

# RBE 3002 SLAM Robot

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# Overview

- Program Design
- ROS nodes
- Node interactions
- What it looks like

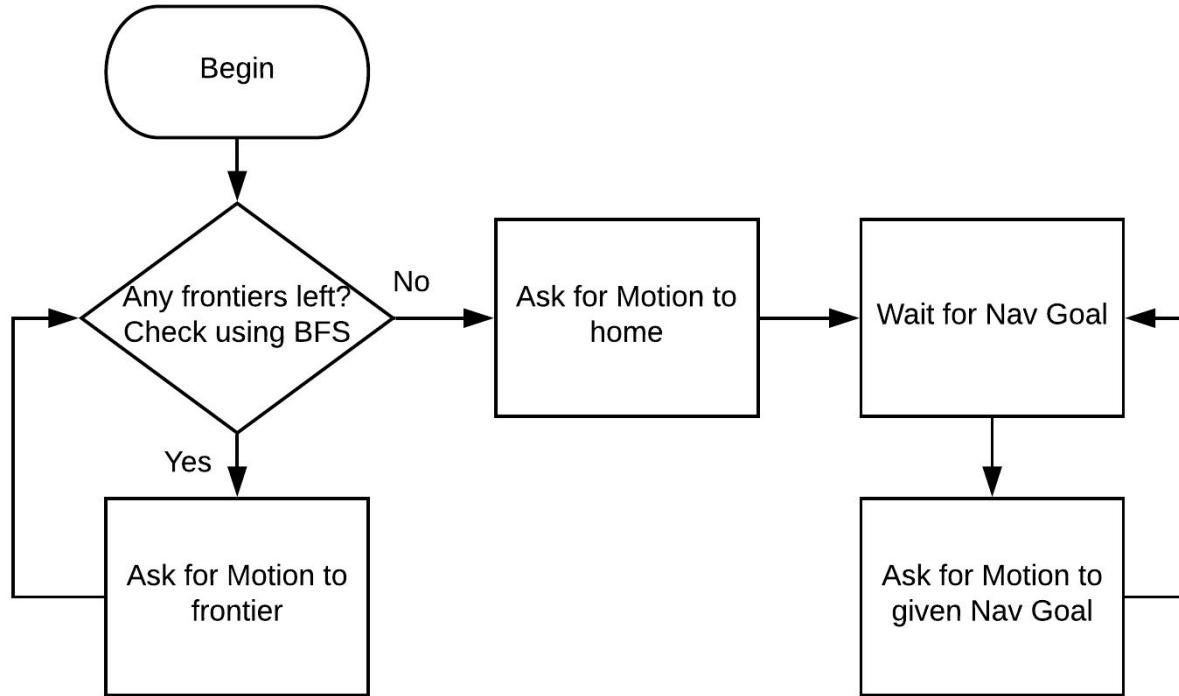
# Goals

- Map an unknown environment
- Use SLAM techniques to localize the robot
- Navigate to a desired locations using optimal path planning

