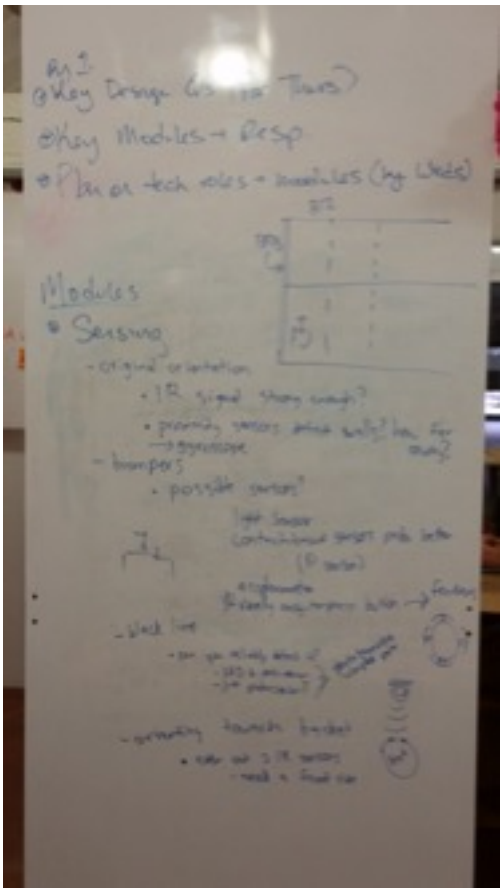
ME 210 Logbook

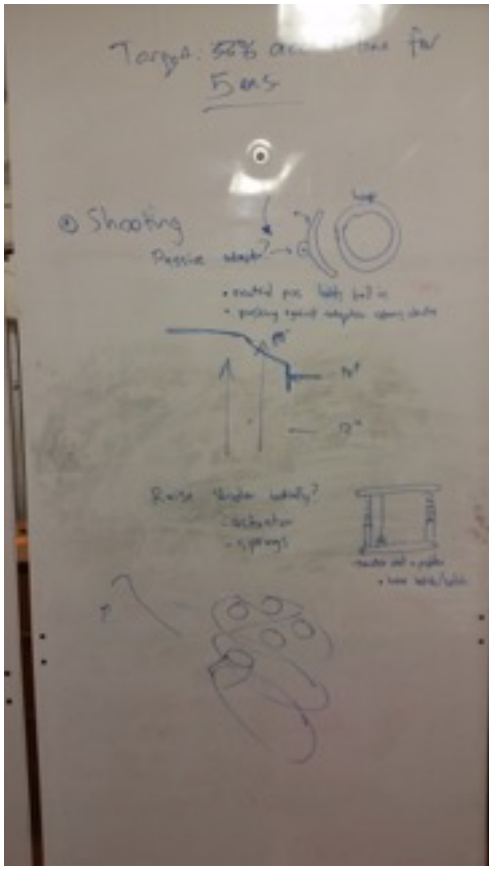
The Fellowship

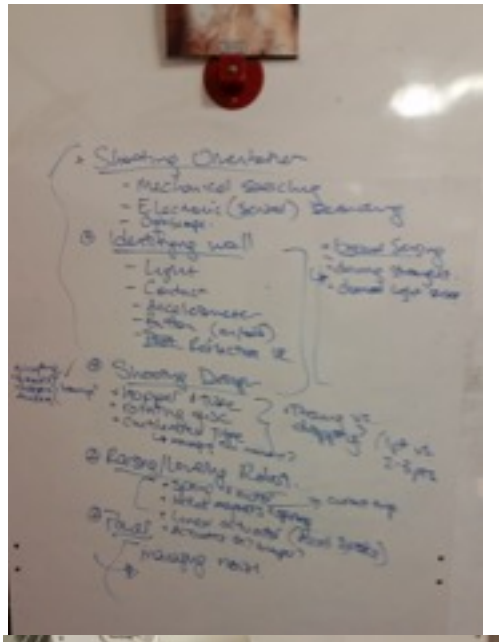
Brad Allen, Armelle Goreux, Sid Kumar, Mason Shaw

- Google Drive created for sharing documents
- Initial design reviews

  Many teams have laid out a full design for their bot already, which we feel is a waste of time since they haven't tested any of the individual mechanisms yet. We are going to focus on designing robust individual mechanisms to make integration as smooth as possible towards the project's end.
- Brainstorming Meeting







• Past projects reviewed:

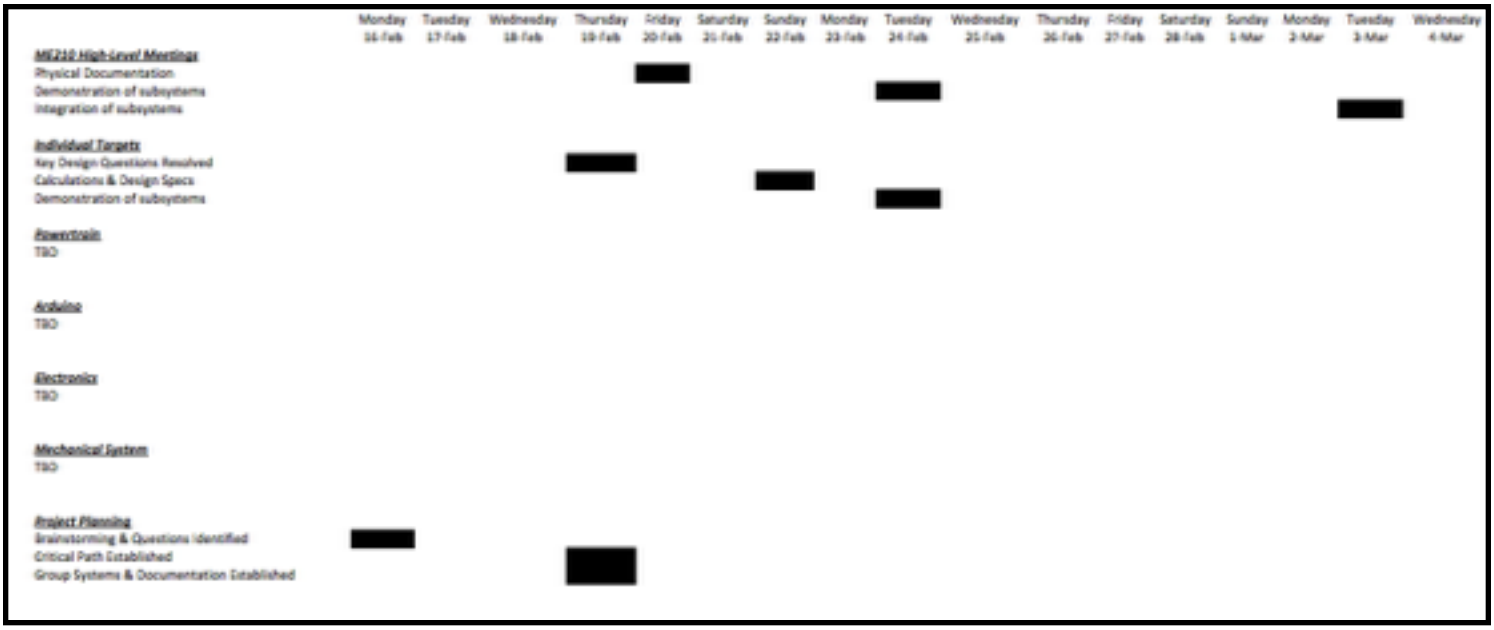
documents created summarizing

–Things I Learned
–Beacon Sensing
–Building a Drivetrain
–Bump Detection
–Motor Implementation
–Power Distribution & Circuity
–Tape Sensing
–Useful Tips

Based on our summarizing documents we are leaning towards using IR sensing instead of our original plan to use tape sensors. Tape sensors appear to be difficult to use on following the tape line. Additionally, we are favoring a strategy of shooting from the corner closest to the 2-point hoop to minimize our need for navigating the robot, since driving straight seems to be a larger issue than we originally thought.

