CPE 133 Final Project Proposal

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PID Controller

Summary: For our final project we will create a PID controller using the BASYS board. If possible, we will also try to implement our PID controller for the purpose of constructing a ball-balancing robot. We chose this project because it presents an opportunity to learn about robotics, PID controllers, and the implementation of PID control using "low-level" digital design. A PID controller implemented using "low-level" digital design tools such as Verilog could potentially operate faster than those designed using higher-level hardware languages. Inspiration for this project came from an Instructable found <u>here</u>.

System Architecture: The following diagram displays the overview of the project. The resulting feedback from a sensor mounted on the ball-balancing apparatus will provide information on the position of the ball on the balancing rail. The BASYS-Board PID controller (which we will create) will apply a PID algorithm to the input signal and output the appropriate signal to be read by a servo motor which rocks the ball balancing apparatus.
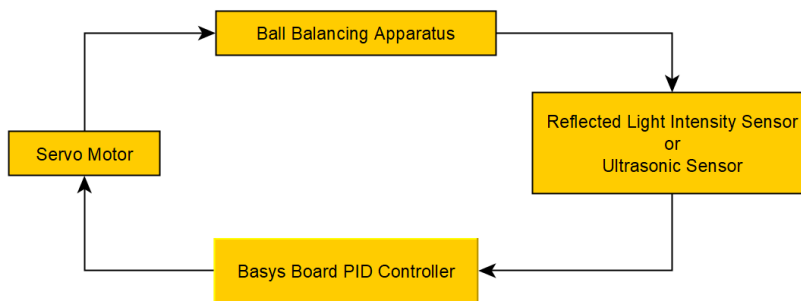
System Architecture: As of right now, we suppose the following function blocks will be created:

- Process Variable to Servo module:
- Proportional Term module:
- Integral Term module:
- Derivative Term module:
- Sensor Input to Error Value module: