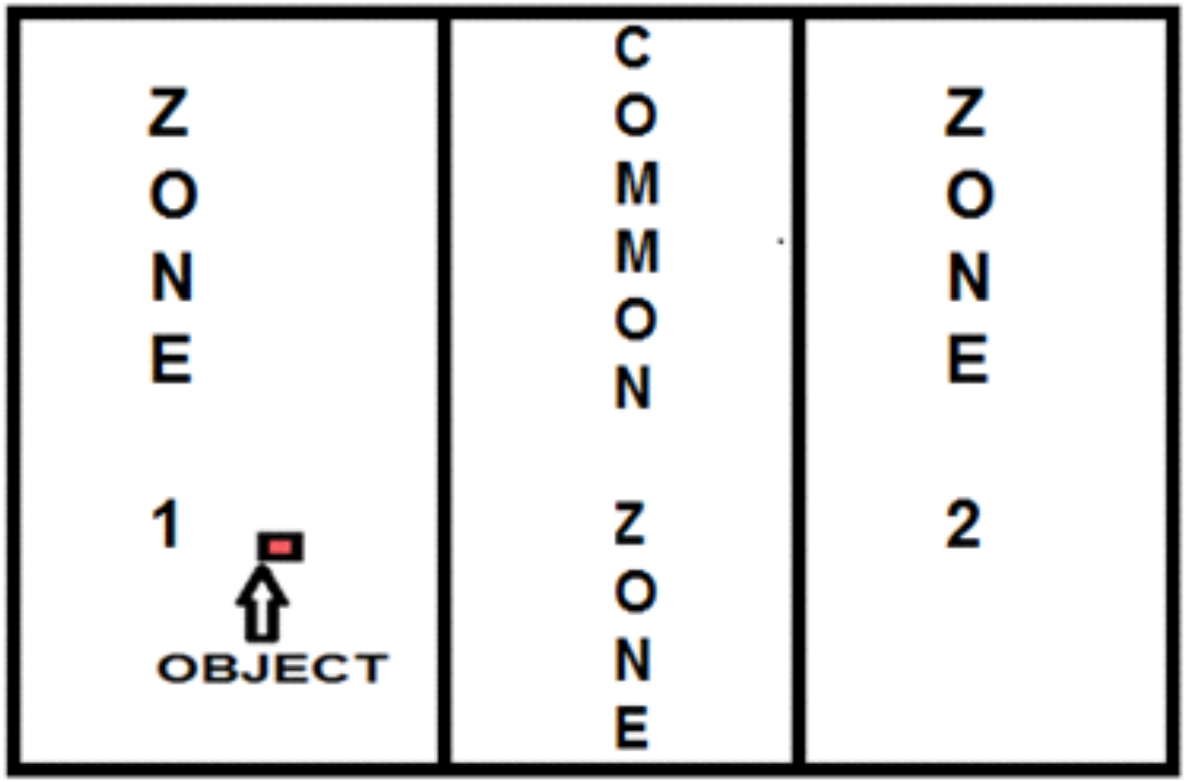
Master Robot



Slave Robot


MOTOR2
MOTOR DRIVER
MOTOR1
IR SENSOR
POWER SUPPLY
ARDUINO UNO
ULTRASONIC SENSOR
ULTRASONIC SENSOR
GRIPPER
RF RECIEVER

Robot Platform

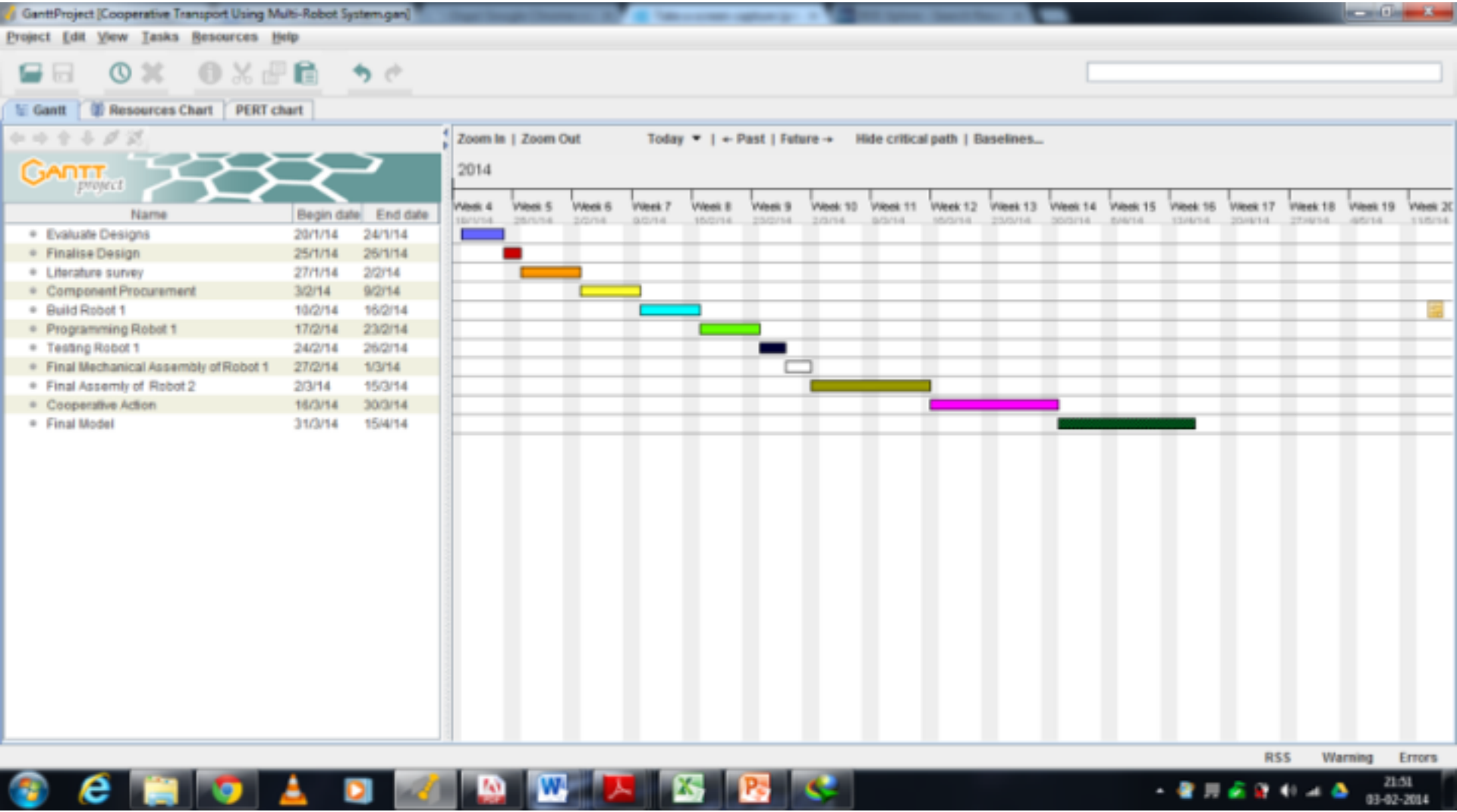


Working Algorithm

According to the design the algorithm for the cooperative mechanism is given as

- Master robot present in zone 1 will search for the object 360 degree.
- After finding the object master robot will pick up the object and place it in the common zone.
- Master robot will return back to the zone 1 after depositing the object in common zone and send a activate signal to the slave robot.
- On activation, the slave robot will move towards the common zone and pick up the object and it will bring it to zone 2.

Project plan (Gantt Chart)



Applications

Precaution and Limitation

PRECAUTION:

- Batteries should be handled with care.
- Do not interchange the 5V and GND connections.
- Avoid placing multi- robot system on a slope.

LIMITATION:

- Object size needs to be smaller than the gripper.
- External RF signals may degrade performance

Conclusion

- The project has been completed and analysis carried out. The cooperative action between the master and the slave robot was successfully demonstrated by the transporting the object.
- In the course of our project there were many reviews and feedback sessions which helped us in improvising our project.
- Through this project we learnt many new concepts and also was a good platform to demonstrate our skills and talents which we have acquired throughout these years.
- This final year project also helped us in learning about time management, team work, perseverance and other managerial skills which would be of great use in the industry.

Future Scope

- Colour sensor can be added to differentiate between different coloured objects
- Number of robots can be increased to improve efficiency of the system.
- Two robots can lift a heavy object together by cooperating with each other.

Refrences

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- (http://arduino.cc/en/Reference/HomePage)
- (http://arduino.cc/en/Tutorial/HomePage)
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- “Design of Robot Colony and its applications” by M Firket Ercan; IEEE swarm robotics etc.
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- Alessandro Farinelli, Luca Iocchi, and Daniele Nardi, Member, IEEE

Questions?