• Project plan outlined:

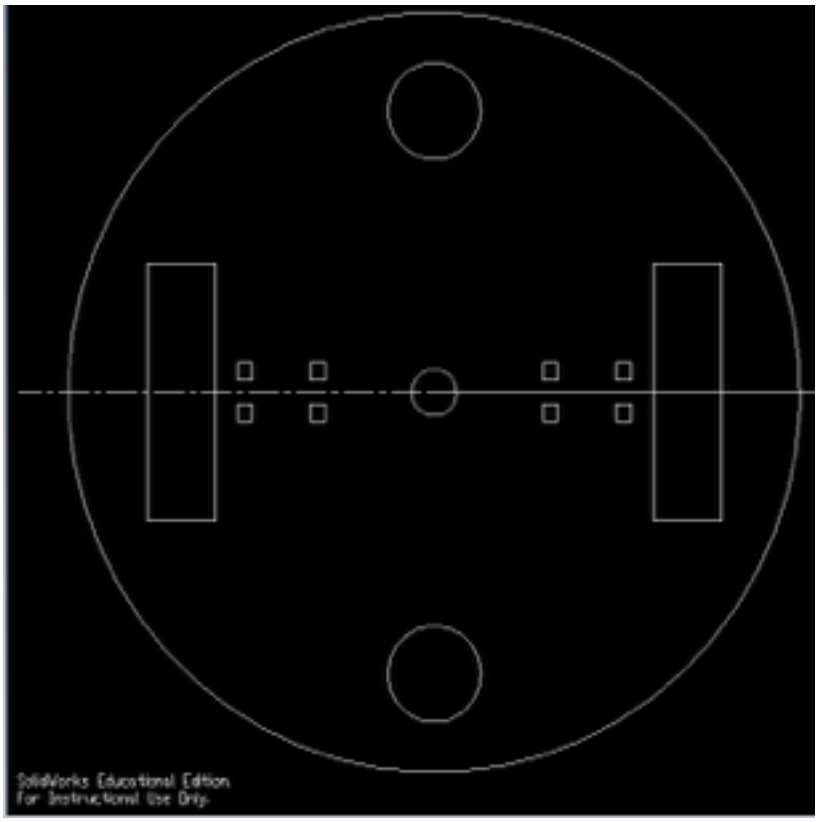
This plan is very general preliminary, and more an estimate of where we would like to be rather than where we think we will be at those dates.



- Expense reported created to keep track of spending
- Technical specifications spreadsheet created – to keep track of designs, goals, and where we are in the process
- Data sheets compiled:
  - – drive train DC motors (jameco)
  - – flywheel motor (pololu)
  - – casters
  - – arduino mounting dimensions

- 1st version of drive train designed – will laser cut and assemble tomorrow

  This versions includes holes to mount the casters on the bottom platform of the drivetrain, as well as slots to mount the drive train motors



