

MECHTRON 4TB6 - Mechatronics Capstone Projects

**Goals (Revision 0)**

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**Description**

The objective of this project is to balance a ping pong ball in the center of a square pad. After the ball has been balanced, the pad will juggle the ball vertically while trying to keep the ball centered. Push buttons will let the user switch between the ‘balancing’ and ‘juggling’ modes. This project will use theory and apply knowledge of PID controllers, motor control, wiring diagrams, and real-time sensing.

**Capstone Project Goals/Objectives**

Our primary objective is to track the trajectory of a ping pong ball. A sub-goal is to determine the best way to do so. The two methods we want to compare are the use of sensors to poll for the location of the ping pong ball, and the use of cameras to track the ball position in real time.

Balancing the ball:

* Have a pad which balances the ping pong ball in the center
* The pad should be able to tilt and stabilize the ball in the center regardless of the location it starts at Should be able to place the ping pong ball at any location, and the pad should tilt and stabilize until the ball is centered.(need to revise)

Juggling the ball:

* Once the ball is centered on the pad, the pad should begin moving up and down to start juggling the ball vertically
* The ball's location in all directions will be tracked at all times
* The pad should react to the ball’s position in the air and tilt as necessary to ensure the ball stays central

Different Modes

* Implement user inputs to allow functionality of different modes (see **Extended Goals**) and for redundancy purposes if there is a software failure
* Medium we are planning to use include either a button, switch or touch interface

**Extended Goals**

Some extended (optional) features that may be incorporated in this project include features such as:

* Being able to set the height of the ball’s bounce based on user inputs
* Selecting a new ‘center’ position for the ball on the pad for the ball to rest, bounce and balance at
* Selecting multiple locations to bounce the ball to and from (i.e. side to side, corner to corner, etc.)
* Bouncing multiple balls at the same times
  + Straight up vertically on different positions of the pad, or
  + Alternating positions (i.e. bounce one ball from left side to right side, and the other ball from right side to left side, etc)