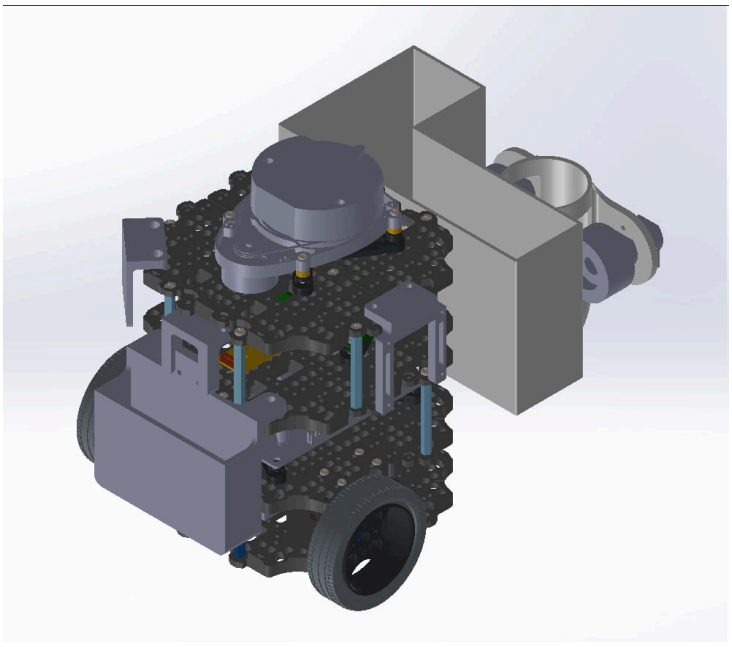
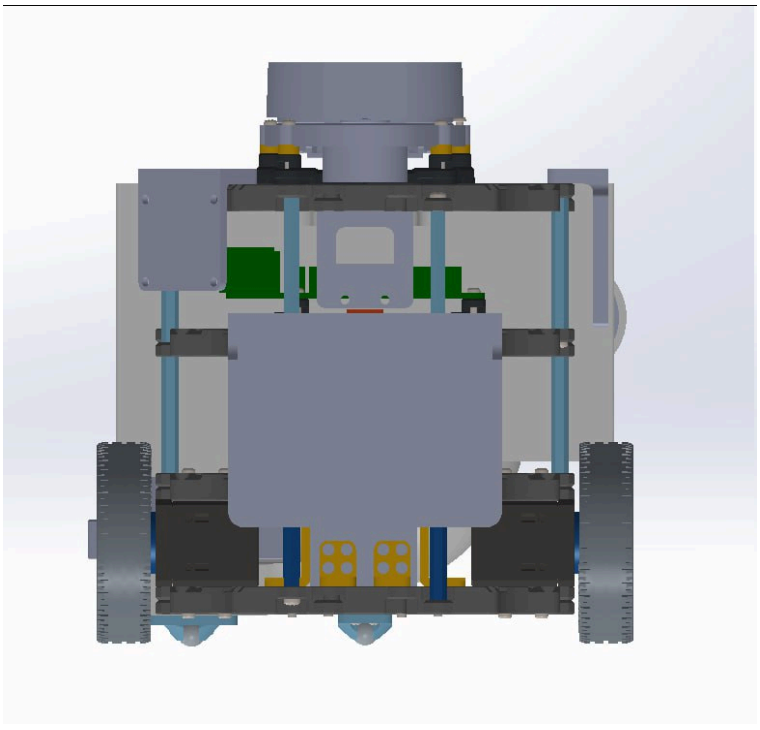
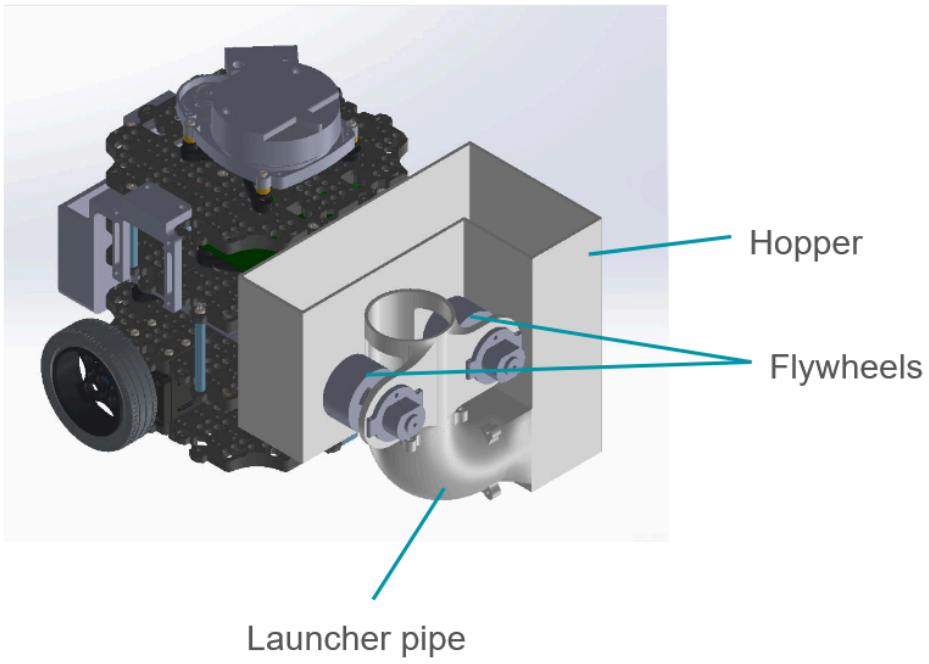
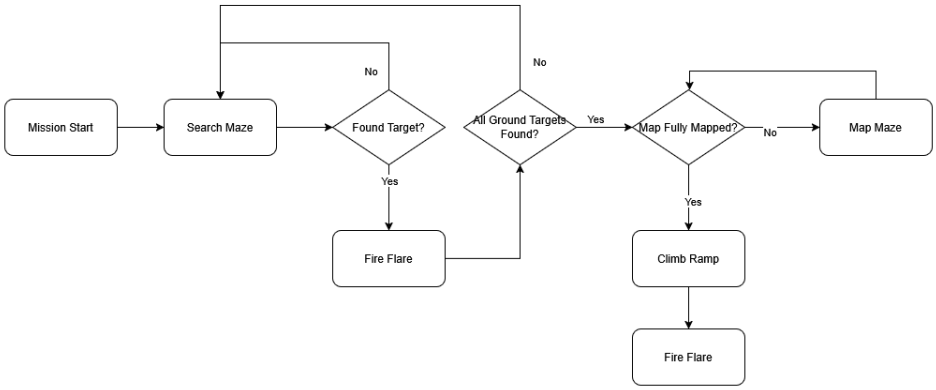
Section 1 General System Description & Critical Data (Spec Sheet)