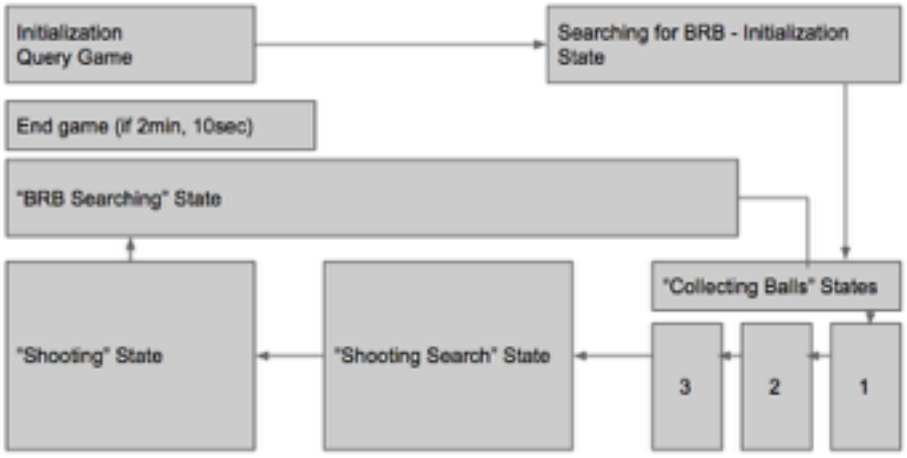
- State machine created and implented in Arduinoi

  –This will likely have to be modified later. We are not sure if the chosen state machine and strategy are going to be succesful until we test it on a moving bot.

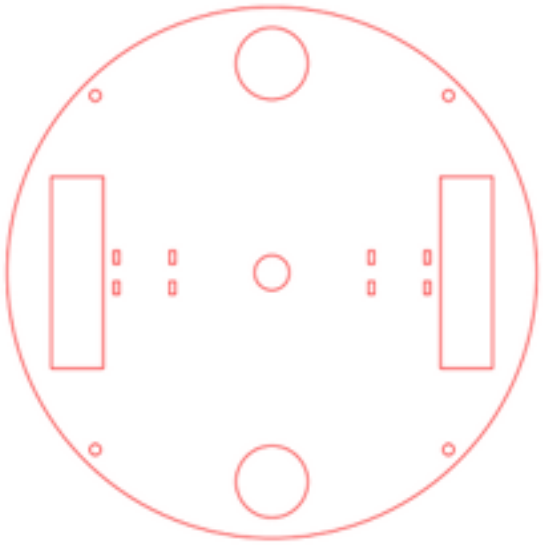
  –Below are some initial questions we need to answer, and the overall state diagram

  1. How to trip "out" of sub-states: have a conditional. Have substates return 1 if completed and 0 otherwise. When completed, jump to next sub-state.
  2. How do we think about tracking Events? Do we have two Events (one for master SM and other for sub- SMs)?
  3. How do we think about functions for tracking sensors & driving?
  4. How do we think about initializations, interruptions, and setting timers?

Note: Between each state, there will be a check on a timer that is set during Initialization. If it is "0", the game stops.

