EP1010 Botball

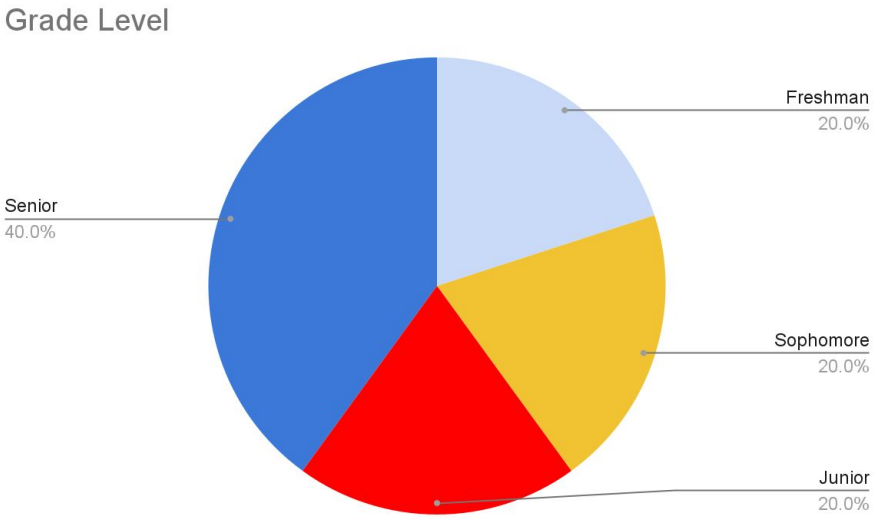
Meetings

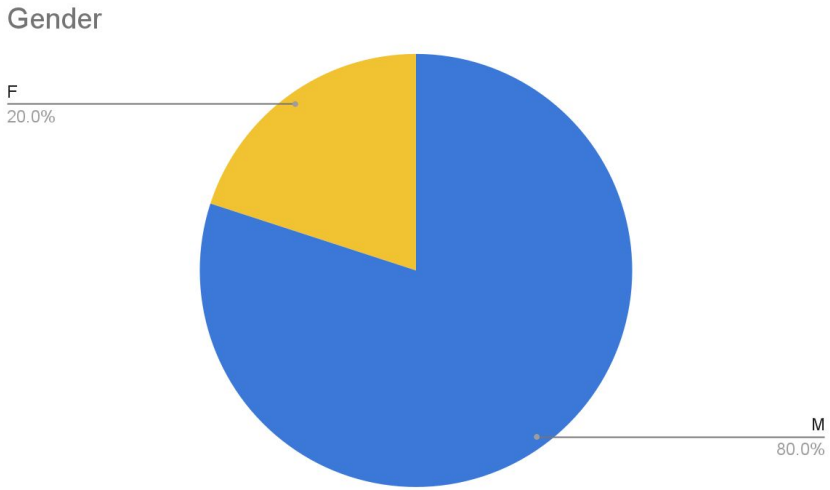
Non-school based (extracurricular) team

36 Maryland Ave, Rockville, MD 20850

Mon	Tue	Wed	Thu	Fri	Sat	Sun
6 - 9 PM	---	6 - 9 PM	---	---	10 - 1 PM	---

Demographics





Team Organization

- **Team Captain** delegates work and strategizes
- **Builders** assigned by the team captain to build and maintain the robots
- **Coders** assigned by the team captain to a specific robot and focus on designing and fixing the robots code

Learning Goals

- Devise an **overall strategy** for the game
- Develop and implement **effective designs**
- Build **prototypes** and **improve** upon them
- Cultivate ability to **work as a team**

Conflict/Resolution

- Conflicting designs
    - Majority rule
        - Designs

Project Iteration

Step 1: Concept

- Decide on task to complete
- Build claws and test them manually
- Discuss and decide on a base design

Step 2: Prototype

- Build the skeleton of the robot
- Attach claw onto base of robot
- Write basic code to test

Step 3: Refining

- Add Servos and Motors
- Test as needed
- Ensure the robot will not interfere with anything else

Step 4: Testing

- Retouch and optimize code
- Ensure consistency with at least 10 tests

Initial Game Strategy

Game Strategy

- Get 3 rings onto **horizontal electrophoresis** with the roomba bot
- **Push** as many poms as possible (unsorted) and **scoop** them into the transporter with bulldozer bot and drags **transporter** to starting box

Design

- Claw with 2 motors, 1 servo attached to roomba (**unstable**)
- Use paper for the bulldozer bot's scoop

Pseudocode

- Bulldozer Bot: **Lower** arm, **Follow** black line and **Push** poms into container, **Latch** onto container and **move** back to designated container position
- Roomba Bot: **Pick** up 3 Rings, **Rotate** claw and **Rotate** Roomba, **Move** to Pipe and **Rotate** Roomba to pole

Mid-season Game Strategy

Game strategy

- Same as initial

Design

- Bulldozer bot paper attached better (no wrinkles)

Pseudocode

- Same

Final Game Strategy

Game strategy

- Same as initial

Design

- Changed claw to a more stable design (2 servos)

Pseudocode

- Same

Code Segment

Roomba Code

```
def main():
    # Roomba Setup
    turn_on()
    reset()

    # Wait for light start
    wfl()

    # back align with wall in start box
    back_align()

    # Move claw into operating position
    straighten_claw()
    claw_open()

    # Set Roomba to Claw Position
    drive_towards_rings()

    # Reduce extraneous momentum
    pause(50)

    # Tighten claw around rings
    claw_tighten()

    # Rotate Claw and Rotate Roomba to Remove Rings
    left_rotate_servo()

    # Align Roomba to Rotation Position
    drive_toward_cylinder()

    # Rotate Roomba to Insert Rings into Cylinder
    cylinder_align()

    # Release rings
    claw_open()
```

Bulldozer Code

```
def main():
    # Align Roomba to Line
    go_to_black(100, 100)
    go_to_white(100, 100)
    move(100, 0, 1400)
    move(100, 100, 400)

    # Scoop poms to container
    line_follow(20500)
    stop(500)

    # Lift and Remove any Poms from Blade to Container
    servo_control(ARM_SERVO, UP)
    jitter()
    line_follow(1200)

    # Latch to container
    servo_control(ARM_SERVO, GROUND)

    # Move backwards to designated container spot
    blf(20000)
    stop(200)
    move(-100, 0, 1900)
    move(-50, -50, 4000)

    # Turn off
    KIPR.ao()
    KIPR.disable_servos()
```

Risks

- Roomba Bot and Bulldozer Bot Timing
  - Roomba Bot must effectively move rings and ring stand out of the way
- Why?
  - Bulldozer blade **cannot** lift scoop
    - Blade breaks
    - Servo stress

Community Impact

- Instagram account (@exp1010botball)
- Introduce our team to visitors of Rockville Science Center
- Presented our team on the Rockville Science Day
- Helped out FLL teams
- Volunteer during Rockville Science Center events

Thank You