Computer-Controlled Experiments in Introductory Electric Circuits Laboratories

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**GOALS**

- Comprehensive learning environment for lab students
- Complement front-panel operation of real instruments with comprehensive set of computer-controlled experiments
- Foster development of hands-on skills & intuition

**NEW LEARNING PROCESS**

- 1 workstation for each team of 2 students
- Students first obtain a few data points from real bench-top instruments
- Students use Virtual Instruments (VI) to obtain remaining data points automatically

**AVOIDING CHEATING**

- In the lab
  - Authentication fields on each VI verify user
  - Printouts of lab data signed by lab instructor before students leave
- After the lab
  - Data uploaded on server checked for duplication
  - Due to noise, students will not have identical data

**WORKSTATION CONTENTS**

- Agilent instruments
  - 3120 oscilloscopes
  - 33220A function generators
  - 34401A or 34405A digital multimeters
  - E3631A power supplies
- Windows Computer
  - LabVIEW version 8 or 8.2
  - Networked: data saved to server
  - Students log on using university password

**RESULTS & BENEFITS**

- Data gathered from 2 courses
  - 69 EE majors; 93 non-EE majors
- VI is more valuable to EE-majors who build more complicated circuits
- Helped students create neater reports (Allows for easier grading)
- Automated data collection moves focus to concepts
- Reinforces concepts by comparison of data sets
- Real time analysis verifies correctly built circuits
- General purpose VIs usable throughout curriculum
- Does NOT open loopholes for cheating