

Abstract

Master of Engineering Degree (Mechanical)

Project Title:

C-3PO Robot Walking Mechanism (Cornell Cup USA, presented by Intel 2013-2014)

Author:

Lijia Wang, Stephanie Altrui; Advisor: David R. Schneider

Abstract:

The Cornell Cup USA Creation Team is comprised of 50 multidisciplinary engineering students. The goal of the team for 2013-2014 was to develop Star Wars inspired robots to be showcased at Walt Disney World. Two robots were designed and built: a humanoid walking robot and an autonomous mobile robot, based on C-3PO and R2-D2 respectively.

One of the main functions of the humanoid robot was to walk in a straight line. The challenge presented was to design, manufacture, and demonstrate the walking capability in less than a year's time. Many existing humanoid walking robots have six degrees of freedom per leg. However, Cornell Cup's design was simpler due to time and budget constraints. The design utilized a four-bar linkage mechanism with a single degree of freedom. The mechanism was capable of actuating the robot's legs to create a straight-line walking motion. The main advantage of this system was that it was powered by a single DC gearmotor, thus drastically simplifying the control system.

The completed robot stood over 6 feet tall and weighed 125 pounds. It was capable of walking at 6 inches per second on flat ground. The robot was successfully demonstrated at Walt Disney World on May 1-3, 2014.