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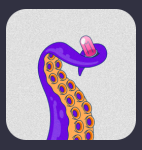

Making Embedded Systems

Final Project Evaluation

Orange Stars Cohort

palLED, an LED Palette Designer

by Carrie Sundra

Reviewers

Daniel Fu

Elecia White

1 Overview

The objective of this document is to assess and give you high-level feedback on your final project. Completing it and receiving a passing grade is a prerequisite for the certificate of course conclusion to be issued. Your project was reviewed and graded by mentor **Daniel Fu** and instructor **Elecia White**.

1.1 Project Details

Project Title
palLED, an LED palette designer

Student Name
Carrie Sundra

Enrollment ID
csundra

Deliverables	Links
📄 Report	Open ↗
💻 Code	Open ↗
▶️ Video	YouTube link

2 Final Evaluation

For each criteria, a score was given according to the grading rubric (see appendix). The total achievable score was **24**, of which **18** are common credits and **6** are bonus credits.

Criteria	Score	Notes
Project meets minimum project goals	**	Three categories of peripherals used but has multiples of each; CLI implemented for testing; neat algorithms for generating LED color patterns and color space conversions; basic state machine
Completeness of deliverables	**	Organized and nicely documented code; report is thorough and clear; demo video shows off system functionality effectively
Clear intentions and working code	**	System performs exactly as described; code is well documented and easy to understand
Reusing code	**	
Originality and scope of goals	**	A novel, awesome project that exceeds the minimum requirements
Self-assessment (mentor category only)	**	Student score was 15, mentor score was 19.
Power analysis, firmware update, or system profiling	**	Used RPi Pico's built in bootloader functionality for firmware updating
Version control was used	**	Long commit history spanning more than a month
	Total	** PASSED

With a total of **, your project **PASSED**.

*Grades have been hidden

2.1 Reviewers' Feedback

2.2.1 Mentor Comments

by Daniel Fu

This is awesome, professional quality work! It is clear that you put a lot of thought and effort into the project from the code to the prototype hardware setup to the video demo and report.

I love that you added heartbeat functionality to the project. It's a great visual aid to see if your system is running as expected and if your main loop is running at the frequency you expect, especially when you don't have a debugger attached.

Calibrating the analog potentiometer is a good idea and most likely will be necessary for good user experience as this project turns into an actual product, to account for "dead zones" and small variations in mechanical build.

Great job on the project Carrie! I am excited to see it evolve into the final vision that you described in the report - please keep us updated in the discord!

2.2.2 Instructors Comments

by Elecia White

You've gone above and beyond the requirements for the project.

I have a few general comments on your code, nothing major, simply stuff to watch for in the future:

- Remove commented out code. You can always retrieve it from source control and the code will be less cluttered.
- Choose a naming convention style (coding style) for functions. If some functions are name_stuff() and others are NameStuff() and others are nameStuff(), it becomes more difficult to know what to call. (Note that this is a "do as I say, not as I do" because I tend to program in whatever convention my most recent client uses which means my personal projects lack consistency.)

- In hue picker mode, in the video, you turned the knob clockwise and the color wheel went counter clockwise. Consistency in UI is key.
- In your state machine, look for the states with unhandled events. Can you make them be handled? Even if it repeats the functionality from another event, it is better than doing nothing at all.

I suspect before productization, you would have identified and handled these. I have so little to criticize on your project, I really have to work at finding improvement points.

You've done a splendid job. Your software is well-thought out and your diagrams are clear. The code is well-organized and easy to read. I love the bonus information about color theory in the video and the report. The effort you put in the project shines through.

It has been a joy to have you in the course, your enthusiasm for learning and willingness to help are so very appreciated.

3 Appendix

3.1 Grading Rubric

Criteria	Score		
	1 - Needs Improvement	**2 - Meets Expectation**	**3 - Exceeds Expectation**
Project meets minimum project goals	All project goals not met	All project goals are met. The state machine may be basic	Additional sensors, actuators Well documented and implemented state machine Comprehensive command line on serial port
Completeness of deliverables	Lacks report, video or code Report does not cover all sections Code has obvious errors that would cause it not to compile	Report covers all sections but some are answered incompletely leaving questions for the reader Code is readable given the report as a description Video shows code working	Code is readable on its own, without the report Report addresses each point thoroughly, demonstrating understanding as it related to the course Video demonstrates the project and is explanatory
Clear intentions and working code	What the system is supposed to do (based on the report or code) doesn't seem to be what the system does in the video	The system performs approximately as described in the report and code	The system performs as described in the report in a manner that is professionally polished The code shows how it works in a way that is easy for a maintainer to see

Reusing code	No code was used from other sources or it is unclear what code was used from other sources	Student code was identified	Versioning of reused code was included along with a license document that describes the license for the student's code and the reused code as well as shipping implications Reader is confident they could rebuild the student's system
Originality and scope of goals	The student did the bare minimum to meet the goals No originality	Some areas of interest were noted in the report but they were minor extensions of the existing examples	The student has gone far beyond the requirements to make something novel and awesome
Self-assessment (mentor category only)	Self-assessment was significantly different from mentor assessment	Self assessment was +/- 25% of mentor assessment	Self-assessment was +/- 10% of mentor assessment
Power analysis, firmware update, or system profiling	None	Described	Described, has graphs, and is accurate
Version control was used	None or a single commit		The log shows the project being built, though the messages may be terse but should be descriptive

3.2 Requirements

3.2.1 Project

🟢 Delivered 🟡 Partially Delivered 🔴 Not Delivered * Not Required ** Extra Credit

Features	Delivered	Note
Video turned in	🟢	
Link to code	🟢	
Report turned in	🟢	
Use a Cortex-M processor	🟢	RP2040
Button with interrupt	🟢	
Has serial port output	🟢	Comprehensive CLI implemented for testing
Implements a state machine	🟢	
Algorithmic piece	🟢	LED pattern and color generation algorithms based on the encoder positions
Peripheral 1	🟢	Rotary encoders
Peripheral 2	🟢	Potentiometer
Peripheral 3	🟢	Addressable LEDs
Other*	🔴	
Other*	🔴	
Uses a HAL*	🟢	RPi Pico SDK
Analysis of Power**	🔴	
Firmware update**	🟡	Used the bootloader functionality provided with the RPi Pico
System Profiling**	🔴	
Version control with history	🟢	Long commit history spanning more than a month

3.2.2 Report

🟢 Delivered 🟡 Partially Delivered 🔴 Not Delivered

Features	Delivered	Note
Application Description	🟢	
Hardware Description	🟢	Detailed description of all hardware components used
Software Description	🟢	Detailed description of all software modules implemented
Identify written vs reused code	🟢	
Architecture Diagrams	🟢	SW & HW block diagrams, Hierarchy of Control diagram, Layered Diagram
Build Instructions (HW)	🟢	
Build Instructions (SW)	🟢	
Debug Instructions	🟢	Mostly printf debugging
Future Plans	🟢	
Self Assessment	🟢	