

Introduction to Hybrid Lab Text

This text began as a paper to the ASEE NCS Annual Conference in Akron, Ohio in 2018. This paper had the focus of encouraging building of experiments for use in our Electrical Engineering Technology labs. A secondary benefit of the paper was to encourage academics to focus on building their own labs which sharpens their programming and engineering skills. I believe both objectives have been achieved. The paper began:

EET Course Common Lab Experiments

William T Evans, PhD, PE

Department of Engineering Technology

Electrical Engineering Technology

University of Toledo

Toledo, Ohio 43606

Email: william.evans@utoledo.edu

Abstract

A number of lab experiments have been developed that are common among a number of EET courses. The experiments have the intent of quick change-over from one course to another and a low relative cost so that multiple stations can be used simultaneously in the same room.

This paper will outline with some technical content the courses served, the lab experiments and the equipment. An outline of costs will be included.

Courses include courses in PLCs, embedded systems, database applications, C programming and automatic controls. Experiments will include simple one-week experiments as well as longer multiple week experiments requiring programming or in-depth diagnostic measurement.

The list of labs for the course are listed below:

- Chapter 1 Hot Dog Counter
- Chapter 2 Coin Changer
- Chapter 3 Car Wash
- Chapter 4 The Traffic Intersection
- Chapter 5 Cash Register

Chapter 6	Cash Register with HMI
Chapter 7	Binary Add
Chapter 8	Binary Subtraction
Chapter 9	Thumb Wheel Switch
Chapter 10	Generating Energy from Bike
Chapter 11	Pumps with Floating Master
Chapter 12	Simon Says Game
Chapter 13	Whack-a-Mole
Chapter 14	Batch System Programming
Chapter 15	Siemens FC and FB Programming
Chapter 16	Human-Machine Interface Programming
Chapter 17	Various Communication Projects
Chapter 18	Single Axis Stepper Control
Chapter 19	Stepper using 3D Printer Stepper Motor
Chapter 20	Single Axis Servo Control
Chapter 21	Gear Motor Speed Control - PID
Chapter 22	Ball-in-Tube - PID
Chapter 23	Tape Rewind – PID
Chapter 24	Valve on Wall
Chapter 25	Tank Over Tank
Chapter 26	Safety Lab
Chapter 27	The Maze