NET1LAB HYBRID CLASS SPRING 2008 CHARLES KIM

CIRCUIT DESIGN PROJECT

1. Target Students:

This project is for all students who are taking Network Analysis I, or Intro to Electrical Engineering Lab ("the Lab"), or both. The grade of the project will be applied to both Network Analysis I and the Lab.

2. Project Classification:

Team Project. We keep the teams which were already formed in the Mobile Studio Class. Anyone who is not in any of the teams should contact the instructor.

3. Circuit Design Project:

(a) Objectives

This project is to design a circuit for finding out the internal connection status of a voltage source and three resistors around three terminals while only two terminals are accessible from outside. This project requires students to use the knowledge gained through the courses of Network Analysis I, the Lab, and Digital Systems Design. The use and understanding of comparator and logic gates is specifically required along with basic circuit analysis methods. The main objective of the project is to improve the circuit design skills and technologies, deploying knowledge learned from intra-disciplinary classes, for solving circuit-related problems.

(b) Problem

Design a circuit which indicates the internal status of the two-terminal black box by displaying three LEDs of red, green, and yellow color, as roughly sketched in FIG.1.

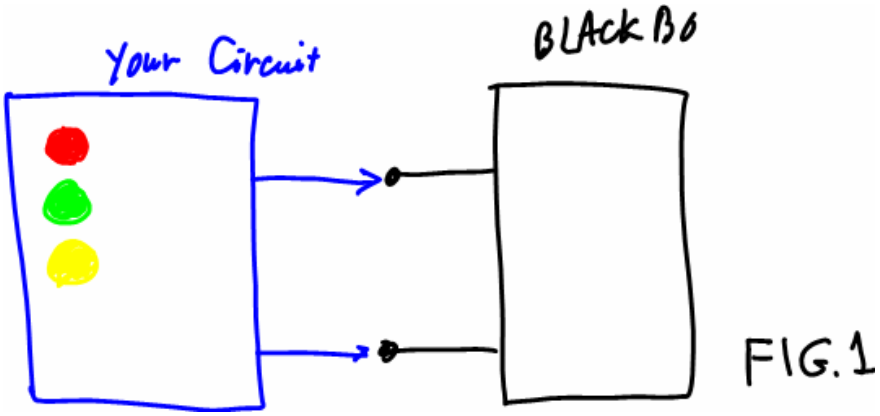

FIG.1

Of the internal structure of the black box, this much is known. First, there are three terminals labeled A, B, and C as depicted in FIG.2, while only two terminals (**A** and **B**)

are accessible from outside. Second, **a 9V battery is connected between terminals B and C, with + polarity to C and – polarity to B.**

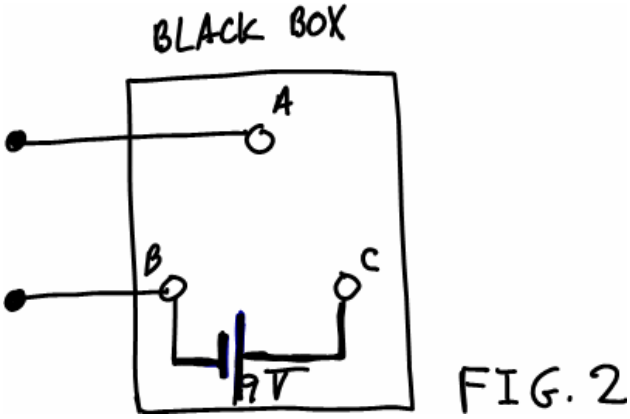

FIG. 2

Third, there are three same value resistors inside connected in only five different ways. The five different resistor configurations and corresponding LED indications are illustrated in FIG.3, FIG.4, and FIG 5.

As in FIG.4, your circuit turns on the red LED when three resistors form a delta, while keeping the other two LEDs off.

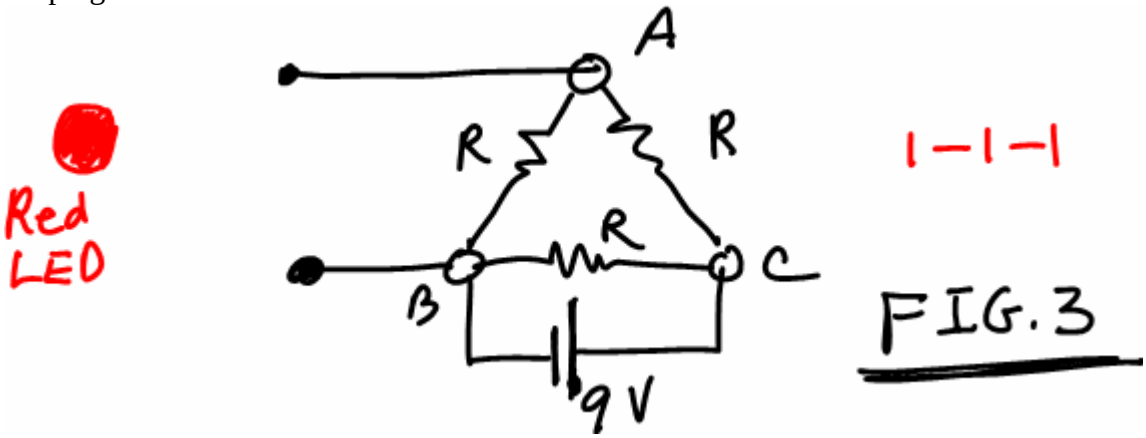

FIG. 3

As in FIG.4, your circuit turns on only green LED, when the resistors are connected either 2-0-1 or 1-0-2 format.

