Visual Decimal-to-Binary Converter

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Type: Design problem
Student time: Two weeks
Location: Laboratory and home

Summary

This project intend to introduce some aspects of electronic circuit design to first or second year (depend on curriculum of home institution) electronic engineering students. An decimal-to-binary D/B converter is an electronic circuit that converts an analog signal to its digital counterpart. An D/B has ten inputs, 0-to-9, and four outputs, 0000-to-1001. Students are asked to use their imagination and creativity to design a visualized D/B converter. The overall cost of project must be under $7.

ABET Descriptors

Engr Sci Content:	First or second year Electronic Engineering, circuit and electronics
Type:	Component and system
Elements:	Analysis, synthesis, construction, testing
Features:	Creativity, alternative solution, and open ended design
Constraints:	Economic factors
Effort:	Team

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DECIMAL
INPUTS
0-to-9

DECIMAL
to
BINARY
CONVERTER

BINARY
OUTPUTS
0000-to-1001
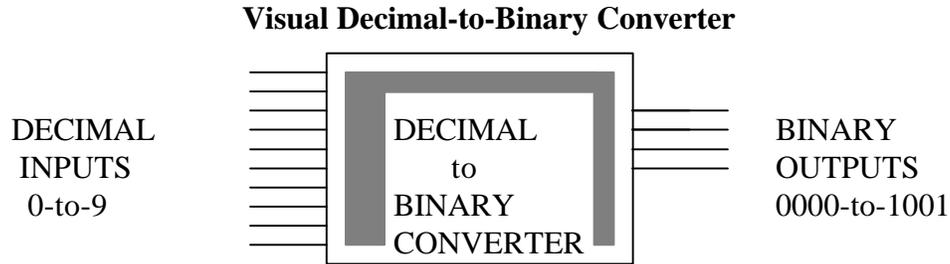
Problem Statement

Computer age students learn more if a subject is presented to them visually. In an

electronic laboratory, students use a black hard plastic with few metallic pins -chips- to

design a digital circuit. Students usually know nothing or a little about real operation or

schematic of circuit inside of the chips. Redesign of some integrated circuits in a large

scale will creates a visualized learning environment for lower level undergraduates

students.

Here is how a D/B converter works:

A DC motor will rotates a metallic pointer on a key ring that is divided into ten metallic

segments which are separated by a tiny plastics or papers. When the pointer is on "0"

position (a decimal number) none of the four LEDs will turn on. When the pointer is on

decimal number "1" it will turn on only the first LED on the right (the LSB). Students

have to follow this logic to design a circuit that change all decimal numbers, 0-to-9 into a

binary number from 0000 to 1001.

Project Deliverables

This project is to be reported in written form. Description of an A/D converter and its
application specially in everyday life, schematic diagram, components selection, cost
estimates, design process, and analysis must be included in report.

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Engineering Notes

This project has potential for measurements, analysis of components, analog and digital circuit analysis.

The main purpose of this project is that students apply their knowledge to redesign an simple integrated circuit in a visual scale in order to understand concept and operation of an electronic circuit.

This project has potential to introduce the concept of modification and improvement to students.

Students may use OrCad or any other similar package to design and simulate their project.

Discussion/ Follow-on

Each group will give a 10-15 minutes talk about their project. All groups can compare their design approaches and critique other group projects. At the end, students are asked to explain how they can improve or modify their project if they were to do it over again.