Model	CDE2310_Group5_V2.2.97 (Modified Turtlebot3 Burger)
	 

	
Dimensions	26.4cm * 17.9cm * 19.0cm (L*B*H)
Center of Gravity	Origin: Outermost side on the centre axis of the right wheel  (X = 20.26222103, Y = 31.30267985, Z = 62.33789643)
Weight	2.4kg
Battery Capacity/ Operating Life	11.1V 1800mAh Li-Po battery Estimated battery life = 1.3h
Description	Autonomous robot based on the Turtlebot3 Burger Features: - Navigate and map an unknown maze. - Detect heat signals above user-specified temperature - Fire flares (Ping Pong Ball) at a specified time interval upon detecting a heat signal

	- Climbs ramp at known position 

Section 2 Technical Guide

Operation	1. Place the robot at the starting point of the maze, parallel to the wall of the maze 2. Place the 11 ping pong balls into the hopper, pushing balls up the launcher pipe until they reach below the flywheel 3. Switch on the robot with the switch on the OpenCR board 4. Connect both the Raspberry Pi and your laptop to a mobile hotspot (ZOP) 5. In a terminal window on the laptop, key in ssh ubuntu@<ip address> to connect to the Raspberry Pi. The IP address can be found from the device providing the hotspot 6. On the Raspberry Pi, run the command: `rosbu` 7. In a separate terminal (ssh-ed into the Raspberry Pi), run the command: `python3 survivorzonesequence.py` 8. On your laptop, run the command: `rslam` 9. On your laptop, run the command: `ros2 run auto_nav pathfinder` 10. On your laptop, run the command: `ros2 run auto_nav mappingphase` 11. On your laptop, run the command: `ros2 run auto_nav searchingphase`
Common Trouble-shooting	Connection issues - `ssh: connect to host 192.168.XXX.XXX port XX: Connection timed out` 1. Laptop cannot connect to the Raspberry Pi, check the device providing the mobile hotspot to ensure that two devices, the dispatcher (Laptop) and Turtlebot (`ubuntu`) are connected to it - If `ubuntu` is missing, power the Turtlebot off and on again to retry connecting - If Laptop is missing, connect through device settings 2. Mobile Hotspot not found

	- Set up a new mobile hotspot - Connect a monitor and keyboard to the RPI and run: `sudo nano /etc/netplan/50-cloud-init.yaml` - In the file, add the Hotspot SSID and password in the same format as the existing hotspots. Save and exit. - On the Raspberry Pi, run: `sudo reboot` - Ensure Turtlebot (`ubuntu`) is connected. Disconnect monitor and keyboard Power - Low battery alarm sounds: - Terminate all programs running on the Raspberry Pi and run the command sudo shutdown to turn off the Raspberry Pi. Charge or replace the battery Software - Robot not moving 1. On the Raspberry Pi, run the command: `rosbu` 2. Restart everything - In a terminal (on the Raspberry Pi), run: `sudo shutdown now` - Do all steps as described in Operations - When heat source found, robot stops but flywheel not spinning - In a separate terminal (ssh-ed into the Raspberry Pi), run the command: `python3 helper_funcs.py` - If the flywheel does not spin, check motor driver wiring. Launcher - Flywheel or feeder motors are not turning - Check if any wires are unplugged - Plug the wires back in according to the wiring diagram
Safety and precautionary measures	- Launcher Shoots Upwards. Avoid Firing Area. - Flywheel spins at high speed. Do not touch. - Stepper motor gets hot during operation. Do not touch. - All physical component changes should be done cold (i.e. the robot is turned off).

Section 3 Acceptable Defect Log

Defect	Justification
Motor Flywheel (Left)	Cosmetic damage with no impact on performance

Section 4 Factory Acceptance Test

Test Description	Expected Outcome	Test Done
- On the Raspberry Pi, run the command: `rosbu` - On the Laptop, run the	Robot moves smoothly, starting and stopping on command and turning the specified amounts.	☐

command: `teleop` and follow the displayed instructions to control the robot		
- On the Raspberry Pi, run the command: `python3 sensor_test.py`	Terminal outputs 8 by 8 temperature matrix and maximum temperature	☐
- On the Raspberry Pi, run the command: `python3 helper_funcs.py`	Launcher mechanism operates	☐

Section 5 Maintenance and Part Replacement Log

Date	Part Replaced	Issue
01/04/25	Flywheel hub mount	Mount was off axis causing wobble to flywheels and mild cosmetic scratching of left flywheel motor casing