

Amazing Ball

A low-cost "Ball and Plate" plant to learn automatic control with ease



Amazing Ball is a complete, ready-to-use system for learning and teaching real-time automatic control.

It allows users to explore various control techniques to maintain the ball in a quasi-equilibrium position over an oscillating plate using two servo-motors and a touchscreen.

Control system design is powered by opensource mathematical control tools **SCICOS**, and **SCICOSLAB**, so the user can design the control algorithm in a block diagram inside SCICOS and then using the code generator to generate the C-code and the executable file. The FLEX Boards which controls the hardware uses Erika Enterprise, a free of charge open-source implementation of the ISO 17356 API (derived from the OSEK/VDX API).

Amazing Ball consists of a steel plate pivoted on a central joint (Patent pending). The system has 2 degrees of freedom ensured by two servos connected to the plate. A high resolution touchscreen is mounted on the plate to measure the coordinates of the ball in **real-time**.

User control algorithms run on a powerful Microchip **dsPIC®33F microcontroller** hosted on FLEX boards. The device has specific hardware modules to acquire ball position coordinates and to generate PWM control output signals. The dsPIC®33F microcontroller can also communicate with other external devices.

Real-time execution of the embedded code is ensured by the **ERIKA Enterprise kernel**, an innovative RTOS for small microcontrollers based on an API similar to those proposed by the OSEK/VDX Consortium.

Data can be transferred to PC via Ethernet or RS-232 connection. Other serial communications like RS-485 and CAN can be used to increase the complexity of the system (e.g. central controller in a control systems network).

The hardware comes with an installed demo program and it also has a dedicated power supply. Hence, the user can immediately run the system by connecting the power plug and simultaneously read the system characteristics by connecting the hardware to the PC via an Ethernet cable.

Key Features

- Fully compatible with Scilab/Scicos.
- Robust steel chassis.
- High resolution touch-screen for accurate sensing of ball position.
- High-quality servomotors.
- Powered by FLEX and Erika Enterprise.
- Quick assistance and support.
- Laboratory manual features modeling, sensor calibration, and control design exercises.
- Open architecture system allows users to design their own controller.

Product Topics

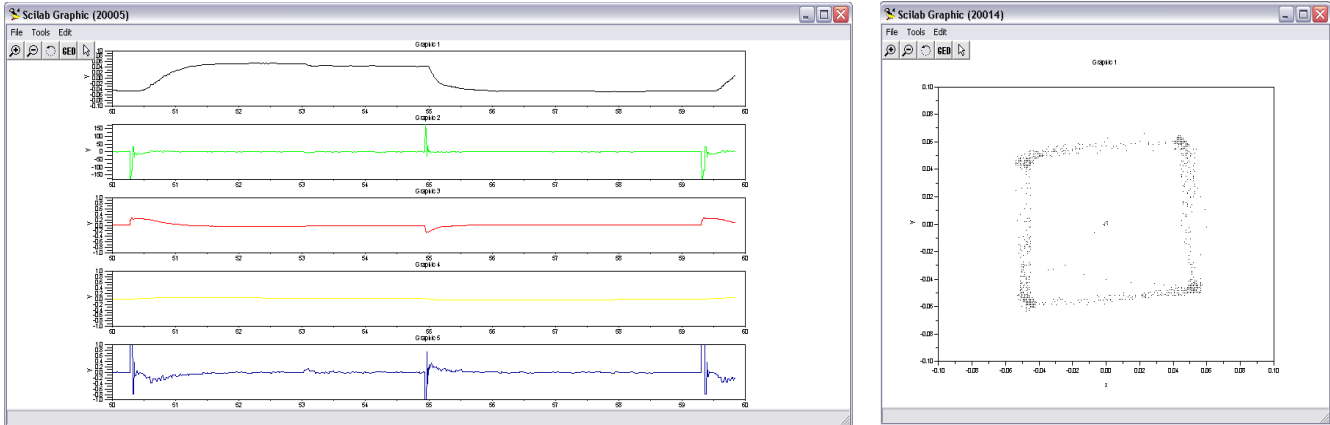
- Position Control
- Disturbance Rejection
- Tracking Control & Regulation
- PID Controller Design
- Multiple Control Loops
- Lead/Lag Compensation
- State Feedback
- System Modeling & Simulation
- Root Locus Design
- Nyquist Stability
- Real-Time Control
- Discrete Time Sampling
- System Identification
- Multivariable Control Design

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Plots for a typical ball position step response of the system using a simple PID controller.



Check Amazing Ball Demo Video on YouTube
www.youtube.com/group/flexboards



Specification	Value	Units
Base dimensions (w x l)	180 x 338	mm
Plate dimensions (w x l)	180 x 230	mm
Height (h)	95	mm
Weight (w)	1.5 (approx.)	kg
Ball diameter (2r)	26	mm
Min. sample time (T)	20	ms
Power supply (voltage, current)	12 DC, 1500 (max.)	V, mA

How to buy
 Visit Evidence web site
www.evidence.eu.com

Related links
erika.tuxfamily.org
www.scicos.org
www.scilab.org

