# Enabling Robots to Navigate Complex Environments through the Use of a Learning AI Algorithm

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Robots and other machines typically need to be pre-programmed with instructions to perform and are not actually provided with what their end goal is. This project aims to change that and gives the robot an end goal of successfully navigating an obstacle and basic instructions on how to go about doing so. Through learning and behavior shaping, the robot should come to understand its qualities along with those of its environment allowing for better overall navigation on varying terrain. An infrared rangefinder, accompanied by an eight core microcontroller, was used to detect the obstacles and two geared motors were the robots way of moving through the environment. The robot was loaded with an AI algorithm and set in front of various obstacles from two types – underpass and gap. It used the results of its scans compared with previous results to make a prediction about success or failure, then it attempted to navigate the obstacle. Input of success or failure was given to it via an on-board interface, the results were stored, and the process was repeated. A robot with prior memory of the obstacle and one without were run through a set of five heights of the underpass. A T-test was conducted using the results of both robot states and P values of 0.0004 and less than 0.0001 were obtained. This means that the difference was significant and the robot learned and was more successful at estimating the outcome with practice.

**Awards Won:**