The primary objectives of this experiment were to implement PID control in a real-world application. PID is often used to precisely control the approach of a machine or system to a target limit, whether it be the surface of Mars, a train station, or in this case- a wall. PID control systems can be used with inputs that are different from the output. In this case motor RPM was controlled with distance, and robot distance from the wall was controlled by the time between sonar pings from the ultrasonic sensor. As it turns out, only PI control was necessary for this application. Derivative control usually plays a minor role in control systems, and can get messy as noise is amplified with this control type.

A methodical engineering approach was taken to create a solution to the objective of this experiment – a robot was modified for use with microprocessor control, software was written to make the robot move, and then that software was modified to control the robot with a prescribed control system. System parameters were obtained from spec sheets or testing, and a model was made to represent the robot mathematically. Once a model was made, a computer and modern system engineering methods were used to implement the most efficient control system possible. Analysis of the control system told the design team how effective the combination of software and materials was.

Improvements to the system could be made by making a more accurate model (measuring constants more precisely, taking measurements instead of relying on spec sheets), and by improving the electric and mechanical quality of the robot.