

LBYEC4A – EK3

Signals, Spectra and Signal Processing Laboratory



Final Project Proposal

**Resistor Image Processing: Creating Resistor Images
based on Resistance Values**

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PROJECT DESCRIPTION (Describe what your project is all about and its intended application. Include your research showing how your intended application can be achieved by your project. Also, provide theoretical concepts that will be utilized.)

Image processing is a technique used to manipulate and analyze digital images using mathematical operations and algorithms. (Dorf, 2006). MATLAB is a popular programming language used for image processing due to its powerful built-in functions and toolboxes. With this, the students will be utilizing the functions of MATLAB in creating a program that will generate an image of a resistor with its appropriate color codes which are dependent on the user's input. We would be focusing on image generation wherein the user would input a value of resistance then the program would generate an image corresponding to its equivalent resistor with the appropriate color codes.

The program aims to utilize image recognition to detect a 4-Band resistor resistance value. The user will input a value of a 4-Band resistor and the program aims to recognize the color of the bands and display its equivalent resistance value. This will be beneficial for engineers who are having ocular trouble in determining the exact value of the resistor. This will also simplify and speed up the process of determining its value which will help when constructing a circuit.

Theoretical Concepts tackled in the project:

Image Processing in MATLAB

As the project's main objective is to detect and display a resistor's color coding, the project focuses on image processing using the chosen software; MATLAB. Image Processing using MATLAB has many amenities. According to (Nikolaos Ploskas & Nikolaos Samaras, 2016), it covers manipulating digital images, improving quality by denoising, and transforming into a different representation. With MATLAB's toolbox, reading, displaying, filtering, and enhancing images are one of the main features that will be of great use. The project will be utilizing reading and displaying functions as it will display an image representation of a resistor and depending on the input of the user, the colors of the bands will be subjected to it.

Resistor Color Coding

Resistors are widely used by engineers and electricians across the world. Resistors are basically electric components that impede current flow or "resist" the voltage from flowing through the circuit and are used in almost every kind of circuit. Resistors come in different types, there are 4-band Resistors and 5-band Resistors. In this project, the students will be writing a code that presents an image of a 4-band Resistor. In a 4-band Resistor, the color coding represents the lines in a respective manner; resistance value, multiplier,

and tolerance. Expanding the concept, the first two bands represent the first two digits of the resistance value. Each color band corresponds to a number, with the third band representing the multiplier, valued by a power of 10s. The fourth band represents the tolerance of the resistor. The project aims to represent an image of common commercially available resistors.

These common commercially available resistors are referenced as follows:

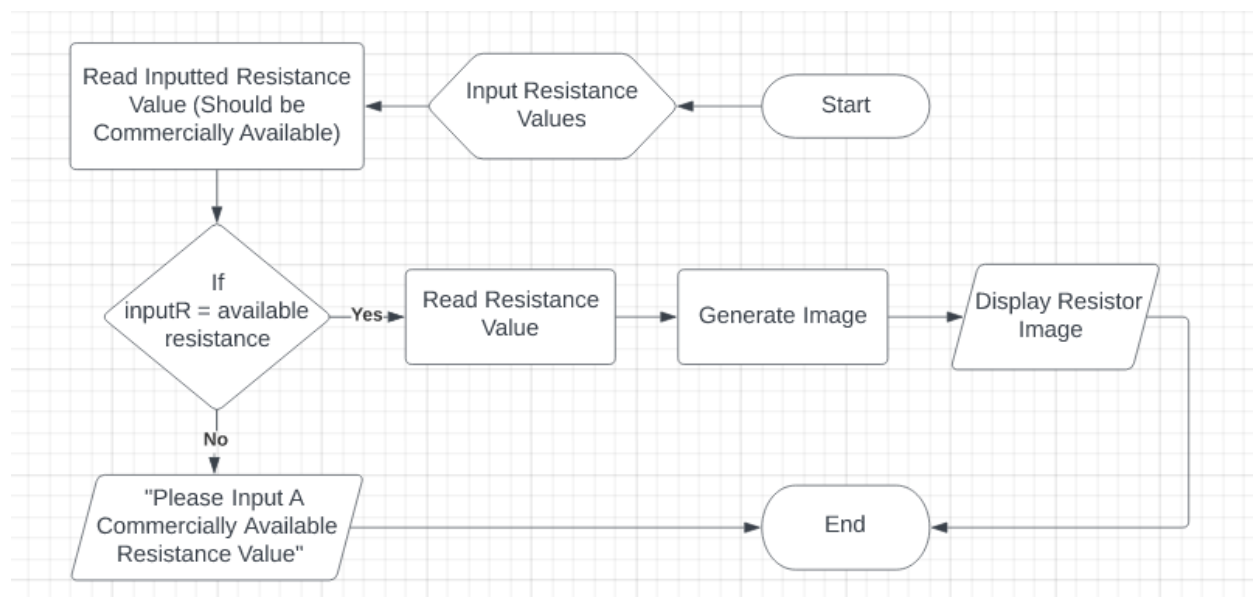
Resistor values | Resistor standards and codes | Resistor Guide. (n.d.). Eepower.com.
<https://eepower.com/resistor-guide/resistor-standards-and-codes/resistor-values/#>

