ROB 311: HOW TO BUILD ROBOTS AND MAKE THEM MOVE

Professor Rouse, University of Michigan, Fall 2022

Ball-Bot Final Report Information

Name: _____

Due **December 19th at 10:00 am** on Canvas—this is the time our course is scheduled for the final exam. Create a single PDF that includes concise, clear descriptions of your rationale for your ball-bot's design and control. The report length should not be longer than five pages. After your report content, please add an Appendix A that includes screenshots / copy + paste of your commented Python code. Appendices are not included in the 5-page limit. In your report, please include the following content. Each aspect of the content will be weighted equally in your grade. Include references as needed, in IEEE format. Finally, the use of headings and subheadings is strongly recommended.

Please include the following content:

- An opening summary of the overarching project, your design and control architecture, and how you quantified performance.
- A description and schematic of how information moves through your ball-bot. What communication is used to transfer data between each component? What variables are transferred back and forth?
- A description and schematic of your steering controller, including how it interacts with the balance controller. Explain logical elements and any added best practices (e.g. deadband, etc.). You may use / modify the controller block diagram shown in lecture, which has been provided as a single Powerpoint slide on Canvas.
- Show step responses for your balance controller and steering controller. These plots should show the commanded / reference angle or velocity, in addition to the output of your controller (actual angle / velocity).
- Create a 2D, top-down view of your steering controller. Create a plot of your ball-bot navigating the 4' x 4' square, with the desired reference square and the path of your ball-bot superimposed on a single plot. Describe your methods, results, and discuss your findings.
- Create a plot showing your maximum angular velocity as a function of time. Similarly, describe your methods, results, and discuss your findings.
- A full page screenshot / render of your ball-bot Solidworks assembly (as page 6 or after).

If you have thoughts, please include a section immediately following your 5-page report that describes any feedback you have on the class. Any positive or negative comments, things that worked or didn't, or any other feedback you have. Great work on your ball-bot demonstrations!