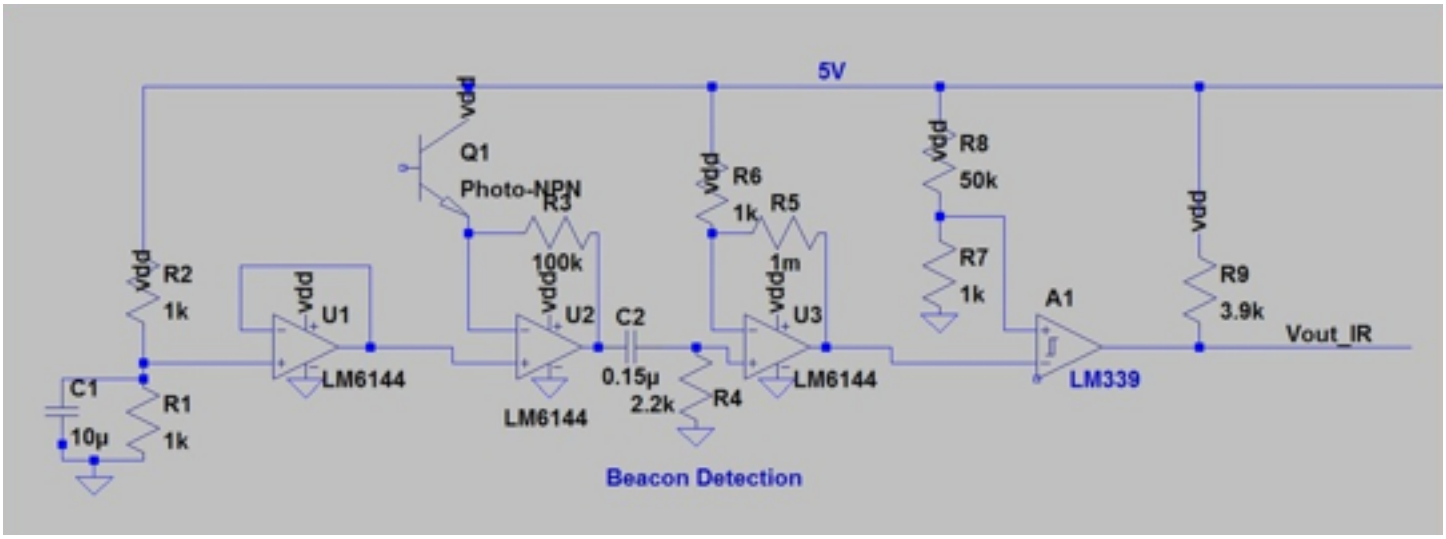


- Drive train second version created, incorporates holes for mounting platforms to each other with 1/4” threaded rods



- IR detection circuit 1st version constructed and tested

  This schematic is from a previous ME 210 project. We assembled the components and tested it today. Seems to work fairly well, however tweaks need to be made if we want this on the final bot.

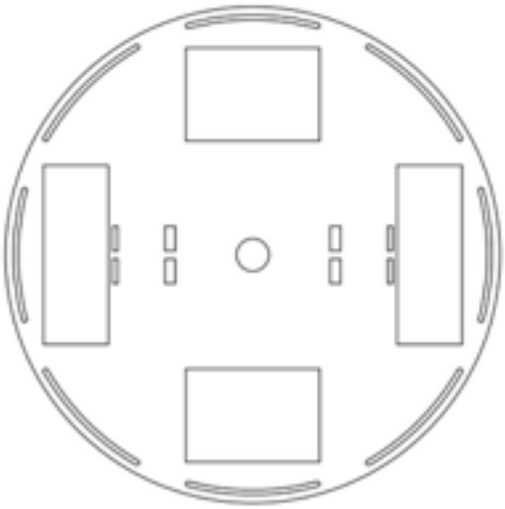


- We have finally impleneted a single bumper. This is just a switch connected to the Arduino.

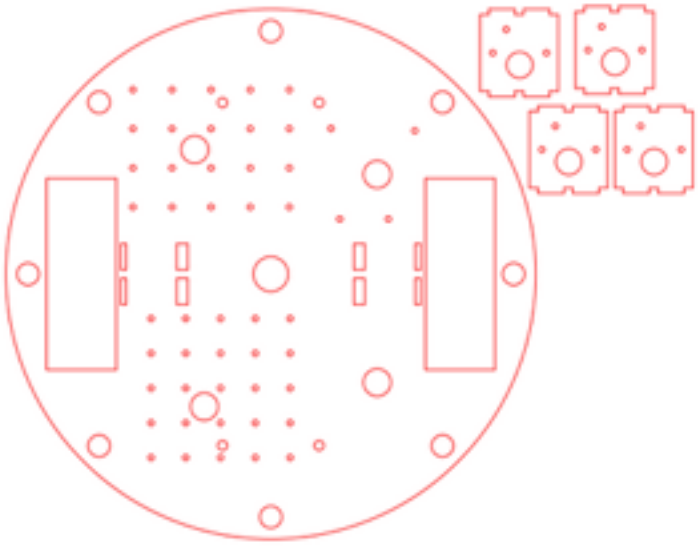
  Unfortunately the switch short-circuit our IR circuit and fried everything in it. We have added a pull down resistor so this doesn’t happen again.

