FEH APP R02

Daniel Rihm, Alex Felderean, Grace Jiang, Lauren Hawkinson
Clingan 12:40
6 February 2022

Chassis/Drivetrain Concepts

1. Triangular Chassis with three omniwheels and three motors.
2. Two wheeled with two unpowered wheels and a rectangular chassis.
3. Tread design with two motors and rectangular chassis.
4. Four powered wheels and a rectangular chassis.

Mechanism Concepts

Ice Cream Levers

1. Rotating circle with a piece jutting off the side to push ice cream lever and flip burger.
2. A crane with a hook on the end using a pulley to lift the lever.
3. Planar moving omnidirectional robot arm.
4. Rotating hook arm.

Burger Flipper

1. Rotating circle with a piece jutting off the side to push ice cream lever and flip burger.
2. Planar moving omnidirectional robot arm that lifts and lowers the flipper tray.
3. Crane with a hook on the end using a pulley to lift and lower the tray.
4. Metal sheet that rotates to flip the burger.

Jukebox Button Pusher

1. Two arms for each button that extend based on the jukebox color.
2. Static stick/nub on robot that the robot rams into the correct button.
3. Extending stick to push button after manual alignment.
4. Robot just runs into the button.

Sliding Order Ticket

1. Extending static stick that the robot uses to move along the ticket and push it.
2. Static hook on the side of the robot to catch the ticket and slide it.
3. Uses two sticks that angle outward to push the ticket away from the edge of the ticket area.
4. Planar moving omnidirectional robot arm moves along the length of the ticket.

Trash Deposition

1. Rotating ramp to slide off trash.
2. Ramp with stop wall that lowers to let trash out.
3. Ramp with robot claws on tray that release to let trash out.
4. Spring board that launches the trash into the sink.

Final Button

1. Static stick/nub that the robot uses to ram the final button.
2. Robot just rams the final button.
3. Extending stick to push the final button.
4. Robot ejects a ball into the button.

Three Robot Combinations

Design 1

1. Chassis/Drivetrain: 3 Omniwheels
2. Ice Cream Lever: Rotating circle
3. Burger Flip: Rotating circle
4. Jukebox: Static nub
5. Order Ticket: Static hook
6. Trash Deposition: Ramp stop wall
7. Final Button: Static nub