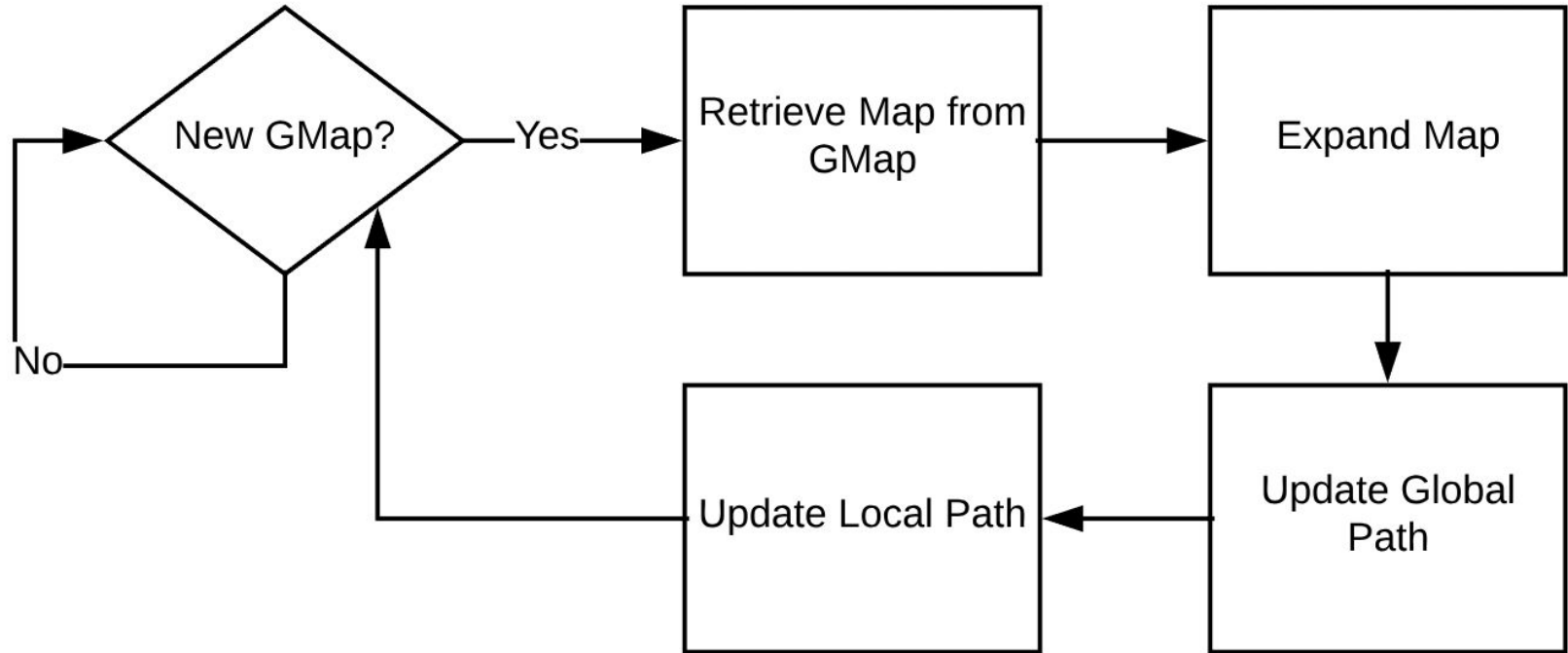
# Program Design

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