• Arduino code has now been implented for the servo to be controlled with a specified timer for letting one ball through the gate at a time. We need to work on reading in the IR sensor–initially we had used arduino interrupts to detect the signal, however this is not a viable strategy for our final code.

- Drive train third version: Now we have different slots for mounting the casters, as well as slots for the bumpers to be mounted around the bottom level perimeter of the bot

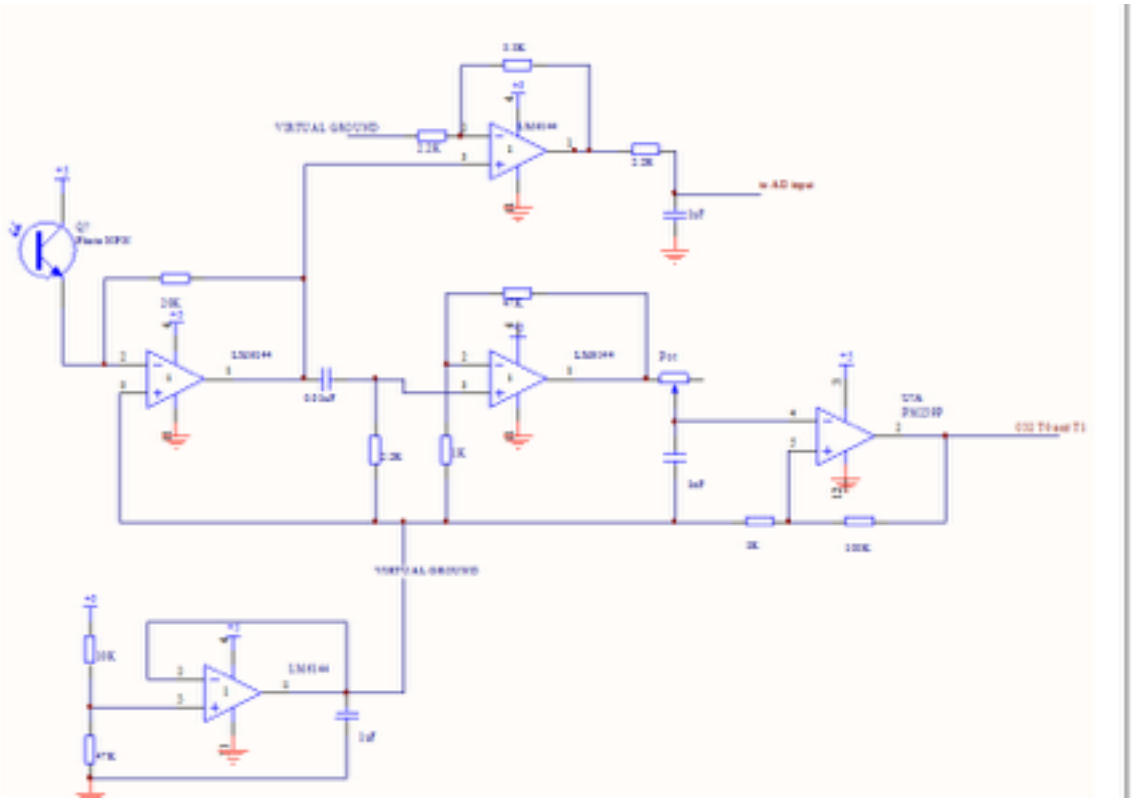


• Drive train fourth version: Laser cut file for drivetrain motor mounts and bottom platform



