Electronics Module - Electrical Field Session 2017
Introduction, Schedule, Grading and Equipment

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This portion of EE Field session (one week) will focus on electronics information finding, assembly, test and evaluation. You will work with a partner or two in this lab. We will focus this part of the Field Session on things that you aren't going to spend much time on as part of your regular coursework but are essential skills for the successful engineer to master.

Exercises
There are ten exercises you will need to complete:

1. Engineering tools finder
    a. Parts Distributor List
    b. Circuit Archive List
    c. Datasheets
2. Assembly skills: Soldering, unsoldering and wire wrapping
3. Electronic schematic examination preparation
4. Solar cell evaluation
5. Temperature controller design
6. Voltage regulator testing
7. Security System
8. 555 timer based traffic light
9. Circuit breaker evaluation
10. Electronic artwork

Work at your own pace but realize that all these exercises must be completed by the end of the week and must be documented and must be submitted electronically to your instructor. Also be aware that not all equipment you may need for some of your evaluations may be available to all groups all the time.

Project: Analog circuit application

You will also do a project that uses an analog circuitry to perform a specific ***function***. You can look through the circuit archive list and find a circuit you want to evaluate and analyze or design one yourself. ***Projects must be approved before you start work.*** Duplicate applications may be accepted but there will be a limited number of duplicates so get your proposals in early. You must find (or design) at least two different circuits that will perform the specified function, decide on a "best" one, explain how the circuit works electronically, prepare a cost estimate of the parts needed for the circuit, prepare a short (10 minute) presentation to the class that describes your project and how it works.

Schedule
The BB304 lab will be open from 8am to 5pm every day. We will break for lunch from noon to 1pm each day and the lab will be closed during that time. There may be some lecture on the first two days to give you some background material. The rest of Monday, Tuesday and Wednesday will be spent on the eight exercises. As a general guideline, you should begin working on your project on Thursday morning so make sure you have all the parts you need to do your prototyping by then. The project presentations will be on Friday afternoon or sooner if everyone is ready.

Grading

Ten exercises = 90% (T) means a TEAM submission, (I) means an individual submission
One project =10%.

1. Engineering tools finder
    a. (I) Parts Distributors: Submit electronically to the instructor a list of electronic parts distributors. Provide a list of at least 20 electronics parts vendors. Name and URL is sufficient. Also, submit a cost estimate for the Bill of Materials (BOM) posted on Canvas.

    b. (I) Circuit Archives: Submit electronically to the instructor a list of Circuit Archive sites. Provide a list of at least 20 circuit archive websites. **In addition**, find two circuits that use a 555 timer chip. Provide the schematic of each in Multisim and show that they work as advertised in your simulation.

    c. (I) Datasheets: Collect the data sheets listed on Canvas and save each of them in pdf format. Submit them electronically to your instructor.

2. (I) Soldering, unsoldering and wire wrapping. Each member of the group needs to complete their own work for this exercise. No report is required but you do need to show your calculated equivalent resistor value determined in class. Grade will be based 100% on correct assembly and demonstration and calculation.

3. (I) Electronics schematic drawing exam preparation. Each student will prepare a 20 question quiz to test an EE student's proficiency regarding their knowledge of electronic circuit schematics. Specific instructions are posted on Canvas.

4. (T) For the Solar Cell evaluation, see the specific instructions on Canvas and prepare a report to include the following:
    - 10% - Summary of the evaluation. Include a brief description of the educational benefits: what did you learn?
    - 30%- Tests you performed
    - 30% - Presentation of results
    - 30% - Electrical schematic(s) of your system

5. (T) Temperature controller design, see the specific instructions on Canvas and prepare a report to include the following:
    - 10% - Summary of your design.
    - 30%- Tests you performed
    - 30% - Presentation of results
    - 30% - Electrical schematic(s) of your system

6. (T) Voltage regulator testing - See instructions on Canvas.

7. (T) Security System design – See instructions on Canvas.

8. (T) 555 timer based traffic light design – See instructions on Canvas.

9. (T) Circuit Breaker evaluation – See instructions on Canvas and the list by the breakers.

10. (T) Electronic artwork design – Will be posted on Canvas, turn in as instructed.

For the Project:
The only documentation required for the project includes the presentation and the electrical schematic. There is no written report. The project grade is:
- 50% technical content of the presentation
- 25% presentation quality
- 25% schematic quality

Equipment

Each workstation in the lab has an oscilloscope, power supply, multimeter and function generator. You will be provided with tools, and the parts you need for the exercises. If you need some unique parts for your project, you may have to obtain some of those parts on your own or may be able to borrow what you need. Check with your instructor if you need some unique parts.