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ME 449
Final Project

Submission Explanation
My commented code is in the directory called code. The results directory contains three directories (best, overshoot, and newTask). Each directory has a README, simulation csv (final.csv), an error response plot (error_plot.pdf), an error.csv (used to generate the error response plot), a video of the simulation, and a log file. The best directory highlights a well-tuned feedforwared-plus-PI controller. The overshoot directory highlights a poorly tuned feedforwared-plus-PI controller. The newTask directory demonstrates that my code works under various conditions.

Code Explanation
My code is built on 5 functions. All function inputs and outputs are commented in my code. Before utilizing any functions my code initializes necessary constants, then calls the Pick_and_Place function which is the backbone of my code. The Pick_and_Place function generates a reference trajectory using the TrajectoryGenerator function. Then, Pick_and_Place loops through each reference configuration output by the TrajectoryGenerator. In this loop, my code utilizes the Get_Jacobians and FeedbackControl functions to calculate control inputs for the YouBot which allows the YouBot to follow the reference trajectory. The control inputs are sent to the NextState function which calculates the next configuration of the YouBot using Euler step integration. Results are written to the necessary csv files.
My code follows the project description almost exactly. One thing I was confused about was that the project description asked us to input a YouBot reference configuration and an initial end-effector reference configuration. This would over define the reference configuration because the initial end-effector configuration depends on the YouBot reference configuration. To resolve this problem, I used an initial YouBot reference configuration that results in the desired initial end-effector reference configuration.