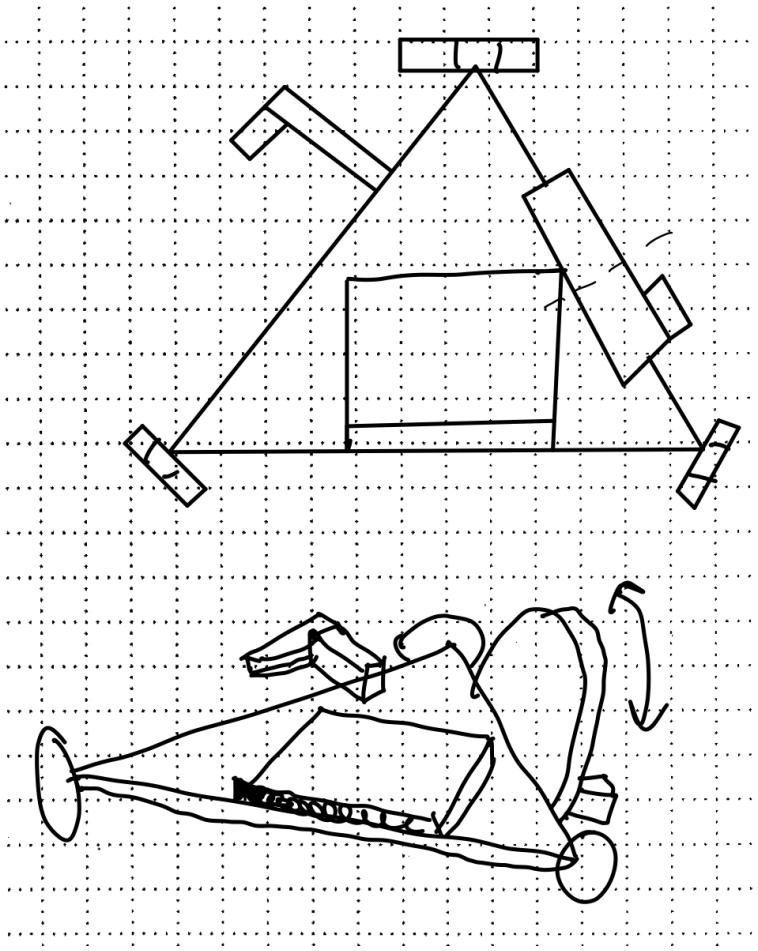

Figure 1: Rough sketch of a potential layout of Design 1. Arrows indicate some moving parts.

Design 2

1. Chassis/Drivetrain: 2 Powered, 2 Unpowered, Rectangular Chassis
2. Ice Cream Lever: Rotating circle
3. Burger Flip: Rotating circle
4. Jukebox: 2 Extending arms
5. Order Ticket: Extending arm
6. Trash Deposition: Rotating ramp
7. Final Button: Extending arm

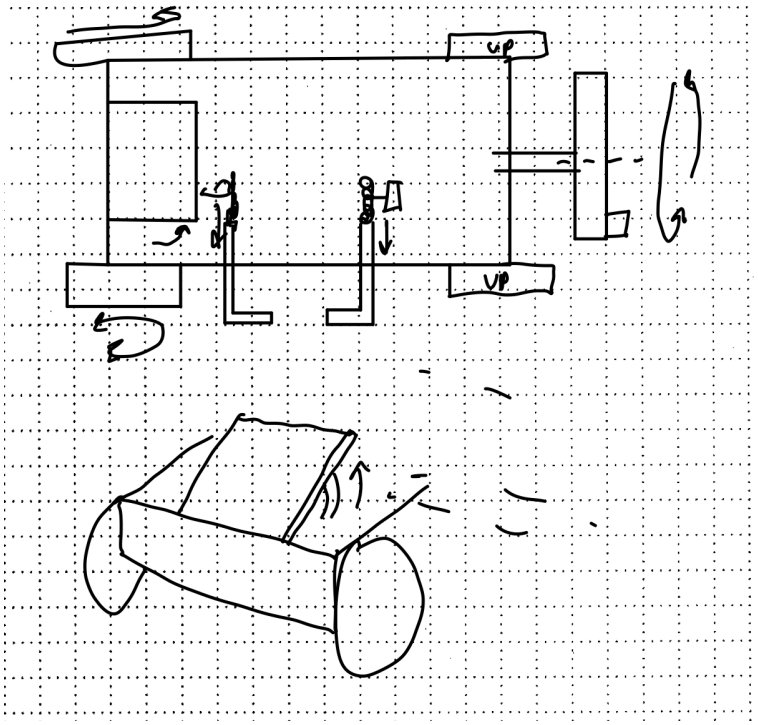

Figure 2: Rough sketch of a potential layout of Design 2. Arrows indicate some moving parts. "UP" indicates unpowered wheels.

Design 3

1. Chassis/Drivetrain: 4 powered, Rectangular Chassis
2. Ice Cream Lever: Rotating hook arm
3. Burger Flip: Crane hook
4. Jukebox: Extending arm
5. Order Ticket: Extending arm
6. Trash Deposition: Rotating ramp
7. Final Button: Extending arm

