EEE392 Measurements and Analog Circuits Lab
Mini Project Description and Guidelines
Due Date: 27th October 2015

Objective

The objective of mini project in the course EEE392 Measurements and Analog Circuits Lab is to help students in understanding and solving real world problems in the field of analog electronics thereby developing practical ability and knowledge about tools / techniques involved in solving problems. Students will select Projects in teams and each student will have to prepare proper documentation consisting of problem statements, specification, design aspects, modeling techniques, analysis, Implementation and Testing strategies.

Problem Statements

Category A

1. A nationalized bank requires a burglar siren/alarm to be installed in their main entrance for security purpose. Design a suitable circuit.
2. An Industry requires a power supply for testing its products. The testing method involves applying various voltages to the Unit Under Test (UUT). Design a power supply with following specifications:
   - ±5V at 1A
   - Variable power supply (0 – 15)V at 1A
3. Design a motor control unit to control the speed of a dc motor rated at 1HP.
4. An industry requires a battery voltage tester for indicating the voltage level. Design a suitable circuit to indicate each incremental voltage threshold. Consider at least 5 thresholds and battery voltage of 24V.
5. Design an automatic washing machine that presets the time of wash based on dirt.

Category B

1. An Industry requires a power supply for testing its products. The testing method involves applying various voltages to the Unit Under Test (UUT). Design a power supply with following specifications:
   - ±15V at 1A
   - Variable power supply (0 – 30)V at 2A

   The power supply will be handled by amateur persons, so the industry needs overcurrent indication and high current protection.
2. A three star hotel in the city needs to be automated with features like automatic/remote lighting control, security system with alarm, activation of power circuit with room key and exterior light for roof garden restaurant. Design a suitable circuit to incorporate these features.
3. Design a motor control unit to control a stepper motor.
4. In a chemical industry, It is required to control the temperature of a furnace automatically. If the furnace temperature goes beyond the Preset temperature then heater will get turned off and if temperature goes below the set value then heater gets turned on. Design a suitable temperature control unit.
5. A Manufacturing Industry has different rotating machineries to cater for its loads. As a step towards automation it needs a condition monitoring unit for early identification of machine failures. Design a suitable circuit for the industry requirement.

Category C

1. A chocolate manufacturing unit requires an optical based wrapper detection mechanism to detect the wrapped chocolate bars and also a display unit to count the bars sent for packing. Design an optical counter wrapper detection mechanism for a conveyor belt to count the number of chocolate bars that pass by.
2. Design a Wind turbine instrumentation system to monitor the parameters like voltage, current, temperature, pressure etc.
3. Design an automatic lock system for your four wheeler which includes window sliding system and automatic remote locking with alarm.
4. Design a music system for your home. A stereo system should have a stereo output speaker wit woofer and tweeter.
5. Design a display system for luxury car.

Constraints

- Student may use any simulation tool such as MultiSim, OrCAD, TINAPro, LTSPICE, HSPICE, Proteus, Micro-cap etc., for design analysis.
- Circuits should be designed using electronic devices, basic components and digital ICs only
- ICs like 723, 317, 555, ADC, DAC should not be used. Dedicated ICs also should not be used.
- Use of LABVIEW DAQ, Arduino is encouraged.
- For any clarification please consult your faculty.

Guidelines

- A team size of **maximum three** is allowed.
- Problem statement is classified into **three categories**. The categories are formed **based on the complexity** involved in the problem statement.

  Category A - easy to solve
  Category B - medium complexity
  Category C - high level of complexity
- Each team is **free** to select any one project from all three categories.

Guidelines for Project Report Preparation

- A detailed project report of **no more than 8 pages** should be submitted on or before **27th October 2015.**
- Report must be typed and proofread (either in word or in LaTek).
- Report should include the **problem statement, detailed specification, design aspects, simulation, implementation circuit and analysis**.
- The Project Report should contain the following headings:
  - Title of the Project
  - Introduction and Objectives of the Project
  - Problem definition, Requirement Specifications (Detailed Functional Requirements and Technical Specifications), analysis, design aspects, implementation circuit and simulation (if any).
  - References in IEEE Format

Evaluation

- Mini-Project is evaluated for maximum 30 marks.
- **Evaluation weightage is different** for each category. This is done to encourage students to solve high level complexity problems.

  Category A - Max 70%
  Category B - Max 85%
  Category C - Max 100%
- The components of examination includes:

  i) Originality
  ii) Design approach and Analysis
  iii) Participation in project work and Accomplishments
  iv) Viva voce
- Design and Analysis must be your own work (or the joint work of your group). **Plagiarism** of any source, including another student's work, is not acceptable. Such reports will result in a **grade point of zero**.
- Failure to turn in a completed report on the due date will result in reduction of 25% of final grade.
