NASA Lunabotics Competition

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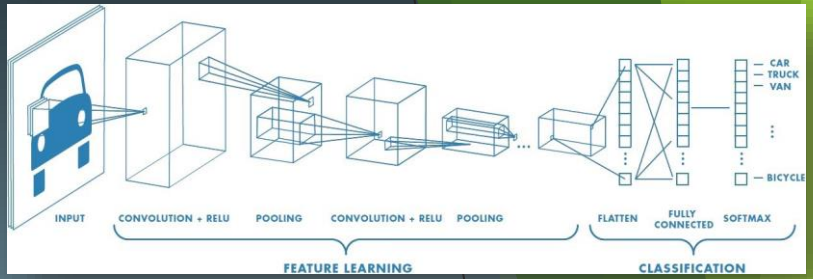
Problem/Objective

- Earth has a limited supply of resources
- Population growth will eventually be unsustainable with the lack of limited resources
- Lunar vehicles are being developed to search other worlds for these resources

Use Cases:

- These robots can be used to gather resources from dangerous/inaccessible terrain on and beyond Earth
- They can also be used to explore and excavate terrain to rescue trapped humans

Key Concepts

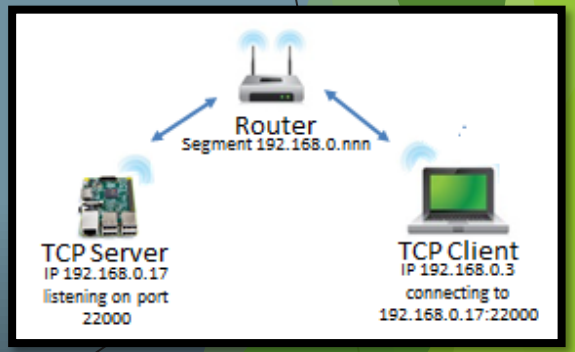


Object Detection:

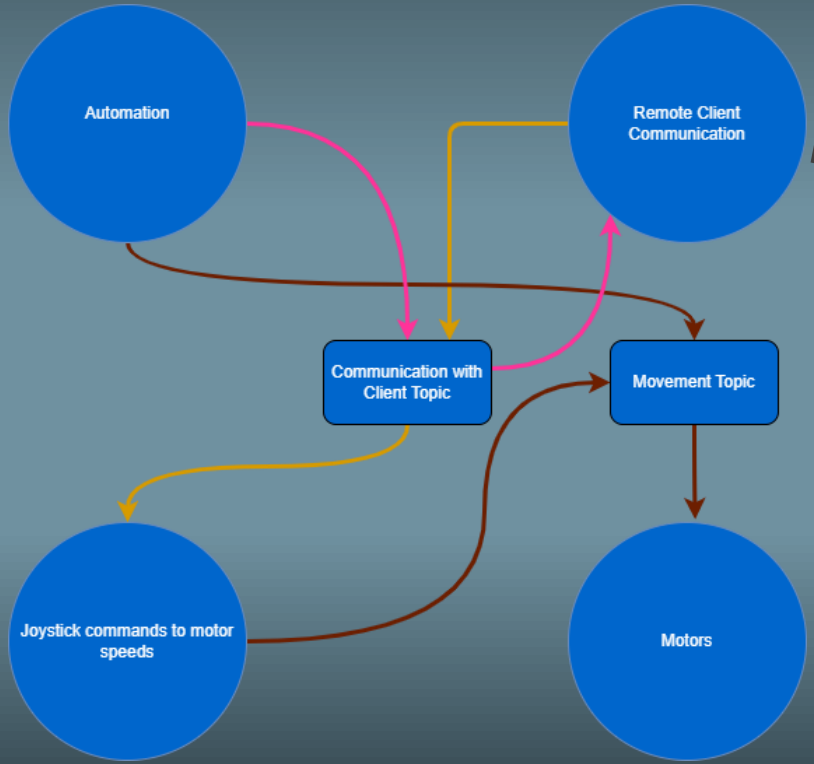
- The task of detecting and classifying individual instances of various objects found within an image
- Practical thanks to advancements in AI including efficient Convolutional Neural Networks

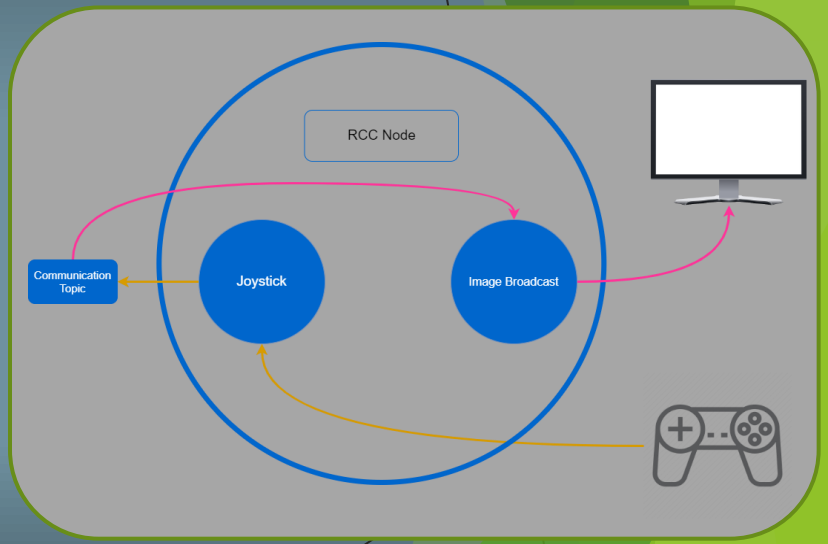
Client-Server Communication:

- The client requests and receives information
- The server handles the request and responds
- Common method of connection is Transmission Control Protocol (TCP)

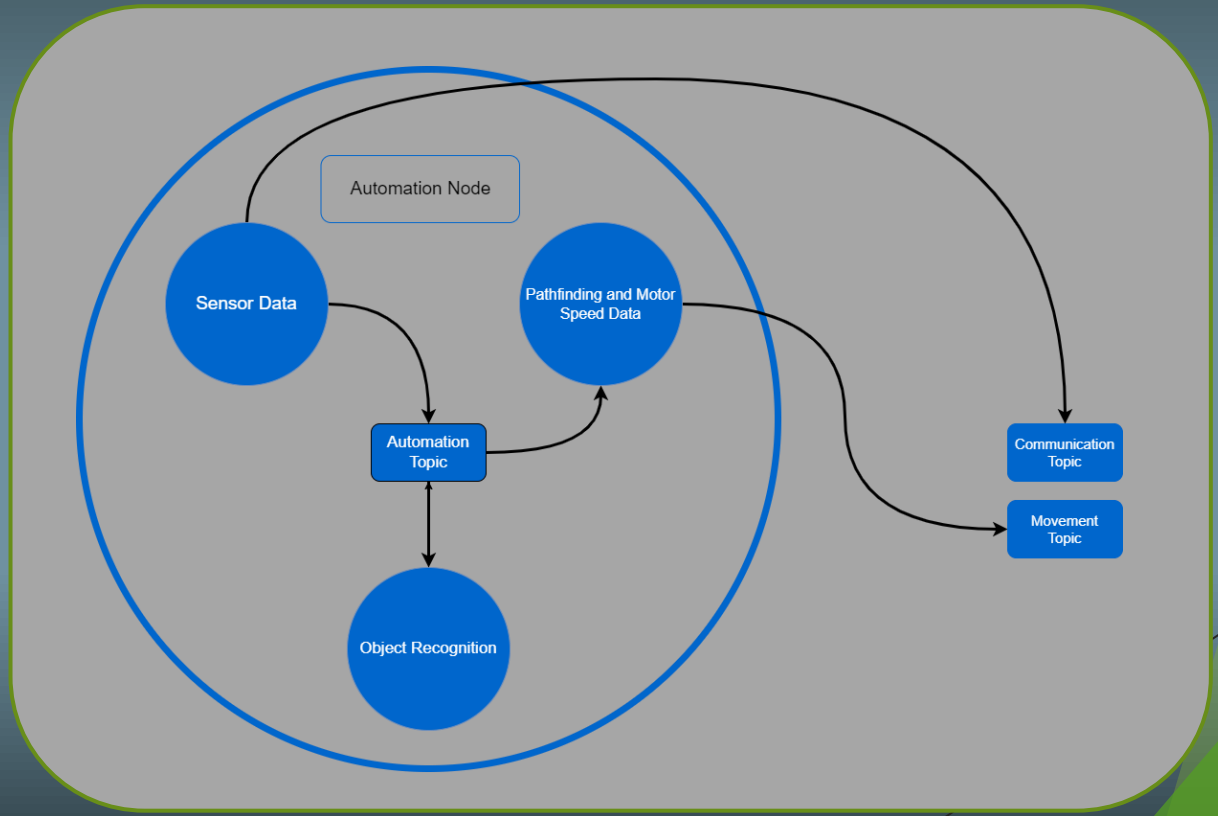


High Level Design





High Level Design (cont.)



Task Schedule

Task	Dates
Implement nodes to control desired motor	1/17 - 1/23
Translating joystick commands into motor speeds	1/17 - 1/23
Communication with client	1/17 - 1/23
Create unit and integration tests for manual control	1/23 - 1/30
Driving autonomy	1/23 - 2/20
Excavation autonomy	2/6 - 2/27
Dumping autonomy	2/20 - 3/13
Create unit and integration tests for each node of autonomous control	3/13 - 4/3

Deliverables

- **Project Website**
  - Will contain project information & proposals
- **Project Proposal/Report**
  - Proposal will explain overall ideas for the project and the report will explain the design decisions made
- **Autonomous Code**
  - We ultimately will program an autonomous robot to satisfy the Robotic Mining Requirements
- **User Control Code**
  - Alongside autonomy is the robot's backup manual joystick control with a simulated delay to match real-world conditions
- **Robot Testing Data**
  - Images will be provided as training/testing data to teach the Lunabot to differentiate objects

Thank You!