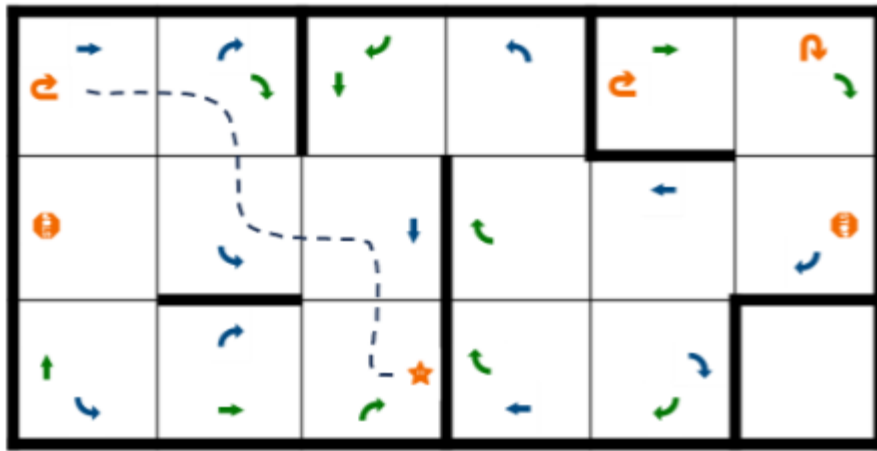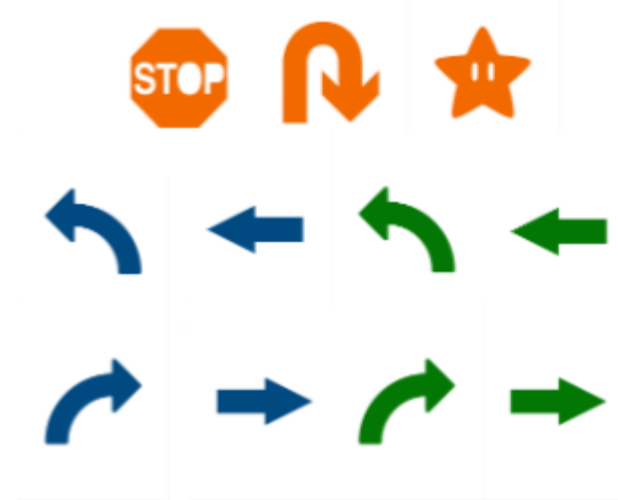# Autonomous Maze Navigation

Problem Statement

- to integrate multi-modal sensing and navigation into a single reasoning system

- goal will be for the robot to complete a maze by following signs
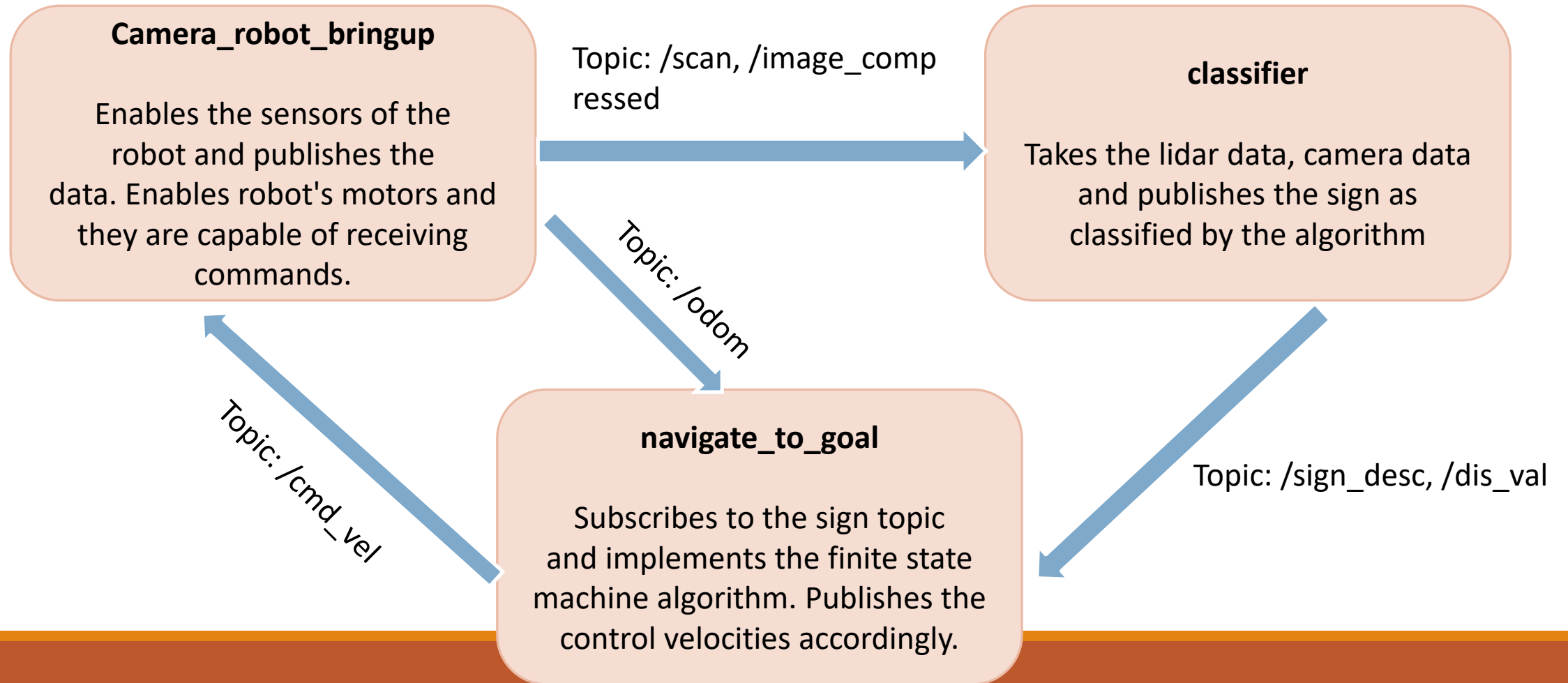

(a)

(b)

Hardware and Sensors

- Turtlebot robot

- Equipped with 2D Lidar, RGB camera and IMU

- Raspi for processing

- OpenCR board

Approach

- Start moving forward till an obstacle is detected in front of the robot

- Once an obstacle is detected, capture the image of the sign

- According to the sign, turn left, right, around or stop.

  - SVM classifier is used for classifying the sign

- Continue till goal sign is reached

- Robot centering algorithm was used to make sure the robot in always at the middle of the path and can read the sign.

ROS implementation

Camera_robot_bringup

Enables the sensors of the robot and publishes the data. Enables robot's motors and they are capable of receiving commands.

Topic: /scan, /image_compressed

classifier

Takes the lidar data, camera data and publishes the sign as classified by the algorithm

Topic: /odom

Topic: /cmd_vel

navigate_to_goal

Subscribes to the sign topic and implements the finite state machine algorithm. Publishes the control velocities accordingly.

Topic: /sign_desc, /dis_val

Demonstration