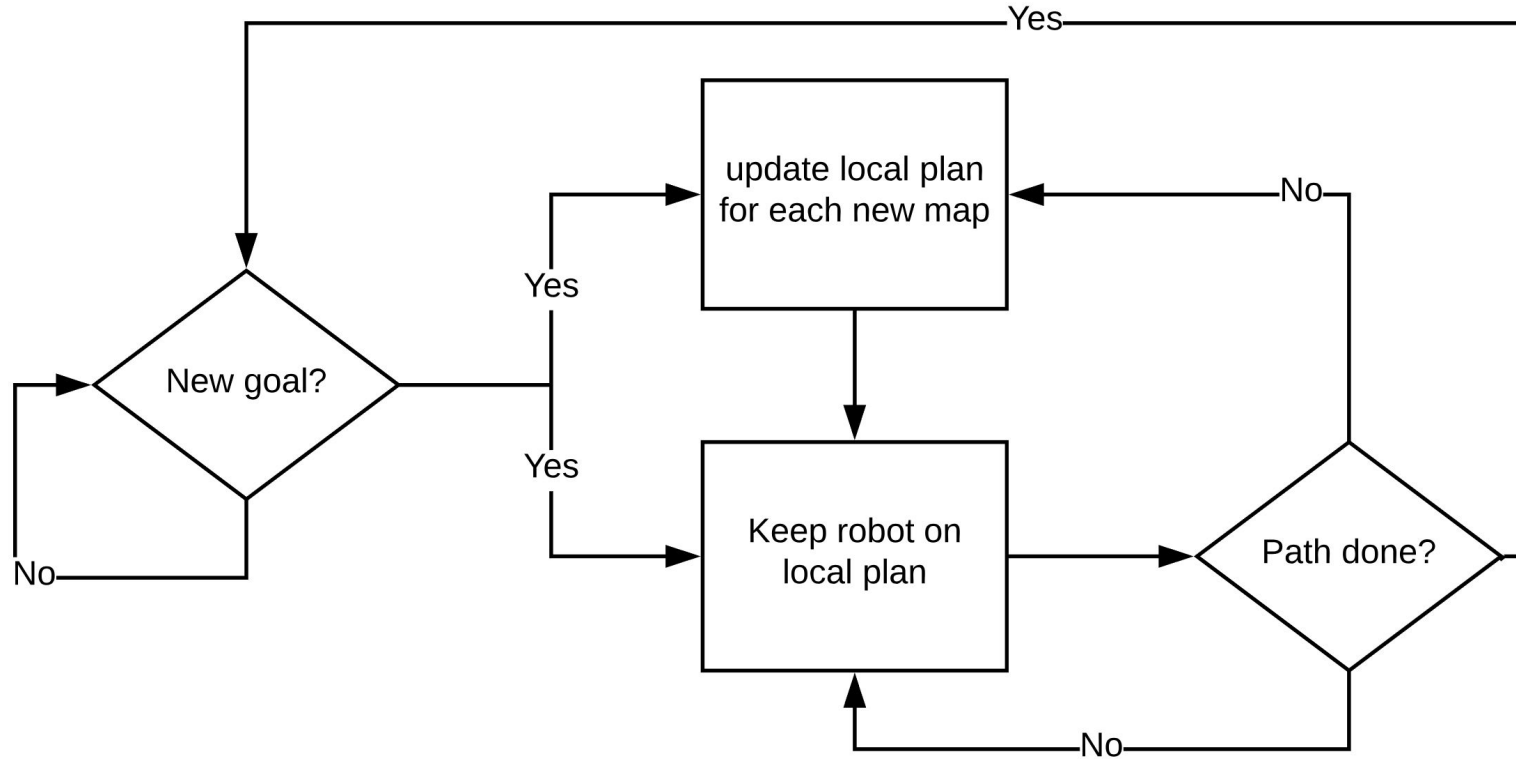
# Master Flowchart



