AGH University of Science and Technology

Faculty of Mechanical Engineering and Robotics

Fundamentals of Design of Mechanisms in Mechatronic Devices

Project

Mechanical Hand

Year: II, Mechatronic Engineering with English as instruction language

Project Overview

The goal of the project was to design a mechanical hand capable of picking up objects of various shapes and sizes.

-The hand was to be made up of four fingers with two degrees of freedom each.
-Each finger pair has their base joint connected to one shaft which will serve as the main compression force for holding a given object.
-The four finger tips all move independently of each other to allow them to conform to a desired shape.
-The gripping mechanism is friction based.

The report first shows the full kineostatic analysis of one mechanical finger. All the calculations; including velocity, acceleration and force calculations, were completed using graphical methods. The results were then transformed to matrix form to allow for computer aided computations.

Since the four mechanical fingers are symmetrical, one analysis was sufficient to describe the entire system.

Using Matlab and the derived matrix equations, we estimated the parameters of our hand and chose the appropriate parts; motors, bearings, retaining rings. Now we had sufficient information to begin producing a 3D model using Autodesk's Inventor.

The exact specifications of the mechanical hand were calculated from the Inventor software and recalculated in Matlab. Our assumptions were sufficient and the limitations of the hand were found.