Team SuperPAC (Jake, Sophie, Maya, Nick B.)

List of Parts

- Sharp GP2D12 IR Sensor x 4
- Digital bump sensors x 2
- DC Copal motor HG16-060-AA-00 x 2
- Ball Bearing Caster x 2
- Velcro to secure sensors
- 3D Printed body
- (Others TBD)

Chassis Design

We want our robot's chassis to be as simple as possible. To this end, we have devised in OpenSCAD a simple circular body with two wheels and a caster underneath and multiple potential mounts for our IR sensors. See the below images for screenshots of our OpenSCAD design as it currently stands (it is a work in progress, w/ multiple drafts).

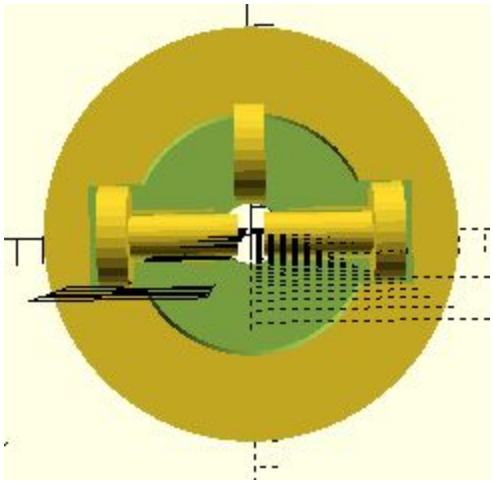
Sensor Design

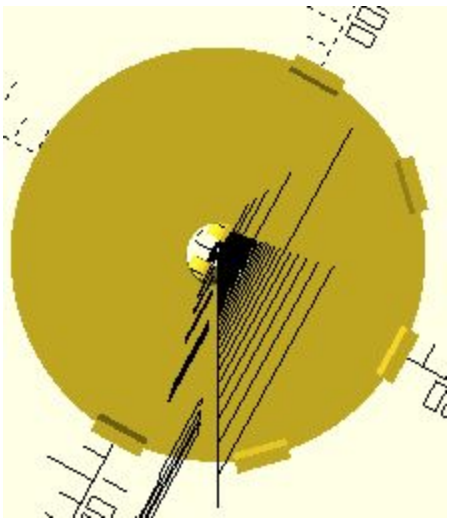
Much of our low-level navigation is going to rely on our IR sensors, mounted in the front and sides of our robot. We have left room for experimentation with various angles, but anticipate 3-4 IR sensors. Sensors on the side of our robot will be used to make a wall following behavior in the rectilinear arena, by keeping the IR sensor readings from each side relatively similar during forward motion and making slight corrective turns when they are not. The IR sensor(s) in the front will be used both to identify walls (and therefore infer that it is time to turn) and to potentially infer.

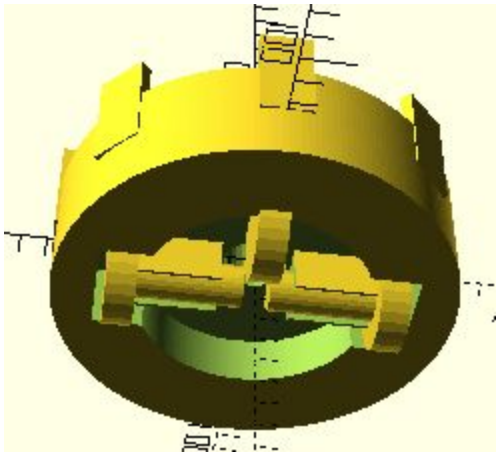
Behaviors

- Mechanical: circular robot, 3d printed, with two DC motors and wheels underneath (with holes in base for wires), LINK controller face up, camera mounted on top
    - Sensors mounted on circular base: two side IR's (one on each side), two frontal IR's at angles (one if that is too costly)
    - We want the robot to be as small as possible
- Behaviors:
    - Core behaviors:
        - Detect other robot
            - Camera based approach: Given that the maze is uniformly black, we can have the robot easily learn "online" the average total area

of black ‘blobs’ it should expect to see assuming no ghost is present. If there happens to be a large deviation in the total area of black blobs present at a given point, we can assume a non-black object (e.g. a balloon or ghost) is obscuring the robot’s vision. This is a hopefully useful heuristic, but will have to be tested further.
        - IR based approach supports other approaches: estimate robot’s own movement
    - Stay aligned with walls (using side sensors)
    - Turn corners
    - Build concepts of maze: we anticipate potentially using some sort of odometry, or buying a compass-device, to keep track of the motion of the robot and build a representation of the arena. However, we haven’t thought too deeply about which of a few approaches we’ve considered to pursue.
- Pacman
    - Run away (when Ghost is detected)
    - Find exit (and go)
    - Balloons
        - Balloon counting to keep track of how “well” we’ve done, once we’ve decided that we’ve popped enough balloons, navigate to the exit
- Ghost
    - Pursue pacman
        - “Cut off” Pacman, by going to exit (we will have to experiment with this and decide if this strategy is feasible)







On the bottom, notice two wheels on one axis (to be powered by two DC motors) and one frontal wheel (which will be replaced with a caster for easier movement in all directions). On the top, notice sensor mounts which, during experimentation, to which we can easily clip, velcro, or tape sensors. On the top we will place the LINK controller. A hole in the middle allows room for wires from the motors to the controller.