

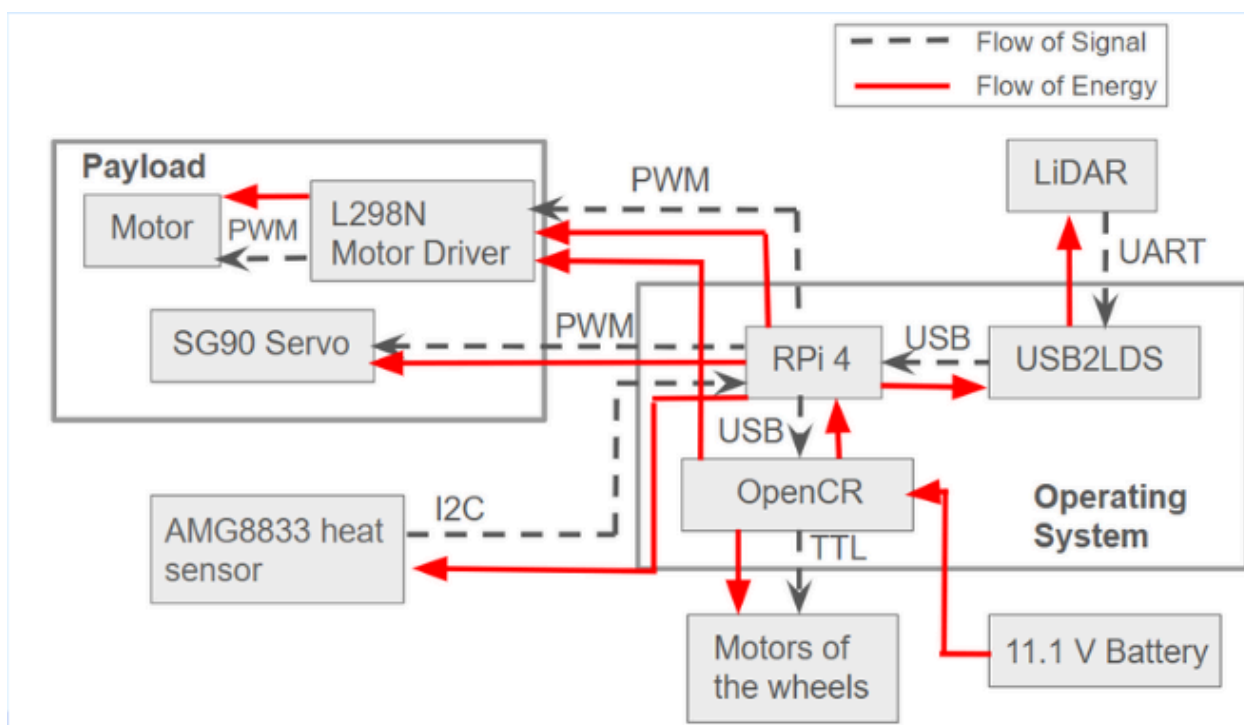
High Level Design

Scope:

The robot is equipped to navigate through the maze, detect heat sources and shoot ping-pong balls upon detection, with a time interval of 2s-4s-2s.

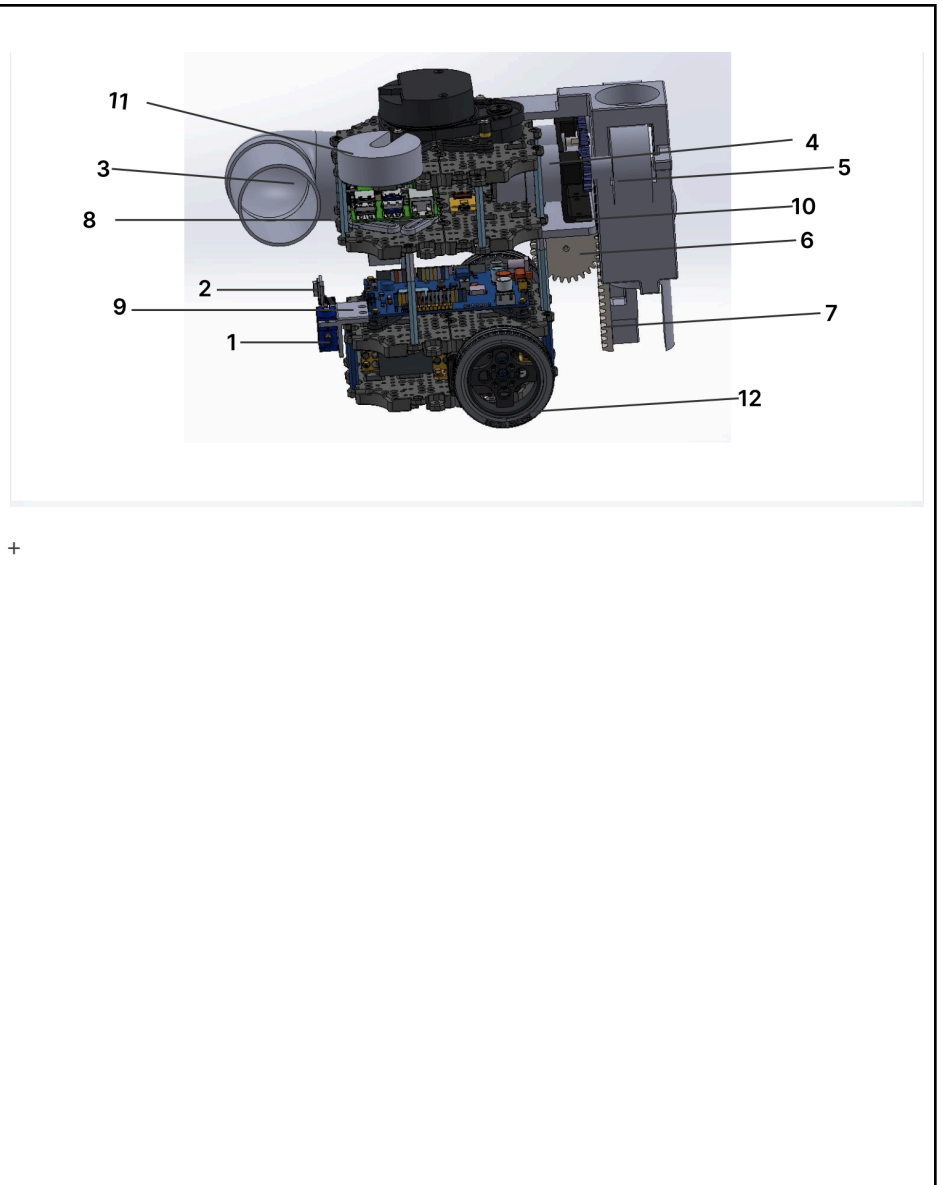
Architecture Diagram:

The following diagram illustrates how the various components of the system interact with each other.



Component Description:

Item No.	Qty	Part Name
1	1	S90 servo for heat sensor
2	1	AMG8833 sensor
3	1	Ball holder
4	2	Flywheel motor
5	2	Flywheel
6	1	S90 servo for rack and pinion
7	1	Rack and pinion
8	1	Pipe support
9	1	Sensor servo holder
10	1	Acrylic Holder for Launcher
11	1	Weight
12	1	Turtlebot3 burger



The map created by the lidar along with the odometry reading helps in updating the local and global costmap, along with giving the position of the robot on the map. The pipes are used to store the ping-pong balls. The AMG8833 heat sensor provides a 8x8 array of temperatures, which is used to scan for heat sources. Upon detection of heat sources, the rack and pinion along with the flywheel is activated, which shoots the ping-pong balls. The weight is used to balance out the weight of the motors and launcher, on the other side of the bot.

Data/Control Flow:

The flowchart below shows the logic diagram for heat detection:

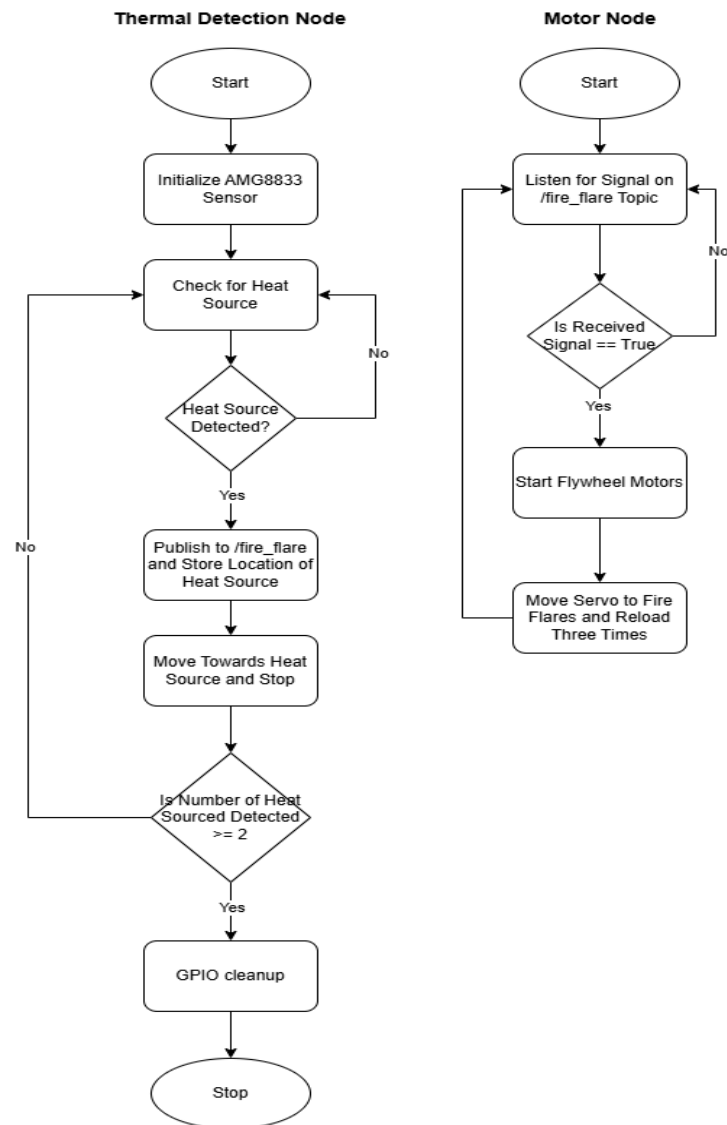


Fig: Logic diagram for heat detection

The flowchart below represent the logic diagram for navigation:

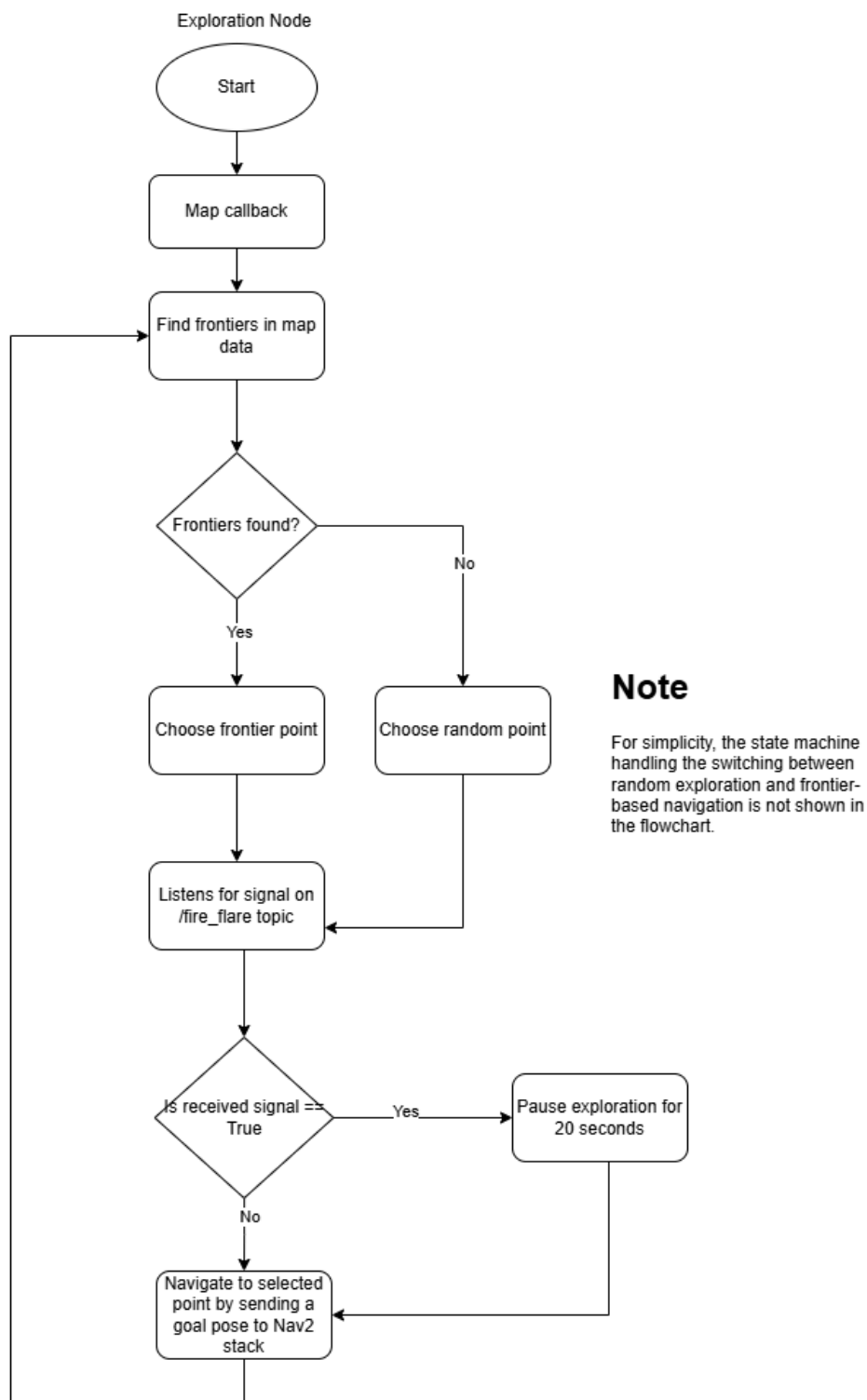


Fig: Logic diagram for navigation.

Design Consideration:

	List	Specifications	Notes
Turtlebot	Dimensions (mm) (LxWxH)	Turtlebot3 & Launcher: 293x262x212	
	Weight (kg)	Launcher: 0.924 Turtlebot: 1.51 Counter-weight: 0.2 Total weight: 2.634	
	Wheel Base (mm)	80.66	From center of DYNAMIXEL to the center of ball caster
	DC Motor	2x JGB37-520	
	Servo Motor	2x SG90	
Payload	Dimensions (mm) (LxWxH)	40 x 40 x 40	Ping Pong Ball
	Weight (kg)	Ping Pong: 0.0027 Total: 0.0243	9 Ping Pong Ball
System	Battery Capacity	1800 mAh	
	Expected Operating Time	92.3 min	
	Communication Interface	GPIO,PWM,I2C,UART,USB, TTL, TCP	