Behavior based Alarmed Robot

Purpose for this project to implement lego robot to search and find the fire (candlelight) in closed environment (different room separated by wall). Localization and path planning are not implemented as it is not required to now current position of robot to perform given behavior task.
Candlelight is placed at different color tiles than environment (for our case tiles is covered with semitransparent white material and candle is placed at red tile to differentiate it from environment).
Robot Design

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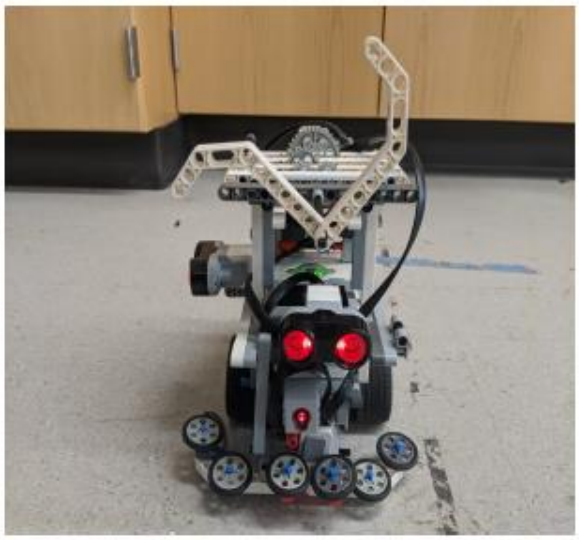
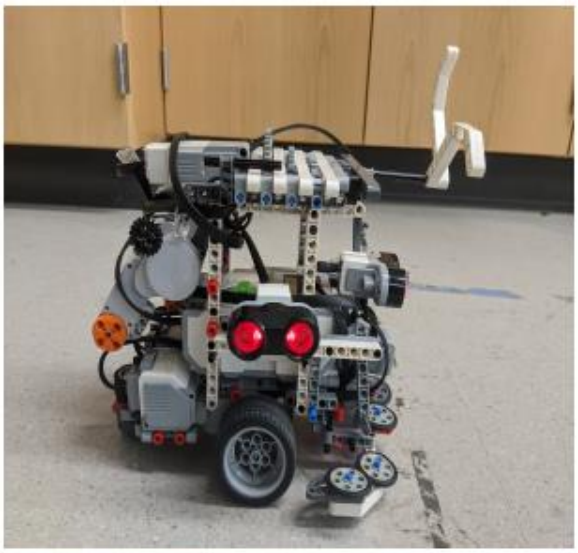

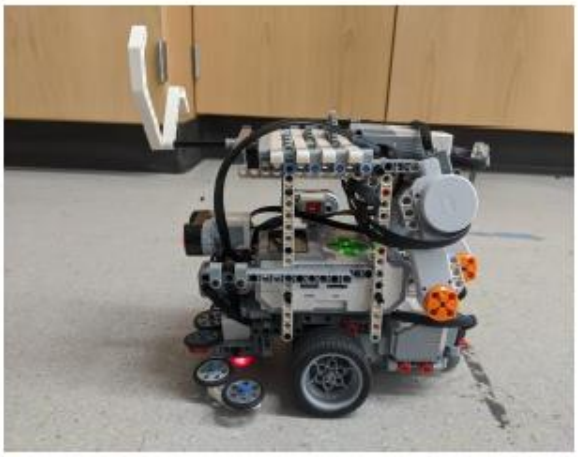

Sensor Choice:

1. Color sensor: Color sensor is to detect the color of title. Once color sensor detects goal (Red color tile), it interrupts and stop the current task and initialize the extinguish the fire behavior.
2. Light sensor: Light sensor is used Light sensor search for light intensity. After observing the threshold light reading light sensor trigger the follow the light source to reach near the fire (Above the red title).
3. Front Sonar: Front sonar the mounted to look the obstacle at from of robot. After detecting the obstacle at the front, it interrupts the robot move forward functionality, stop it from further forward movement until obstacle get clear or robot change its direction toward obstacle free direction.
4. Right side Sonar: Right side sonar is used to maintain safe distance from right side of wall, keep robot near the wall in wall Following behavior with safe distance from wall. It also looks for right side door opening and turn the robot toward it right and certain number of left turns to avoid closed loop behavior and getting stuck in one room forever.

Functionality:

1. Wall following: Wall following behavior is implemented to move robot from one room to another. Robot by default take left turn (anti clock 90-degree rotation) after reaching the end of wall if it make sufficient left turn then there can be possibility, robot is got stuck in one room, to break the loop after certain number of left turn we are switching to right turn(clock 90-degree rotation).
2. Wonder: In wonder behavior robot randomly turn left or right direction, move forward in one tile length and look for fire near its proximity.
3. Fire Detection: Robot looks in 360 direction from its current location for find the fire. Once it defects the fire it interrupts the current task and call for respective task (in this case reach toward fire and initiate extinguish the fire).
4. Extinguish the Fire: After reaching the goal robot call the extinguish the fire routine and perform the fire extinguish.
5. Sensor Reading: Sensor reading is part of sensor module. Its job is to read the sensor and trigger the interrupt to perform the respective task after detecting the any required changes. I chose multithreading programming to read each sensor to make in independent of current task. One thread is created for each task which is responsible to read each sensor independently.