# Gmapping



# Motion Flow chart



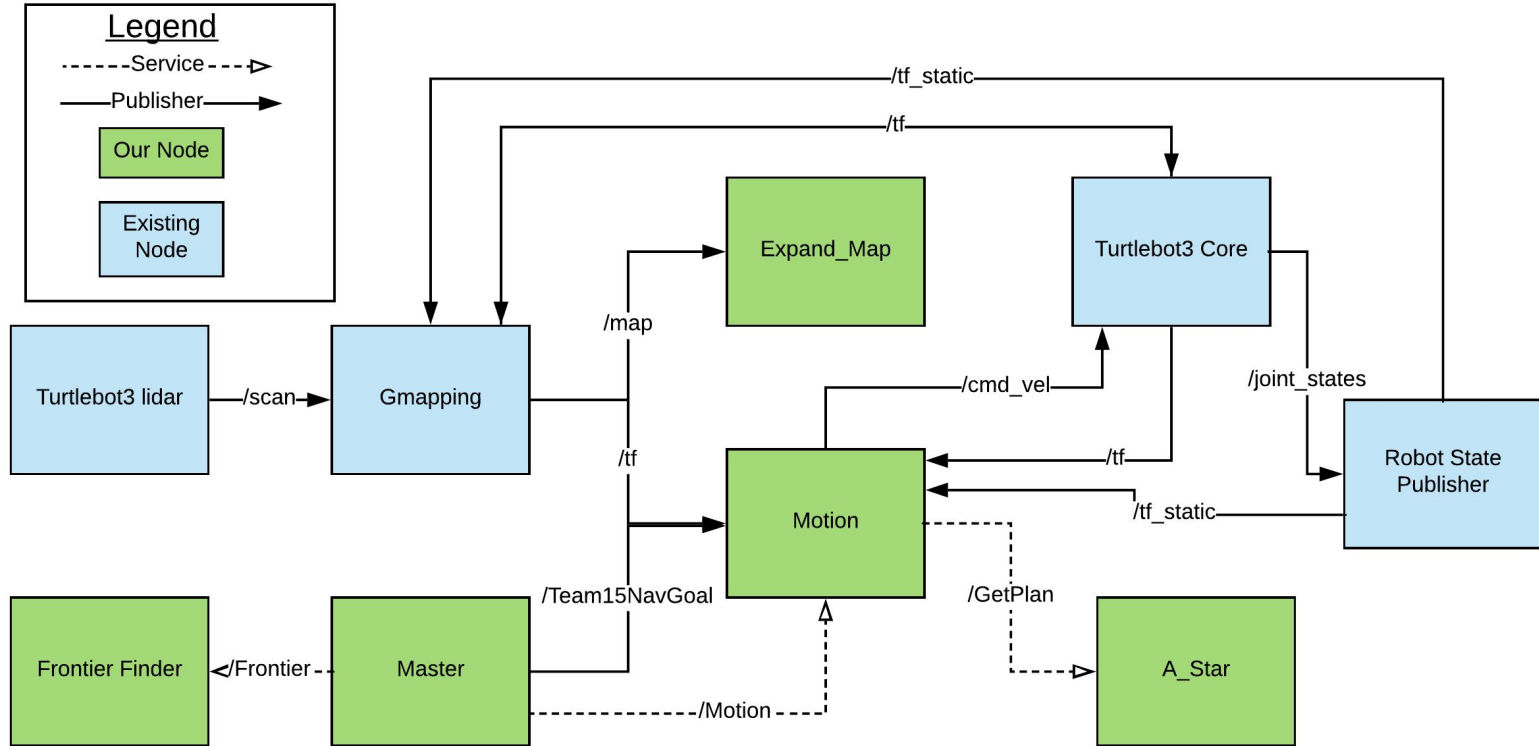




# ROS nodes

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# Node Map



# Master

## Services provided

N/A

## Publishers

- Moves on  
/Team15NavGoal

## Services used

- Frontier
- Expand map
- Motion server

## Subscriptions

- Goal position on  
/team15\_goal
- tf listener for  
position

## Purpose:

Ties all nodes together and manages interaction between finding frontier, exploring new areas, and responding to navigation goals

# Frontier

## Services provided

- FindFrontier

## Publishers

- /Frontier

## Services used

N/A

## Subscriptions

N/A

## Purpose:

Provides a service call which returns the nearest frontier point that should be explored using BFS

# Expand\_Map

## Services provided

## Publishers

## Services used

## Subscriptions

- GetExpandedMap

- /team15\_padMap

N/A

- /map

## Purpose:

Used to update the current map with padded walls to account for robot size.  
Update and publish the new padded map everytime gmapping updates.

# Motion

## Services provided

- ToGoal service for motion

## Publishers

- N/A

## Services used

- A\_Star

## Subscriptions

- tf listener
- Motion requests on /Team15Goal

## Purpose:

Drive turtlebot to the goal location.

Update local plan everytime the padded map is updated.

Verify goal and current location before planning.

# A\_Star

## Services provided

- A\_Star path planning

## Publishers

- /visual\_astar

## Services used

N/A

## Subscriptions

- /team15\_padMap

## Purpose:

Provides a service for planning an optimal path between two points on a map  
Built-in safety feature to prevent the start and goal being invalid.

Questions?

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