Motion Profiling Algorithm for Improved Intelligent Machine Target Correction

Gordon, Alexander (School: Ridgeview High School)

When moving autonomously, robots struggle to move to an exact target position, usually overshooting the goal. This is because it is impossible to infinitely decelerate (or stop immediately). A motion profiling algorithm uses the robots kinematics (like velocity and acceleration) to calculate the best path to take to reach the target position smoothly and without much overshoot. However, many robots receive inputs during motion to change target position. The goal of this project is to further improve the motion profiling algorithm to change the target position during movement, allowing for less time to be lost while keeping the accuracy. For this project, a motor with an encoder, a device that measures rotations, was used. The motor was run to a certain position with motion profiling, without motion profiling, and with PID, another form of increasing the accuracy of robot movement. Then, three more sets of code for each group was created, including different types of target correction. The motion profiling algorithm proved to be the most accurate of the three, having similar runtime to that of code without motion profiling. While PID was the most precise, it had significantly longer runtime and was less accurate than motion profiling. However, the accuracy of all the codes was decreased during target correction, though the comparisons between each stayed the same.

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