**CSCI 458: Autonomous Mobile Robotics**

**Assignment Name:** Servo/Movement
**Assignment Number:** 1
**Group Members:** Nisha Patel and Richard Hempel

**Project Description:**
***A brief description of what was asked of you, and the general constraints of the problem.***

In this assignment, we were asked to build a robot with a mount for a whiteboard marker that could trace shapes on the white boards. Our robot is capable of doing the following: first, it can draw a square that is 1 foot in diameter. It needs to start and end in the same place and the same orientation. Second, it can draw a circle that is 1 foot in diameter. It needs to start and end in the same place and the same orientation. Third, it can draw an S-shaped curve using two half circle. It needs to start and end in the same place and the same orientation. Fourth, it can draw a five point star. It needs to start and end at the same location and orientation.

**What Worked (Source and/or Build):**
*Describe things that you tried either in the hardware or software (algorithmically, data structure choices, API choices) that work well (and likely made it into the final product) under the assignment conditions.*

We decided to go with a simple approach where we used a four rubber beams and two axle modules to create our simple mount.

With the software, we started off with the handout programs and we modified it as we needed. We did the whole assignment by setting appropriate motor power and timing for the shapes.

We also tried moving the turing on the carpet to practice different turns, and to see how much different ways of turning the wheels makes the shapes.

**What Didn't Work (Source and/or Build):**
*Describe things that you tried either in the hardware or software (algorithmically, data structure choices, API choices) that didn't work well under the assignment conditions.*

With the hardware, first we built a marker mount with beams (various sizes), frame, axle (various sizes), and connector pegs with friction. We must have used 8-10 of these parts to create pressure on the top of the marker so our mount can hold it. However, it was very complicated and wasn't holding our marker properly, so we had to try a different approach that was less complicated.

With the software, we tried using setMotorTarget() for the angles, but we couldn’t figured out how it worked. We tried several approaches to draw a square and a star, but we were unable to get the perfect angles. Our angles were off for both the star and the square. Furthermore, our star was the worse amongst all the shapes.

Lastly we were not used to seeing code run on a real world machine, so because of this we made our code more complex than it should've been. For example, we tried making each turn and line of the of the star a different line of code instead of making it simpler.

**What I feel that I learned from this assignment:**
*Describe any algorithm/data structure insights, features of the language, or creative uses of the hardware that you picked up during the assignment.*

We feel that we learn how to make a robot do something. Moreover, write a program, and it will do the assign task for us.  We also learned how use servo motor power and timing to move a robot in a specific orientation and a direction.

With the hardware, we learned from the manual about how to put specific parts together to build a physical hardware.

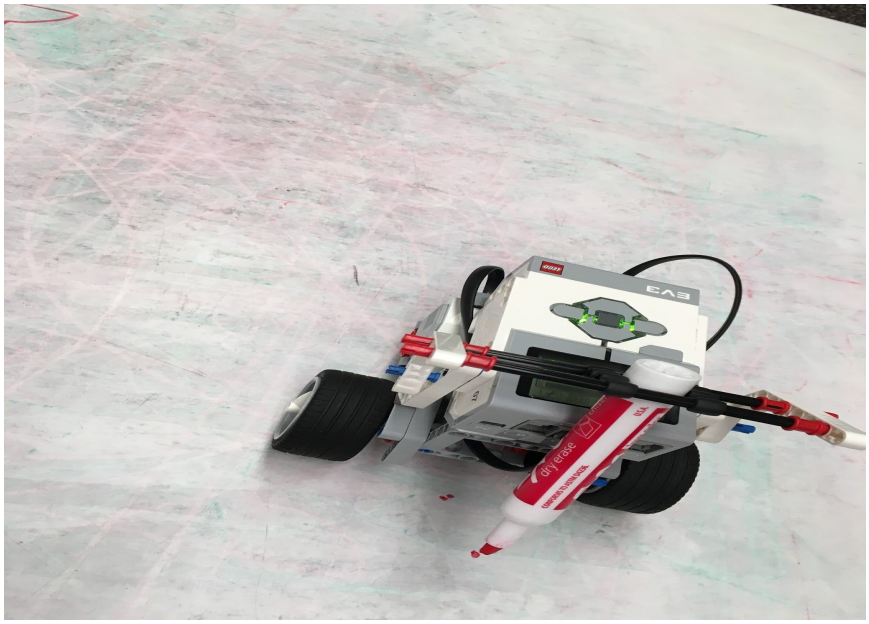
We learn how to modify for robot to hold a marker without any instructions, and  most importantly with this knowledge we learn how a marker works.

Lastly we learn how to work with resources that we can not get to. For example, working with the robot only three hours a week was hard to get to use to at first, but overtime we got use to drawing, talking, and thinking about what the robot should do.

**Build Details**

*Please provide one or more representative images of your configuration with a description on this page (most likely a page or two).*

*Figure: Representation of a physical build of a robot*



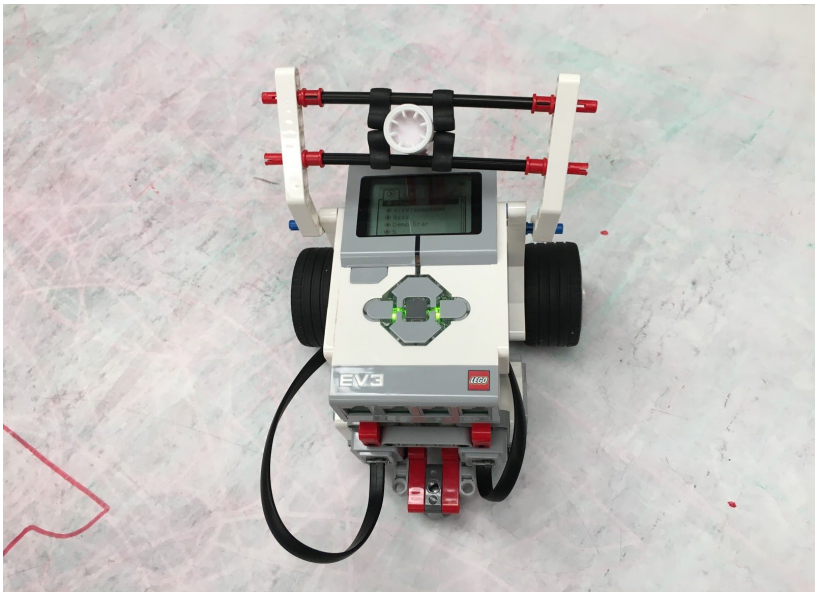
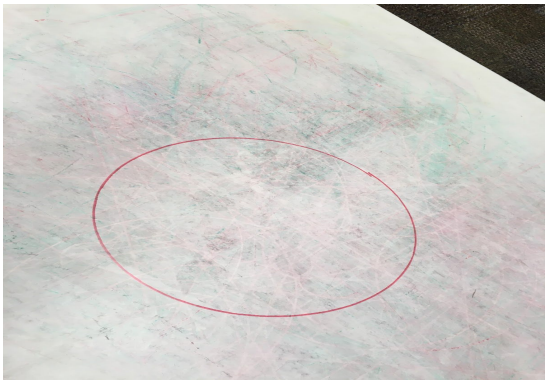



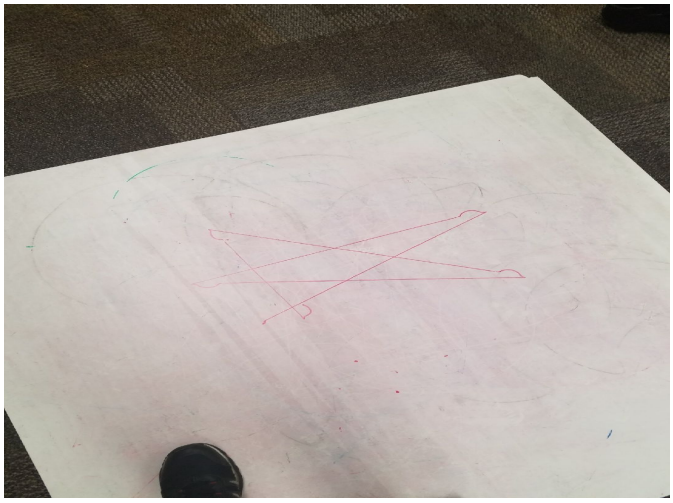

*Figure 2: Representation of a marker mount*

*Img-1: S-Shaped- it is a two half circles*



*Img-2: Circle*

*Img-3: A square - Three sides of the square are good, but the ending is little messed up. It is off and not ending at the correct position.*



*Img -4: A Star - it is a five pointed star. It is not a perfect star because we were having trouble with the degrees. We tried to come up with something closer.*

**Source**
***Please include documented source(s) here (one file per page).***

*Code snippet for a Circle:*

```
/* Circle */

tMotor Left_Motor=motorB;
tMotor Right_Motor=motorC;
task main()
{
    //set servos for a right point turn
    motor[Left_Motor] = 40;
    motor[Right_Motor] = 20;
    //pause for 1 second
    wait1Msec(7700);

    //set servos to stop
    motor[Left_Motor] = 0;
    motor[Right_Motor] = 0;
    //pause for 1 second
    wait1Msec(1000);
```

*Code snippet for a five point Star:*

```
/* Star */

tMotor Left_Motor=motorB;
tMotor Right_Motor=motorC;
task main()
{
    for(int i =0; i<5;i++){
     motor[Left_Motor] = 40;
    motor[Right_Motor] = 40;
    //pause for 1 second
    wait1Msec(2000);

        //try this first
        motor[Left_Motor]=10;
        motor[Right_Motor]=-10;

        sleep(3000);
        }
}
```

*Code snippet for a Square:*

```
/* Square */
tMotor LEFT_MOTOR=motorB;
tMotor RIGHT_MOTOR=motorC;
task main()
{
for(int i=0;i<3;i++){
    motor[LEFT_MOTOR]=25;
motor[RIGHT_MOTOR]=25;

wait1Msec(2450);


        //try this first
        motor[LEFT_MOTOR]=10;
        motor[RIGHT_MOTOR]=-10;

        sleep(1800);
}
motor[LEFT_MOTOR]=25;
motor[RIGHT_MOTOR]=25;

wait1Msec(2200);


        //try this first
        motor[LEFT_MOTOR]=10;
        motor[RIGHT_MOTOR]=-10;

        sleep(1500);
    //Stop
    setMotorSpeed(LEFT_MOTOR,0);
    setMotorSpeed(RIGHT_MOTOR,0);
}
```

*Code snippet for a S:*

```
/* S */
tMotor Left_Motor=motorB;
tMotor Right_Motor=motorC;
task main()
{


    //set servos for a right point turn
    motor[Left_Motor] = 40;
    motor[Right_Motor] = 20;
    //pause for 1 second
    wait1Msec(3850);

      motor[Left_Motor] = 20;
    motor[Right_Motor] = 40;
    //pause for 1 second
    wait1Msec(3850);
    //set servos to stop
    motor[Left_Motor] = 0;
    motor[Right_Motor] = 0;
    //pause for 1 second
    wait1Msec(1000);



}
```