

Autonomous Hovercraft – The Power of Neural Nets

Colin O'Flynn

Abstract

The engineering goal of this project was to discover if it was possible to use artificial intelligence to control a hovercraft autonomously. There are several types of artificial intelligence such as state machines, fuzzy logic and artificial neural networks. This project uses an artificial neural network, as it can be more adaptive in controlling an unstable vehicle.

The hovercraft has three main boards: the main computer, the artificial neural network and the speed control board. An ultrasonic rangefinder mounted on a servo provides the vision of the unit. The main computer board instructs the rangefinder to emit a sound pulse and wait for an echo and then it calculates the distance to the object based on the time taken for the echo to return. This data is sent to the neural network, which then decides on the best course of action to avoid any collisions. The recommendations of the neural network are processed by the main computer board and sent to the speed controller, which uses pulse width modulation to control the speed of the lift and propulsion motors, and to a servo that controls the rudder. The main computer board communicates with the neural network board and the speed control board using the Scalable Node Address Protocol that has an error detection scheme.

It is possible to use an artificial neural network to control a hovercraft autonomously; however, properly training the neural network is the key to accurate control. Artificial neural networks are a promising way of controlling robots.