

Drexel University
Drexel Autonomous Systems Lab
DASL 132 Electronics and Robotics Introduction

Instructor Information

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Prerequisites

Some basic electricity and/or electronics knowledge

- Basic circuit wiring
- knowledge in general robotics, and components
- Basic hand tool knowledge

Textbooks or other useful materials

Mimms, Forrest M. *Electronic Formulas, Symbols, & Circuits (Volume IV)*. 2004

- Personal Computer capable of running Windows based applications (ATMEL AVRStudio 4, hyperterminal or other serial terminal software)
- Notebook
- Safety Glasses
- Closed Toe Shoes

Course Goal

This course provides an overview of DASL electronics and robotics projects. The course will teach the basics of electronic circuit theory, from Ohm and Watt's Laws, current limiting resistors, soldering and desoldering, bread-boarding, and construction of circuits using printed circuit boards (prototyping boards). The course material will lead up to a project at the end of the term. The project will be to build a small wheeled robot (the chassis will be machined in the course taught by RJ Gross). This course will focus on integrating both the machining course, and the C Course taught by Noah Kuntz, to build, wire and solder together a robot for use in detecting an obstacle. Knowledge will be used from all three courses to accomplish the robot task.

Lecture Times

Bossone 109
Monday – 9:00am-11:00am
2 hour class Block
1 hour lecture / 1 hour lab

Lecture Topics (TBA)

- Lecture 1: Introduction to Electronics and Circuit Theory
 - Basic Concepts
 - Watt's Law, Ohm's Law
 - review from Physics II – resistors, capacitors, inductors
 - Resistor and Capacitor Networks
 - Current Limiting Resistor
 - Use in Light Emitting Diode for current regulation
 - Demo of LED
 - Sizing resistor for use on applications
 - Introduction to book, and how to navigate chapters
 - Uses in electronics schematic diagrams
 - components and what they do
 - basic circuits to build and interface with

Final Project Details

The end-goal project of this course will be to apply the platform produced in the DASL 141 course. The objective of this project is to apply the principles learned in machining and C programming, to construct a robot capable of basic obstacle avoidance. The project will make use of soldering, wiring, and construction of a circuit board, as well as programming the microcontroller in the C programming environment of the ATMEL AVR Studio.

Grading Policy

Every week, homework will be issued at the end of class. This homework will be relevant to topics covered in class. Homework is mandatory, but will be graded based on a pass/fail basis upon a well presented class discussion. The following class a quiz will be issued based upon the homework and previous class material. These will be graded to keep the student accountable for his/her work. The Final project is based on a Pass or Fail policy. Pass: Complete integration of machining, electronics, and programming for a robot that detects a wall, and can successfully navigate around it. Fail: Does not produce final project, no acceptations.

Words of Wisdom

- Work quickly, but stay accurate (expensive equipment and time)
- Double check your work before applying power
- Be SMART!!!
- Get things done ahead of time
- Help is available so ASK!!
- Do not be afraid to research topics outside of lab or homework time - Wikipedia
- You want to work fully autonomous in the lab in the future?