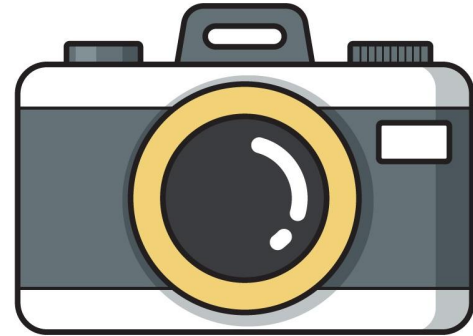# EEC136 Digital Camera

Week 3 Project Update

Waylon, Cassandra, Viktor, Alina, Angel

Overview

1. Built a 2x2 photodiode prototype to display the first image
2. Created a MatLab code to display the 4 pixels in grayscale
3. Debugged errors in prototype circuit.
4. Created alpha report, following the report requirements.
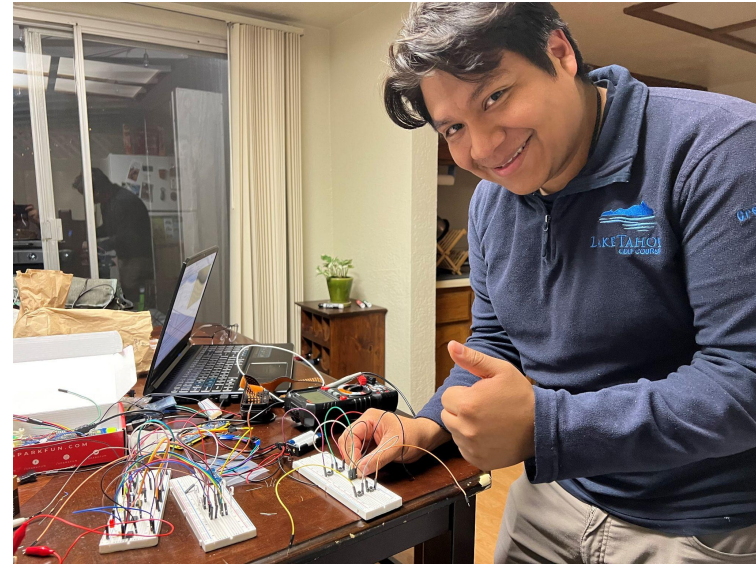
Waylon

This week:

- Worked with Viktor to design and build transimpedance amplifier array with output diodes for quick reference.
- Integrated digital multiplexer and built a backup manual multiplexer
- Worked through issues with floating ground causing erroneous readings
- Presented alpha prototype with group

(Viktor having a great time testing voltages on February 2nd at 11pm)

Next week:

- Implement transistor array as described by Professor Amirtharajah
- Create PCB circuit design in Altium
- Order SMD components and boards

Alina

This week:

- Documentation - Worked on the report and organized it with the IEEE requirements. Included complexity of design, graphs, and amount of hours spent.
- Hardware - Worked on the prototype bring up with group and documented errors to possibly change components.

Plans for next week:

- PCB Design - Work on the design for the finalized PCB board with Waylon.
- Hardware - Find new components for non-polar Op-Amp and follow professors suggestions.

Viktor

This week:

- Hardware - Worked with Waylon to build and design transimpedance amplifiers with photodiodes to make reference output values.
  - Made breadboard circuit for multiplexers that are able to control the photodiode that is to absorb light.
- Code: Made the firmware in Psoc to control the multiplexer in binary outputs and also create the logic to read all photodiode values.

Plans for next week:

- PCB Design - Conceptualize the final circuit board for the 8x8 array of photodiodes.
- Hardware - Follow professors suggestions on the prototype that we suggested. Which is a new circuit that can control the rows and columns with the multiplexer and transistor.

Angel

This week:

- Code - Implementation of ADC value readings through UART and save them in a text file so that MatLab can open this file for image display. The simple method is using Putty to create a log file and MatLab opens it.
  - Researched possible internal memory file inside Psoc. This would allow us to use UART and another programming language to extract the internal file.
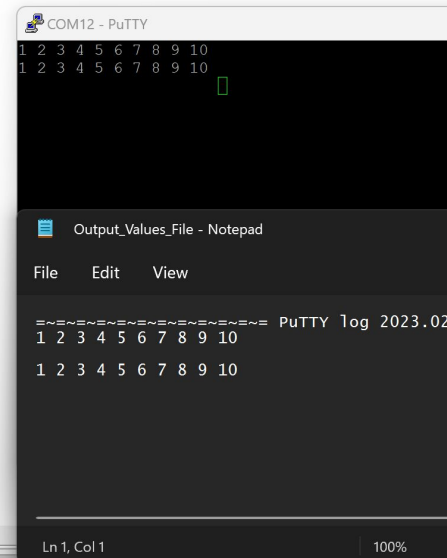
Plans for next week:

- PCB Design - Work on final schematic design of the whole board to start creating a documentation of a circuit board and begin PCB routing.
- Hardware - Work on the power implementation of all components and find alternative Op-amps/multiplexers.
- Code - Expand the MatLab array for image processing and collect the stored files from Putty or Psoc.

```
setvbuf(stdin,NULL,_IONBF,0);

int k = 0;

for(;;)
{
  CyDelay(100);
    if(k<2)
  {
      for(int i = 0; i<10; i++)
      {
        printf("%d ", data[i]);
      CyDelay(10);
      }
      printf("\n\r");
  }
k = k+1;
CyDelay(100);

}
```

COM12 - PuTTY

```
1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
```

Output_Values_File - Notepad

File   Edit   View

```
=~=~=~=~=~=~=~=~=~=~=~= PuTTY log 2023.02.
1 2 3 4 5 6 7 8 9 10

1 2 3 4 5 6 7 8 9 10
```

Ln 1, Col 1   100%

Cassandra

This week:

- **Hardware** - Testing and troubleshooting of Alpha prototype
- **Software** - Created MATLAB code to turn ADC data into images
- **Documentation** - Assisted with report

Plans for next week:

- **Software** - Refine MATLAB code for processing files created by PuTTY and accepting arbitrary-sized (square) arrays
- **Hardware/Design** - Continue troubleshooting issues with multiplexing, test alternative designs for addressing the pixels, test the system with battery power instead of a supply

Reference Images
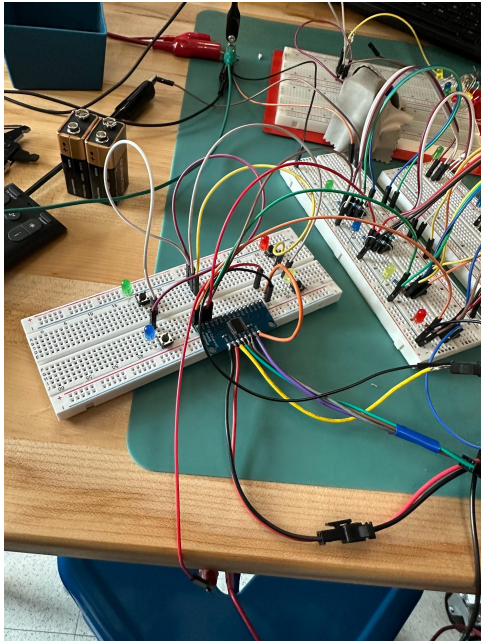
Fig 1.1 PsoC to Multiplexer Circuit
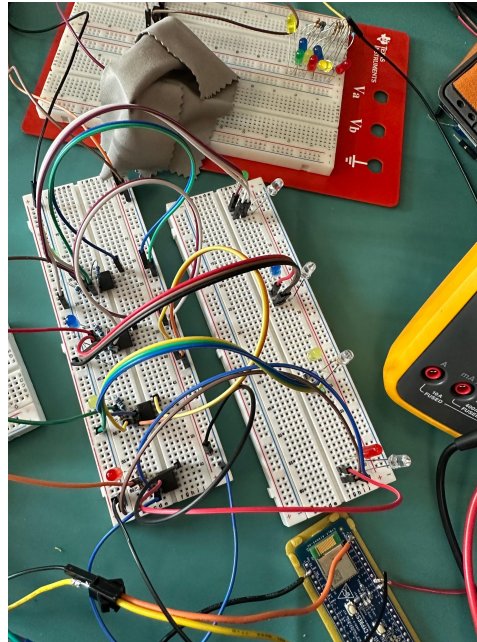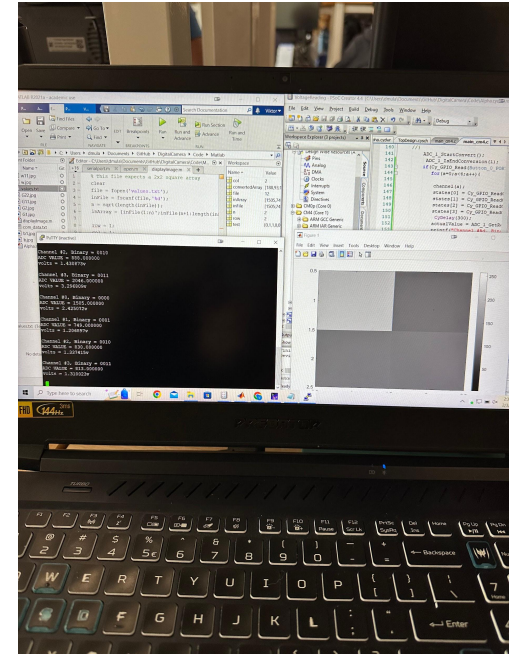

