

Physics 536 Spring 2009 Project - Due May 1st

Instructions: Pick a particular electronic component, device or *small* system, and prepare a 2-3 page report describing applications, operating principles, design considerations and examples.

For example, if you selected *lock-in amplifiers* you would describe how they are used for making very low-noise current and voltage measurements on devices that are maintained at very low temperatures. If you decided to discuss capacitors you may want to describe the technologies used to fabricate them, the dependence of their capacitance on frequency and temperature, their cost and target applications.

The discussion of a large *system* is discouraged, but the description of part of a larger system would be acceptable. For example, describing how RADAR works would be too broad, but describing a circuit for a high-power RF amplifier for RADAR transmission, or a low noise RF pre-amplifiers for RADAR reception would be appropriate.

Examples of devices or instruments you might want to describe include

- Lock-in amplifiers
- Instrumentation amplifiers
- Properties of different types of capacitors
- Operational amplifier oscillators
- Survey of component packaging
- Designing with ECL logic
- Overview of VME bus protocols
- ATCA/ μ TCA
- I^2C bus protocol
- Fiber optics drivers/receivers
- others...

Some topics have been oversubscribed in the past. I specifically do *not* want reports on any of the following topics, unless you explain clearly how you intend to analyze some aspect of their operation.

- CCD image sensors
- RFID technology
- ...

You can use a variety of resources for picking a topic. Some suggestions are

IEEE Spectrum	http://www.spectrum.ieee.org/	IEEE trade magazine
IEEE Transactions on Nuclear Science	On-line from Purdue libraries	Research Journal
Physics Today		Look at the advertisements
Keithley	http://www.keithely.com	Measurement devices
Analog Devices	http://www.analog.com/	Analog/Digital integrated circuits
Dallas/Maxim Semiconductors	http://www.maxim-ic.com/	Integrated circuits
Fairchild Semiconductor	http://www.fairchildsemi.com/	All kinds of stuff
ON Semiconductor	http://www.onsemi.com/	All kinds of stuff
Vishay	http://www.vishay.com/	Active discrete components
Texas Instruments	http://www.ti.com/	All kinds of stuff
AVX Corp.	http://www.avxcorp.com/	Capacitors

I strongly recommend that you discuss your topic and the proposed scope before you begin a significant amount of work. Check with me if you need help picking a topic.