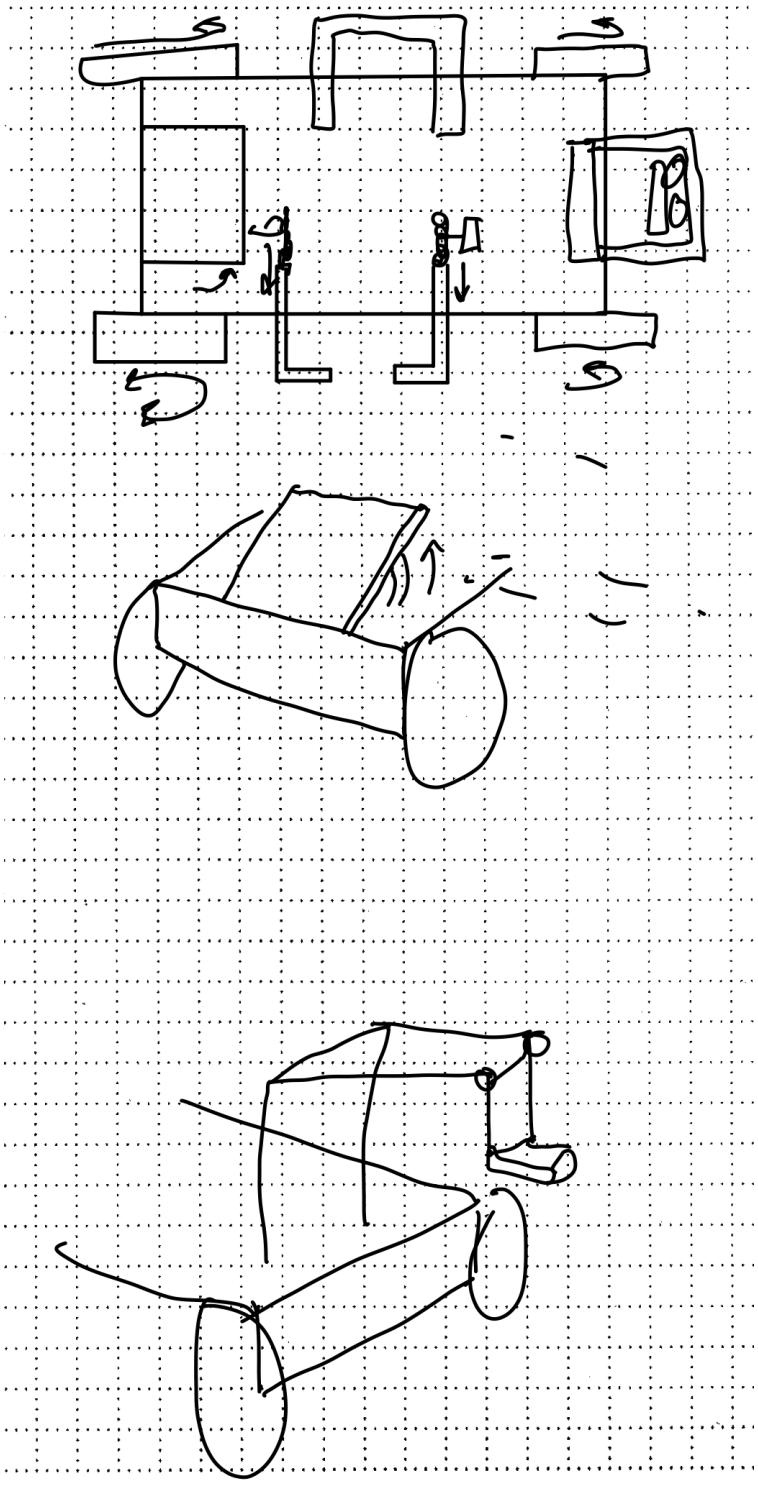

Figure 3: Rough sketch of a potential layout of Design 3. Arrows indicate some moving parts.

Ranking/Pros and Cons

Rank 3: Design 3

Pros:

1. Moderate mobility and driving power is allowed by having four motors.
2. The extending arms and ramp shouldn't require too fine of alignment to work and won't require much movement by the robot.

Cons:

1. Most expensive of the designs.
2. Articulating the crane could prove difficult and introduce uncertainty as to location/sway.

Rank 2: Design 2

Pros:

1. Uses the least amount of motors out of the designs.
2. The extending arms and ramp shouldn't require too fine of alignment to work and won't require much movement by the robot.

Cons:

1. The robot will have a certain turn radius that it will have to look out for.
2. Aligning the robot laterally is time consuming and difficult.
3. The rotating circle will have to be dimensioned fairly precisely to allow it to function correctly.

Rank 1: Design 1

Pros:

1. Full range of motion regardless of orientation.
2. Allows position to be fine tuned quickly.
3. Driving the nubs into specific spots should prove trivial.
4. If the rotating circle is positioned and scaled correctly, it should allow the burger flip to be fairly trivial.

