Comparative analysis using speed and position control for robot 2-GDL

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In this work, the control of a device to guide a vision system with two degrees of freedom is presented. This device can be use in vigilance systems, director of movement and for the tracking of moving objects. In the work the basic characteristics of the system to control and their restrictions are described. The mechanical structure of the system is analyzed from the kinematics and dynamic point of view in order to obtain a model of the plant and reproduce it in a simulation environment: Matlab and Dymola. The equations of the model are obtained using Denavit-Hartenberg representation and the Lagrange-Euler methodology. Three different control strategies are applied: PID, lead compensator and LQR; For the control of the plant, feedback of position and speed for the manipulator is used. Finally the graphs of the results of the simulation system for the two proposed control schemes are presented.

Keywords: Control, simulation, Robot dynamics, comparative analysis.

Introduction
The robots are designed to help in various activities such as repetitive work, handling of hazardous materials and activities that exceed the natural capacity of humans such as using a robot vision [1-3] to surveillance distances automatically . An example of these systems is the system for tracking objects (Figure 1).
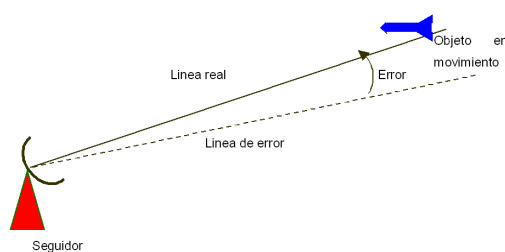

Fig. 1. Tracker objects

The motors must be able to interpret the commands sent by the vision to track the movement of the object. The system must be able to follow the motion of the object in order to keep within the image produced by the video camera. To achieve these requirements is necessary to have the kinematic and dynamic models of the robot with gimballed configuration capabilities that allow to know the mechanism to evaluate the control mechanism [4] for object tracking activities..

System
The system (Figure 2) is a robot with two degrees of freedom in spherical configuration [5]. Its main feature is that has two movements, one movement is rotation and second is elevation. The system has two joints on which can rotate. These links are called pan and tilt. In the system, the pan movement is in rotation. In the case of tilt movement is in elevation. The movement in rotacion can rotate 360 degrees, but the upward movement is restricted by mechanical issues.
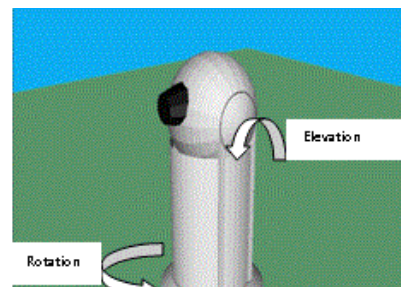

Fig. 2. Robot de 2 GDL para seguimiento de objetos.