# Team 9721

Cailin and Bernadette

About the team

- 9721 was founded in 2016
- Team is currently focused on recruited girls into robotics
- Team currently has two 6th grade girls: Cailin and Bernadette

Goals for 2023

- Re-use as many materials as possible

- Learn CAD for 3D Printing

- Print a useful custom device for robot

- Design robot using new REV bevel gears

- Design robot using mecanum wheels-4 motors

- Expand using of methods for onBot Java
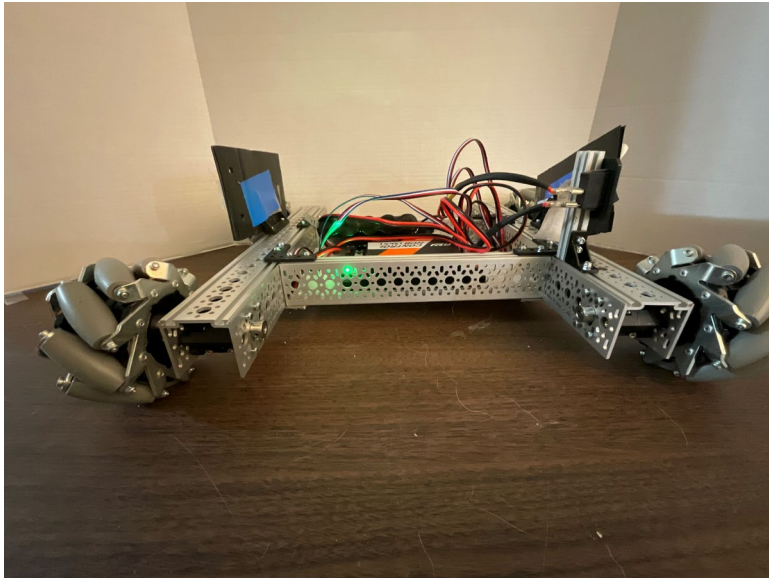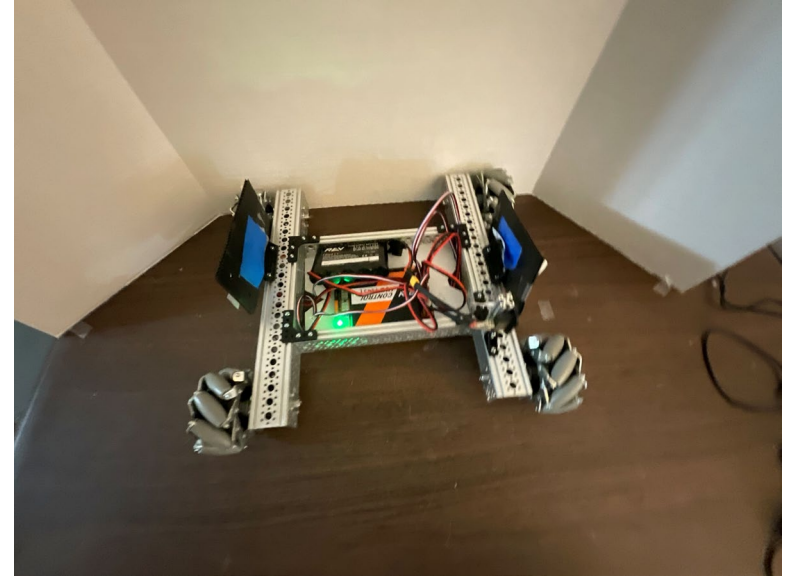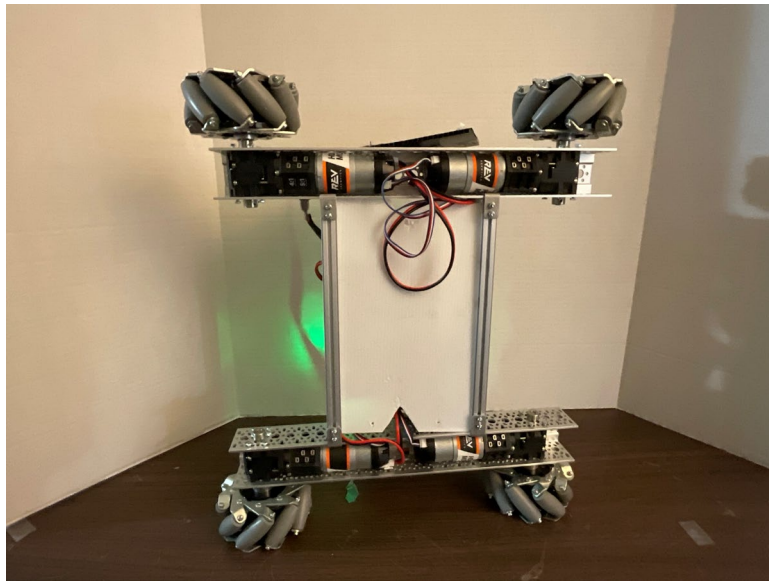
Robot-Design frame

- Robot frame is mostly symmetrical
- The forward/backward axis uses Rev U Channels
- The side to side axis used the REV C Channels
- During testing, the frame bowed because there was no bottom connection between the C and U channels.
- Several prototypes were used to address the bowing problem
  - Top U channel was tried but rejected because too big
  - A cross hex axle was tried but the screws kept stripping
  - Other connectors were tried but the motors took-up too much space
  - Final prototype used 90 degree bracket with no connection on the inside

Robot Design-Mecanum Wheels

- The team tested several prototype robots
  - Two wheel drive (the team used this for the past 2-3 years)
  - Omni-wheel drive (team rejected this because too complicated to mount)
- The team chose mecanum
  - Mecanum allows the robot to strafe and push cones
- Several prototypes
  - The oldest, lightest wheels did not strafe well at all
  - The heavy duty wheels strafed better
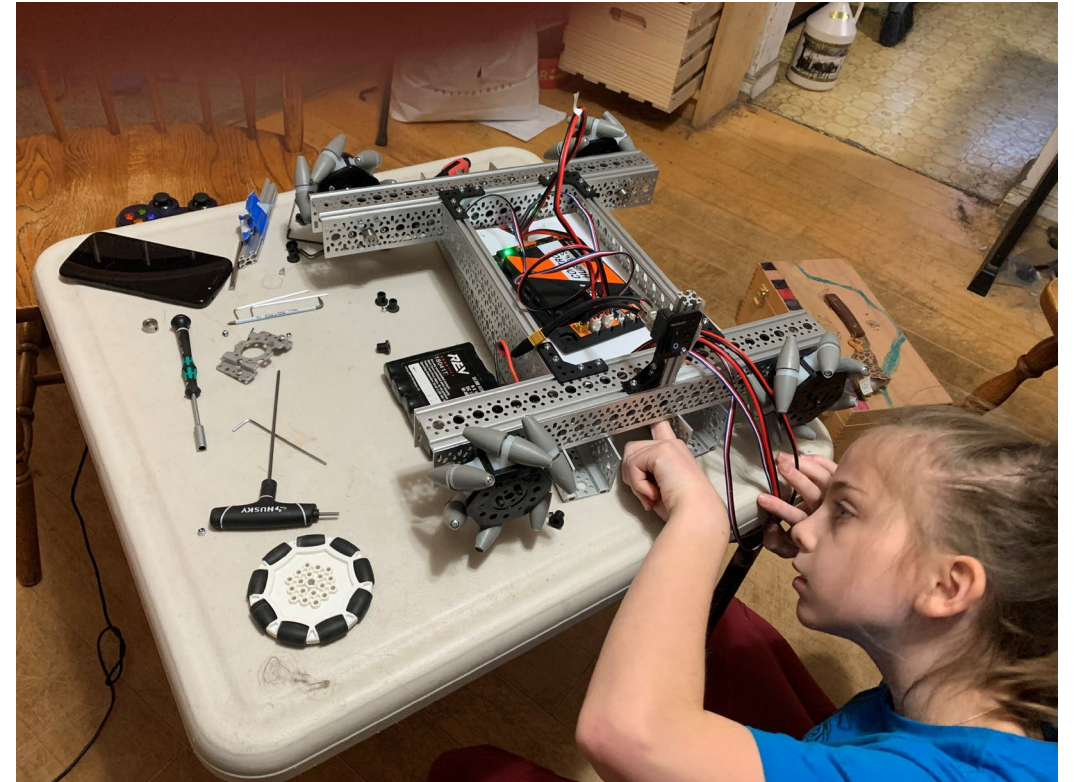
Robot Design-Motors

- The team re-used (4) motors harvested from two older two-wheel drive robots and their robot arms.

- The robots were geared 5:1 and 4:1, to make the robot a little easier to control.

- The motors were mounted to the bevel gears inside the U channel for a form mount. The other brackets wobbled.