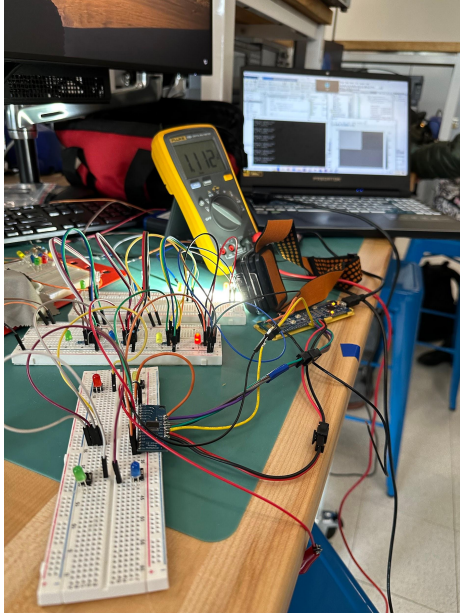**Fig 1.2 Transimpedance Op-Amps to Photodiodes**

Fig 1.3 First 2x2 Image Display

Reference Images

Fig 1.4 Lab Circuit Setup

GANTT CHART

PROJECT TITLE	Digital Camera		COMPANY NAME	EEC136B
PROJECT MANAGER	Waylon		DATE	1/13/23

							PHASE ONE																
							WEEK 1 - Jan 9-13					WEEK 2 - Jan 16-20					WEEK 3 - Jan 23-27					
WBS NUMBER	TASK TITLE	TASK OWNER	START DATE	DUE DATE	DURATION	PCT OF TASK COMPLETE	M	T	W	R	F	M	T	W	R	F	M	T	W	R	F	
1	Project Conception																					
1.1	Concept Design	Casandra	1/9/23	1/27/23	18	75%																
1.1.1	Bill of Materials	Vic/Way	12/1/22	1/13/23	42	100%																
2	Circuit Design																					
2.1	PSOC Programming Board	Angel	1/9/23	1/27/23	18	100%																
2.2	Photo Diode Board	Alina	1/13/23	2/10/23	27	75%																
2.3	OLED Display Board	Alina	1/13/23	2/10/23	27	0%																
3	Software/Coding																					
3.1	Reading charge on pixels	Cassandra	1/21/22	2/18/22	27	100%																
3.2	Processing Data	Cassandra	1/21/22	2/18/22	27	0%																
3.3	Saving Files	Angel	2/4/22	2/25/22	21	0%																
3.4	Displaying Files	Angel	2/4/22	2/25/22	21	0%																
4	PCB Assembly																					
4.1	Parts Order Placed	Waylon	1/13/23	2/3/23	20	75%																
4.2	PCB Boards Order Placed	Angel	1/13/23	2/3/23	20	25%																
4.3	Soldering	Waylon	2/11/22	2/18/22	7	0%																
4.4	Continuity Testing	Waylon	2/25/22	3/4/22	9	0%																
5	Enclosure Design																					
5.1	3D Model	Victor	1/14/22	2/11/22	27	5%																
5.2	3D Print	Victor	1/28	2/11/22	13	5%																
5.3	Assembly		2/11/22	2/18/22	7	0%																
5.4																						

Gantt Chart Google Slides Link

Bill of Materials Page 1 of 2

Item	Part No.	QTY	Cost	Received
Photodiode (final board)	VBPW34S	100	$54.00	
Photodiode (breadboard)	1540051EA3590	10	$7.29	X
MOSFET (n-type)	SQ1922AEEH-T1_GE3	200	$60.20	X
Button	In lab	5	$5.25	
Header Pins	In lab	10	$4.95	
PSOC	In lab	2	TBD	
Crystal Oscillator	In lab	1	TBD	
Battery	LIPO Battery (3.7V)	1	$10.95	
OLED Display	LCD-13003	2	$35.76	
Tri-LED	In lab	5	TBD	
Multiplexer	BOB-13906	2	$5.90	

Item	Part No.	QTY	Cost
10KΩ	TBD	4	TBD
0Ω Resistor	TBD	10	TBD
1KΩ Resistor	TBD	2	TBD
10uF Capacitor	TBD	1	TBD
22pF Capacitor	TBD	2	TBD
4.7KΩ Resistor	TBD	2	TBD
330Ω Resistor	TBD	1	TBD
470Ω	TBD	1	TBD