DEPARTMENT OF
Electrical and Computer Engineering

11-203 Donadeo Innovation Centre for Engineering
9211-116 Street NW
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Edmonton, Alberta
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Optical Resistor Identifier Scanner

Objective

Create a camera-based scanner that reliably will identify axial leaded resistors using the standard colour code.

Motivation

The ECE Department provides lab kits for students each term. Many of the kits have axial leaded resistors like those shown in Figure 1. Often they are returned by students at the end of term, but because they are used and often jumbled together, we don't reuse them. This is partly because of the effort needed to sort them and discard those with leads that are too mangled, and partly because they are so inexpensive that it's easier to just get new ones. Also, students pay for consumable components like resistor, so really they deserve new.

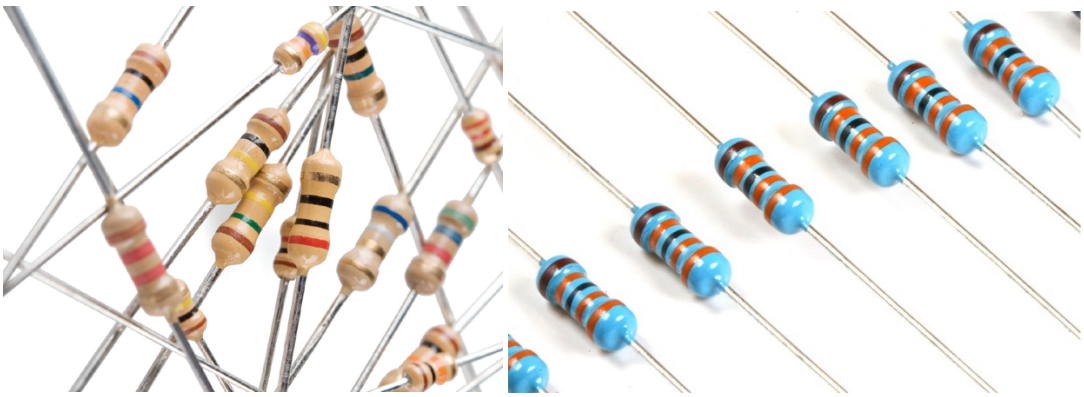

Figure 1 The two common resistor types for ECE labs.

However, no one wants to just throw away the used resistors. Instead we prefer to provide them to the ECE clubs for the use of their members. Since they are unsorted, it's onerous for students to find what they need; most people have not memorized the resistor colour chart and are not that familiar with 4 and 5 band codes.

It would be much easier to have a desktop scanner that could tell you what value a resistor is.

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Most Suitable Background for the Project

Engineering Physics	3
Electrical Engineering	2
Computer Engineering	1
Computer Engineering – Software	2

Please rank the background required (N = 1= high, 10=low) and delete those disciplines that don't apply.

Description

The challenge is to create a standalone scanner that reliably identifies individual resistors, or groups of the same value (e.g., 4 resistors joined by "cut tape") using a readily-available, low-cost camera system. Ideally the system would be set up on a desk or bench. A handheld system is possible, but might be more difficult to implement.

Different approaches to identify resistors should be reviewed and one or more selected for implementation. A good place to start may be OpenCV [1]. A Raspberry Pi with one or more cameras is acceptable as a platform, but it's not known which version or form factor is sufficient.

There are some phone apps that can recognize resistors, but their usefulness and poor user interfaces make them not that good. Also, we don't want to require someone to install an app just to get resistors.

Functional and Performance Requirements / Objectives

1. The system can be expected to be line-powered.
2. It should work under various lighting conditions.
3. It must work for resistors that resemble those shown in Figure 1; that is, beige- and blue- bodied resistors.
4. It must work for various wattage resistors from 1/8th to 2 W.
5. It should work for one or more resistors of the same value (e.g., still attached to cut-tape or individual)
    a. Ideally it indicates the wattage of the resistor
6. Ideally, the system can keep a record of resistors scanned that can be transferred to an external device.
7. All system components are commercial off-the-shelf (COTS) and open source.

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a. Custom software should be open sourced eventually.

Specifications / Constraints

The final <proof-of-concept or prototype> design should have the following elements:

1. Cost to build the prototype < $100
2. System fits in less than 30 x 30 x 30 cm^3.
3. Power consumption must be less than 5 W

Information Resources / Links

References:

[1] https://opencv.org

Prototyping/Testing Resources

As provided in capstone lab, using ECE-provided budget, and re-used or re-cycled materials.

Intellectual Property Restrictions

Note: Public presentation and, hence, disclosure is a course requirement.

- All results and intellectual property created will be owned by the student capstone group with the client having the right to use same royalty-free in the course of client's business (written agreement required).

Contacts

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