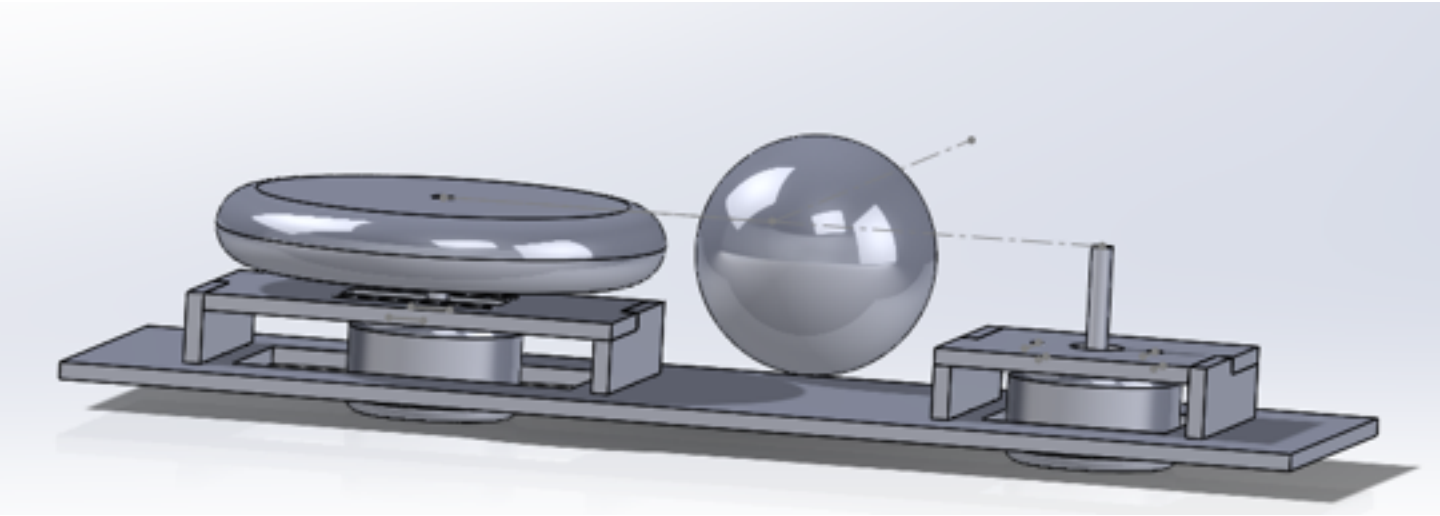
- 2nd interation of IR circuit constructed

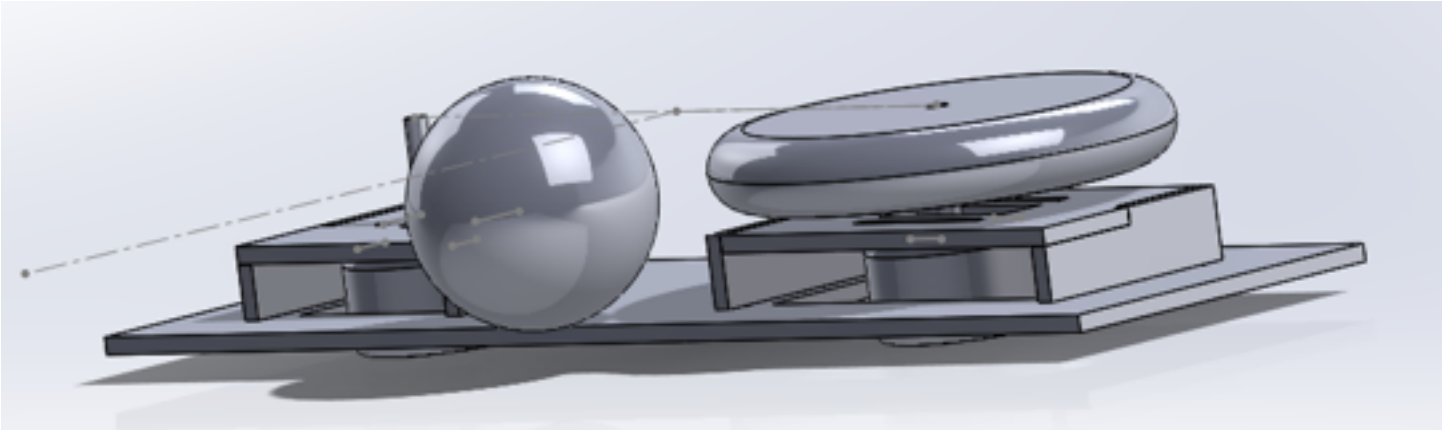
  This circuit is form a previous ME218 robot. I made modifications to the high-pass filter, low-pass filter and comparator thresholds for detecting the 3kHz beacon. This is a much more reliable circuit than the 1st version and we are thinking it will be on the final bot. We can easily fine tune the signal gain and comparator thresholds to make our IR detector as accurate as possible. We are not going to use the AD input component shown on top of the circuit. This was employed by the 218 group to test the relative signal between two different beacon sensors, whereas we plan on only employing one sensor.