Cons:

1. Programming rotation and movement may be difficult.
2. Programming aligning the robot to specific orientations could prove difficult.
3. The rotating circle will have to be dimensioned fairly precisely to allow it to function correctly.

Course Strategies

Rank 2:

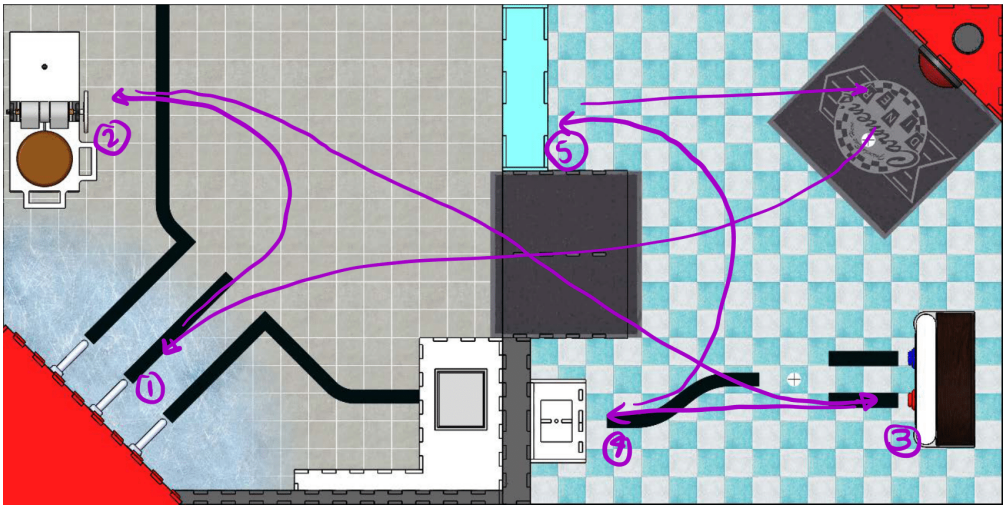

Figure 4: Path starting at the top tasks and then moving on to the bottom, placing the trash in the trash area.

Rank 1:

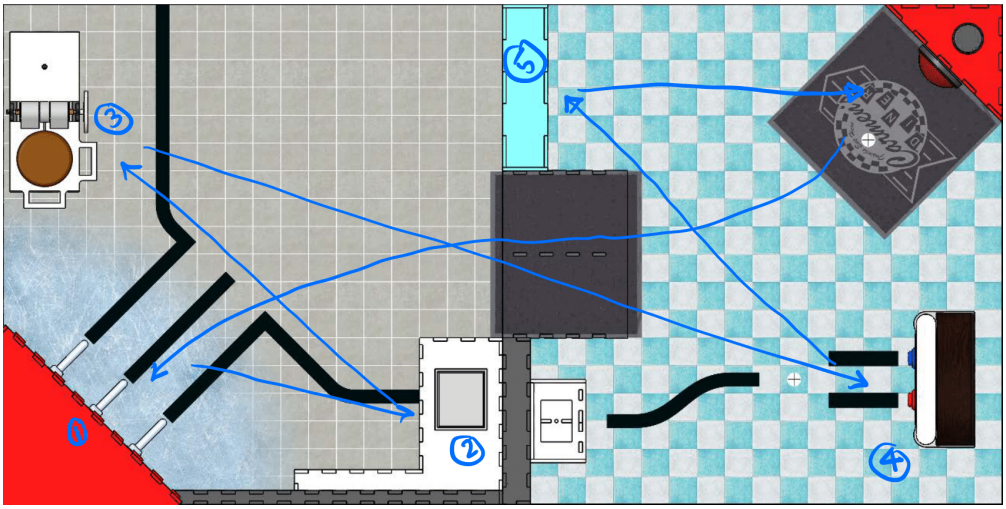

Figure 5: parth starting at the top tasks and then moving on to the bottom placing the trash in the sink.

Comparison

The paths were chosen based on minimizing how much the robot has to travel on the ramp. The top ranked path was ranked as such since we decided that placing the trash in the sink would be easier than in the trash.