Robot Design-Team Number

- The team number was re-used for the past (4) seasons

Robot Design-Electronics and Floor

- The electronics floor and electronics system was re-used from the previous season

- The switch was re-used from a previous season

3D Printer

- Cailin worked for more than 20 hours the week before Christmas to assemble the 3D printer kit from Prusa

- Cailin learned the basics of operating the printer

- Cailin learned the basics of CAD using a Prusa Course

CAD and 3D Printing

- Cailin designed Alliance Markers for both the Red and Blue Alliance

- She imported a step model from REV's website on the corner bracket

- She added a rectangle to one of the faces to lift the marker

- She added the marker to the rectange

- She made a final file
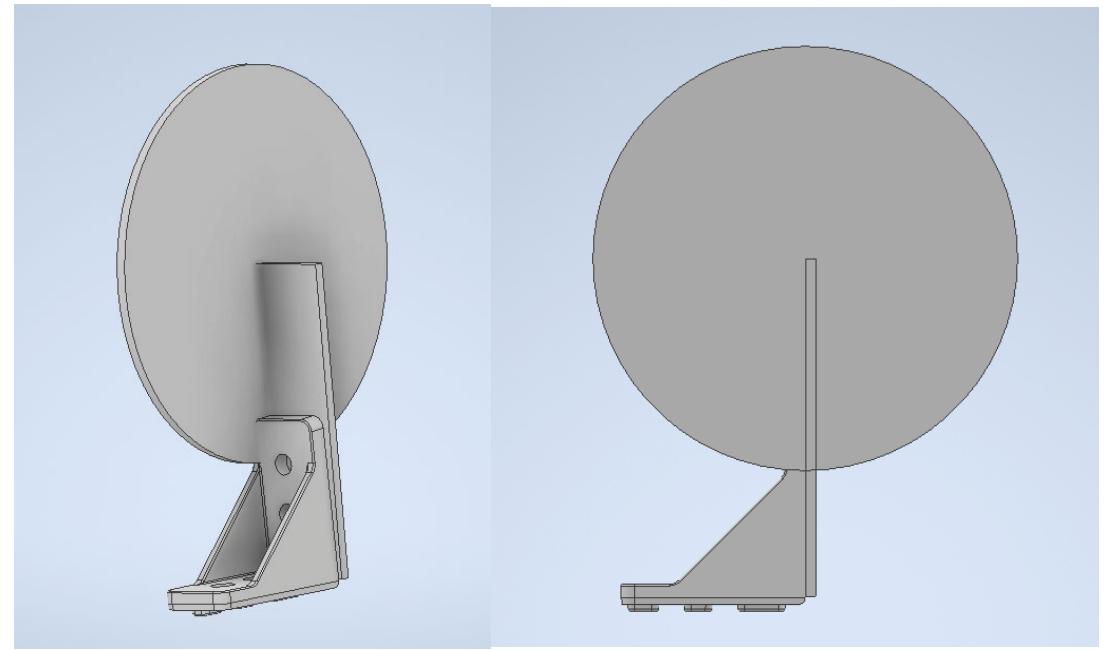
Programming

- The robot is programmed using OnBot Java
- The main logic searches for a button press while the opMode is looping.


```java
while (opModeIsActive()) {
    if(gamepad1.dpad_up){
        driveAxialForward(power);
    }
    else if(gamepad1.dpad_down){
        driveAxialBackward(power);
    }
    else if(gamepad1.dpad_left){
        driveStrafeLeft(power);
    }
    else if(gamepad1.dpad_right){
        driveStrafeRight(power);
    }
    else if(gamepad1.left_bumper){
        driveRotateLeft(power);
    }
    else if(gamepad1.right_bumper){
        driveRotateRight(power);
    }
    else
    {
        driveAllStop();
    }
}
```

Programming-Methods

- The robot code uses methods for forward, backward, rotate right, rotate left, strafe right and strafe left

```java
public void driveAxialForward(double power) {
    driveFR.setPower(-power);
    driveBR.setPower(power);
    driveFL.setPower(-power);
    driveBL.setPower(power);
}
public void driveAxialBackward(double power) {
    driveFR.setPower(power);
    driveBR.setPower(-power);
    driveFL.setPower(power);
    driveBL.setPower(-power);
}
public void driveRotateLeft(double power) {
    driveFR.setPower(power);
    driveBR.setPower(-power);
    driveFL.setPower(-power);
    driveBL.setPower(power);
}
public void driveRotateRight(double power) {
    driveFR.setPower(-power);
    driveBR.setPower(power);
    driveFL.setPower(power);
    driveBL.setPower(-power);
}
public void driveStrafeLeft(double power) {
    driveFR.setPower(-power);
    driveBR.setPower(-power);
    driveFL.setPower(-power);
    driveBL.setPower(-power);
}
public void driveStrafeRight(double power) {
    driveFR.setPower(power);
    driveBR.setPower(power);
    driveFL.setPower(power);
    driveBL.setPower(power);
}
public void driveAllStop() {
    //driveLeft.setPower(0);
    driveFR.setPower(0);
    driveBR.setPower(0);
    driveFL.setPower(0);
```

Linear slide and grabber

- The team started work on a linear side and grabber
- The team ran out of time to complete this work