- Flywheel final version designed and assembled in Solidworks

  This design allows the wheels to be mounted closer or farther apart due to a sliding mechanism on one of the motors. This design also uses two DC motors from Jameco with no-load speeds of roughly 1000 rpm. Our previous motor used too small of wheels so this time around we are going to larger lego wheels with deep grooves to grip the ball better. Based on initial testing by hand-holding the motors and feeding a ball in manually, this seems to be a much better design.

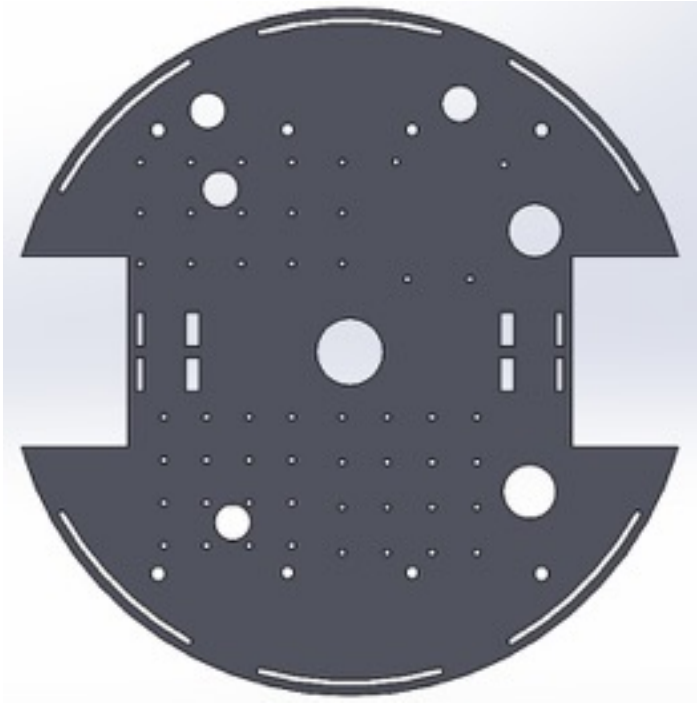




- Final version of drive train platform created in Solidworks

  This version incorporates holes for:
  - –mounting electronics
  - –feeding battery chords underneath platform
  - –feeding motor wires
  - –mounting drivetrain motors
  - –mounting platforms to each other with 1/4” threaded rods

  There are also slots for mounting bumpers all around the perimeter



- INTEGRATION

  We are working on integrating all components now. The fly wheel still needs to be adjusted so it faces the correct direcition, and the IR circuit has to be shielded properly so it triggers at the right time. So far the drive train is set up and we have it running according to the state machine, using the bumper to guide it. We NEED to get the shooter in place.

  Code has been debugged and fine tuned. Important aspects are starting the flywheels before we need to use them so they get up to speed, and setting a timer to turn the bot back if it doesn't detect the hoop.

  After staying up all night we have a robot that works, although the sunlight severely hampers the IR detection. We probably won't be able to check off until tonight when there is not indruding light from outside.

CHECK-OFF COMPLETE

We're going to take a break until the competition. Everyone is pretty beat.