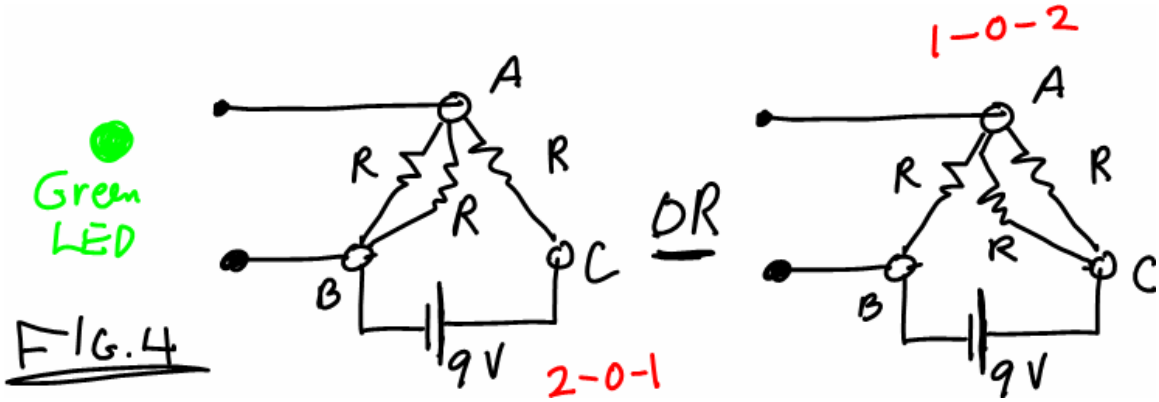

FIG. 4

As in FIG.5, your circuit turns on only yellow LED, when the resistors are in the format of either 3-0-0 or 0-0-3.

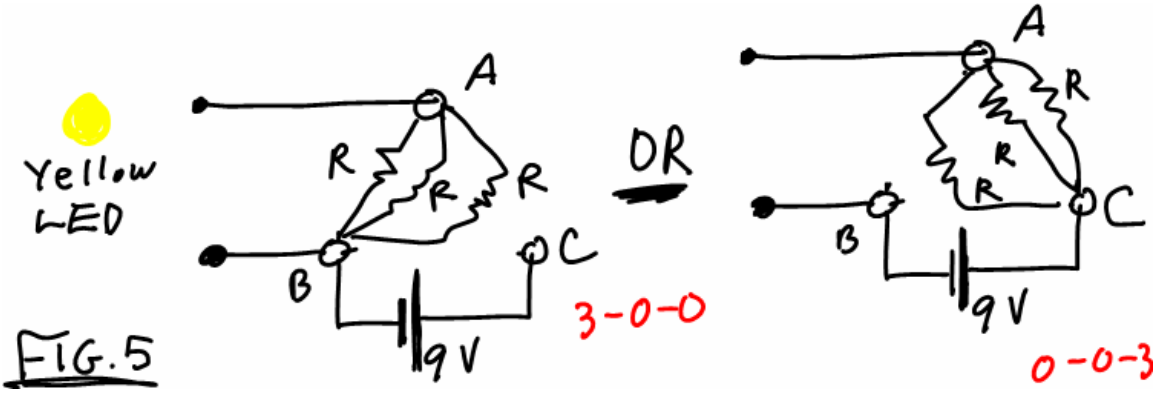

FIG.5

All other resistor format cases can be ignored. However, inclusion of other cases or changing the whole project in that regard would definitely deserve extra credits.

(c) Project Constraints and Criteria

The constraints of the project: The project should be completed using only the available elements, parts, and equipment available from the department. Any purchase of parts or elements requires approval of the instructor.

The criteria of the project: Performance of the circuit (correct indication by LEDs) is the most important criterion of the success of the project. The next important criterion is the use of fewer components in the circuit. Inclusion of other resistors formats or the complete change of the project with new formats would make a project circuit extra successful.

(d) Project Steps

The project will follow the scheduled steps. Missing the steps described below would jeopardize the success of the project. Usually, missing a step disqualifies a team and prohibits moving to the next step of the procedure, which could mean the forfeit, and thus the failing grade of the project. All submission is electronic with MS Word formatted document, with 1" margin all four sides with 12 font Times New Roman. In each submission, the team's members are to be clearly indicated inside the document.

1. Problem Statement (due WED 25 MACH 2008. 11:59pm)
   Submit the problem statement in your own words. Show that your team clearly understands what the problem is, what is required, and what steps to follow, etc.

2. Initial Circuit Design (due WED 2 APRIL 2008. 11:59pm)
   Submit your initial circuit design (circuit diagrams are to be clearly drawn) with explanation of the way it works. Use of graphical tools in circuit drawing is highly encouraged.

3. Final Circuit Design (due WED 9 APRIL 2008. 11:59pm)

Submit the final circuit design which surely works with detailed explanations.

4. Demonstration of the Circuit (Appointed Time on either WED 16 APRIL or FRI 18 APRIL. The leader of each team must make appointment for the demonstration time slot)

Demonstration of the circuit is done by each team. Bring your completed circuit to the instructor for testing and demonstration at the appointed time. Each team should make a reservation of the demonstration time slot. First come, first served.

5. Submission of Peer Evaluation Sheet (due SAT 19 APRIL 2008. 11:59pm)

A peer evaluation form must be submitted by each team member. Details of the evaluation would be discussed soon. Each individual will get peer evaluation score (0 – 100%) based on the peer evaluations.

(e) Team Project Score

10%	Project Statement
20%	Initial Circuit Design
30%	Final Circuit Design
40%	Test of the Circuit

(f) Individual Project Score Formula

(Your Project Score) =(Your Team Score)/2 +{(Your Team Score)/2}*(Your Peer Score)