

<b>Author:</b>	Jari Kostamo	
<b>Title of thesis:</b>	Design and Development of Device Demonstrating Control Theory	
<b>Date:</b>	March 12th, 2004	<b>Pages:</b> 120
<b>Department:</b>	Dept. of Automation and System Technology	
<b>Professorship:</b>	Control Technology	<b>Code:</b> AS-74
<b>Supervisor:</b>	Heikki Hyötyniemi, professor	
<p>In this work a device demonstrating basic ideas of feedback and control was developed. Work was carried out at the Control Engineering and Machine Design Laboratories of Helsinki University of Technology. Device was also designed so that it can be borrowed by Finnish Science Centre Heureka.</p> <p>The demonstration device provides to the user an interesting challenge. The user can try to control the process by himself or let the computer do the work. In the demonstration device a small ball is set on a convex round surface and the balancing can be done by turning the surface.</p> <p>Control system is based on a position measurement obtained from a machine vision system. Position information is fed to Kalman filter used to estimate the state of the ball. Optimal control can be calculated from state estimate.</p> <p>As a result of this work a reliable demonstration device was developed. Control system of the device can handle balancing of the ball in all situations and the behavior of the device is predictable. A lot of effort was also done to take care of the finished outlook of the device and the result satisfies demands. Device was also tested by audience and people found it interesting.</p>		
<b>Keywords:</b>	control, feedback, unstable process, machine vision, Kalman filter, LQ regulator,	