METHODOLOGY (How are you going to do it? Included an overall system flowchart of how your project should work as well as an initial draft of a schematic diagram. Include a description of digital signal processing concepts that will be used to develop the project.)

The project aims to generate images that resemble the color-coded resistors depending on the resistances the user inputted. The system would be revolving around the concept and commands of conditional statements, image processing, and some common commands the students are using on laboratory experiments.

In simple terms, there will be an input command to the system wherein the user would be inputting different resistance values commonly available commercially. After letting the system read this resistance value, the code should be generating an image (either 2D or 3D) that would be resembling the looks of a real-life resistor. The colors of the bands on the resistor that would be displayed should be equal to the resistance value of the resistor inputted by the user. If the resistance value inputted by the user is not available commercially, the system should prompt the user to input another resistance value that includes references on the list that shows commercially available resistances.

The displaying of the image can be done by using conditional statements like else-if statements which would allow the system to display the correct image depending on the inputted value of the user. Meanwhile, the image of the resistor can be shown by using the concept of color bars introduced in one of the experiments in the laboratory.



SCHEDULE OF ACTIVITIES (Provide a timetable or Gantt chart of your deliverables. Indicate also whom and when the specific deliverables will be accomplished.)

Overall, the project will follow a 5-week Gantt chart which includes the following:

1. Project Selection and Writing of Project Description
2. Creation of GitHub repository, Trello
3. Collection of RRLs
4. Paper Writing 1 - includes Introduction, Problem Statement, Methodology, Expected Results
5. Generating Matlab code
6. Implementation of Code along with Trials
7. Paper Writing 2 - includes Analysis of Results, Conclusion, Comparison of Expected and Actual Results
8. Submission and Presentation of the Project

To do activity	Week No.	Duration	Start Date	End Date
Project Selection	1	1 day	March 6	March 7
Creation of github repository	1	1 day	March 6	March 7
Writing of project description	1	3 days	March 8	March 11
Collection of RRL	2	2 days	March 12	March 14
Paper Writing 1	2	3 days	March 15	March 18
Generating Matlab Code	3-4	4 days	March 20	March 24
Implementation of Code	4	2 days	March 27	March 29
Paper Writing 2	4-5	5 days	April 3	April 8
Submission and Presentation of the project	5	1 day	April 10	April 10

REFERENCES (Cite the resources that will be used as well as your research regarding your project.)

- *color individual bar with different colors in bar plot.* (2013). Mathworks.com.
<https://www.mathworks.com/matlabcentral/answers/57719-color-individual-bar-with-different-colors-in-bar-plot>
- *Creating a color image.* (2016). Mathworks.com.
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- Dorf, R. C. (2006). *The electrical engineering handbook, [Vol. 2] Circuits, signals, and speech and image processing.* Crc/Taylor And Francis.
- Haque, S. (2019, October 23). *Resistor Color Code/ Value Detector from image.*
Www.mathworks.com.
<https://www.mathworks.com/matlabcentral/fileexchange/73099-resistor-color-code-value-detector-from-image>
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- Lobontiu, N. (2018, January 1). *Chapter 8 - State-Space Modeling* (N. Lobontiu, Ed.). ScienceDirect; Academic Press.
<https://www.sciencedirect.com/science/article/pii/B9780128045596000087>
- Nikolaos Ploskas, & Nikolaos Samaras. (2016). *GPU programming in MATLAB.* Morgan Kaufmann.
- *Resistor values | Resistor standards and codes | Resistor Guide.* (n.d.). Eepower.com.
<https://eepower.com/resistor-guide/resistor-standards-and-codes/resistor-values/#>