Control Award Submission Form

Team # 8696	**Team Name:** Trobotix

Autonomous objectives:

1. Launching two particles into the center vortex
2. pressing both beacons

Sensors used: 2x MR Color Sensor, Nav-X Micro

Key algorithms:

- Voltage adjustment - *We have included some algorithms that take into account the battery voltage of the current battery and return a value that we can use to make the launches quick and consistent even with batteries that are less than fully charged.*
- Fast and Accurate turning - *We have combined gyro measurements with the built in motor encoders to make a function that turns our robot quickly within degree measurements. Because of our efficient calculations we are able to drive the robot to the beacons fast enough to get both of them in our autonomous while still being able to fire both balls into the center vortex.*
- A Beacon Color Detector That Consistently Works - *We have a section of code that is able to check a color sensor on the front of our robot for the value of the light coming from the beacon. If it within a certain threshold it determines that it is "Red" or "Blue". It then moves the respective servo and drives forward to press the correct button.*
- Encoder Calibration Inspired by the Binary Search Algorithm - *We created an algorithm to measure the number of encoder counts that are equivalent to one degree of rotation. It uses a variation of the binary search, but instead of searching through an array, it calculates a constant needed for our autonomous turning. It rotates 90 degrees repeatedly using the encoder turning method, and adjusts a constant each time it turns. If the gyro detects that it goes past 90 degrees, it decreases the constant. If it doesn't go far enough, the constant is increased*

Driver controlled enhancements:

- Gamepad 1:
    - Two bumpers to modify the speed of the driving to a half and a fifth of the normal speed.
    - Press "x" to reverse the controls, enabling easy control over movement when doing different tasks such as lifting the cap ball.
- Gamepad 2:
    - The "y" button activates a launching sequence nearly identical to the one in the autonomous, guaranteeing efficient and fast scoring.
    - The left and right bumpers, respectively, toggle the positions of the two beacon servos.

Engineering notebook references:

19, 20, 48, 49, 56-58, 66-69

Autonomous program diagrams: