

# Syscomp Lab Courseware

Traditional and project-based lab teaching material.

**College and university courseware to complement Syscomp lab equipment.**

**Available for free download or customized to meet adoption requirements.**

## AC Circuits 101

Introductory study of AC circuits, including impedance and the amplitude and phase behavior of various frequency dependent networks. Accompanying tutorial material covers the use of Laplace techniques and Maxima for solving equations. Lab exercises include traditional AC measurement techniques as well as advanced techniques such as the effect of a circuit on an arbitrary waveform, and plotting amplitude and phase with network analyzer software (included).

*Audience:* EE Students, Freshman level

## Electronics 101

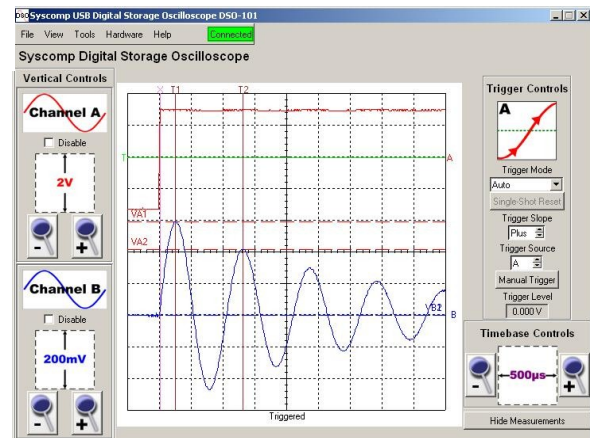
Introductory study of analog electronic devices and circuits. Focus is on op-amps, but also includes specialized devices. Basic op-amp negative and positive feedback, op-amp characteristics, linear op-amp applications (eg, difference amplifier), piecewise linear applications (eg, precision rectifier), switching applications (eg, Schmitt trigger), oscillators, timers, three-terminal regulators.

*Audience:* EE Students, Sophomore level.

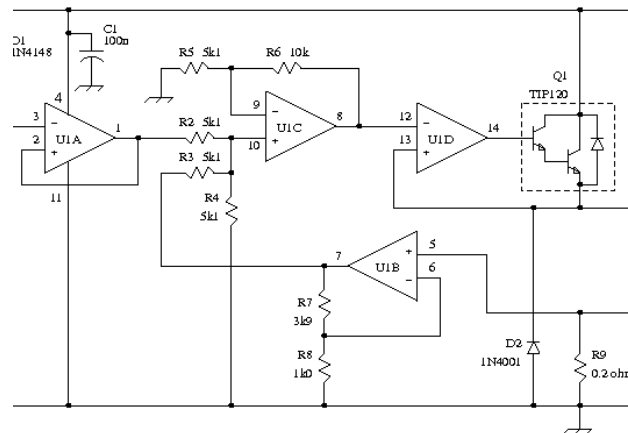
## Microprocessor Systems

Introductory-level lab teaches the common elements of microprocessor hardware and software. Seven lab exercises and project guide the student in programming a mobile robot for tasks of increasing complexity, ranging from the on-off control of a motor to the navigation of a maze. Students learn to debug hardware-software interactions to create a functional microprocessor system.

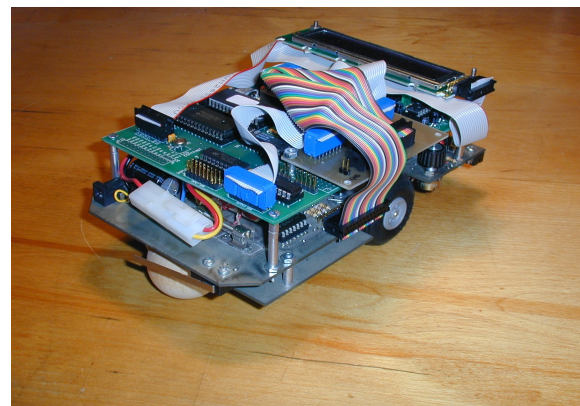
*Audience:* EE students, any level.



*RLC Transient*



*Analog Circuits*

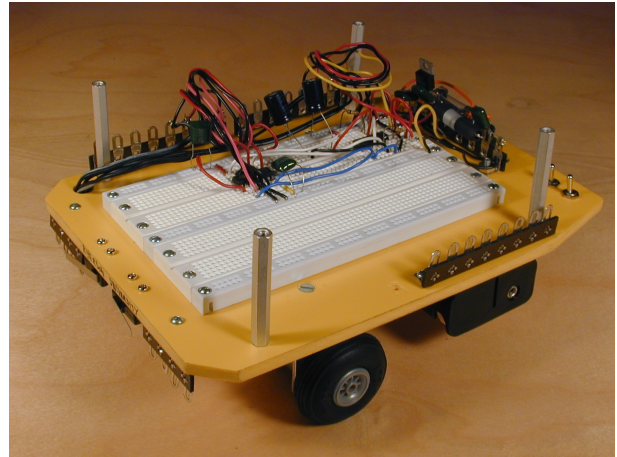


*eebot Mobile Robot*

## Mechatronics

This introductory level lab covers analog electronics for mechanical engineering students. Subjects include linear and non-linear op-amp circuits, optical and mechanical sensors and DC motors. Seven lab exercises and project lead the student through construction and troubleshooting analog circuitry and mechatronic devices, to control a robot for a lightweight sumo-wrestling competition.

Audience: Mech students, Sophomore level

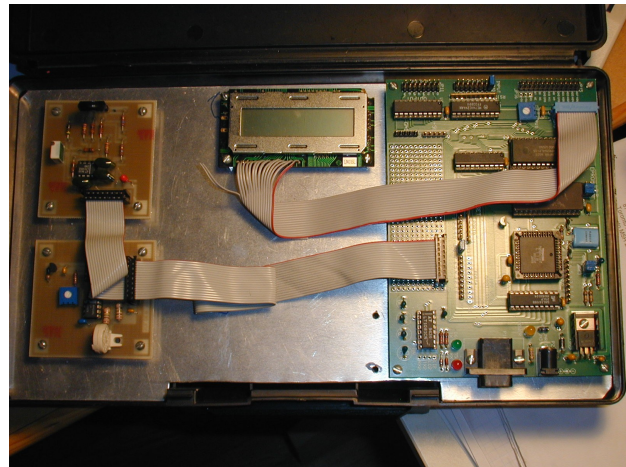


*Mechbot Mobile Robot*

## Instrumentation

The lab focusses on issues of analog and microprocessor system design, using the vehicle of a meteorological measurement system. The final system must accurately measure temperature, air pressure, humidity and wind speed. The design requires consideration of component tolerances, grounding, shielding and decoupling, and the construction of software for an embedded microprocessor. The 258 page lab manual provides tutorial material on sensor design, organization of software and project management.

Audience: EE Students, Senior level



*Weather Station*

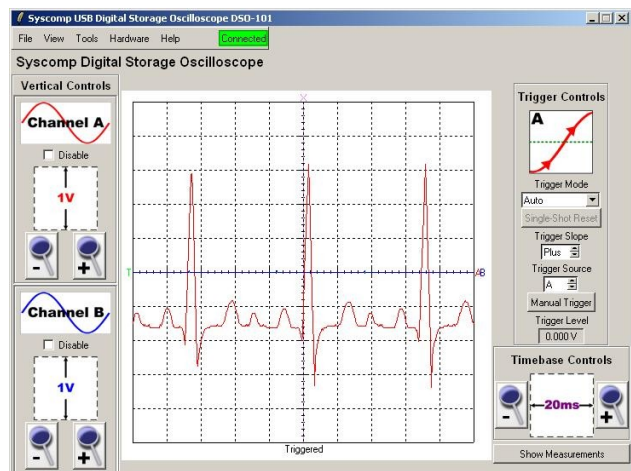
## Biomedical Instrumentation

Four exercises guide the student through the design and construction of a cardiograph: using CircuitGear for measurements, spectrum analysis of the cardiograph signal, the cardiograph filter, human-body model and instrumentation amplifier. Optionally, students may construct a PulseOximeter for measuring blood oxygen level and monitoring heart rate.

The lab notes are structured as guided design, with difficulty and risk between a structured lab exercise and a completely open-ended design.

This material was developed in collaboration with Dr. Kaamran Raahemifar of Ryerson University for the course ELE874 Biomedical Instrumentation.

Audience: EE Students, Senior level



*ecg Waveform Generation*