# EEC136 Digital Camera

Week 6 Project Update



### Overview

- 1. Assembled PSoC boards
- 2. Tested out the ADC component
- 3. Improved and optimized Matlab code
- 4. Finalized Altium design for the photodiodes

# Waylon

#### This week:

- Worked with Viktor to resolve issues with ADC.
- Worked with Alina to create PCB in Altium.
- Finalized orders for necessary SMD components.

#### Next week:

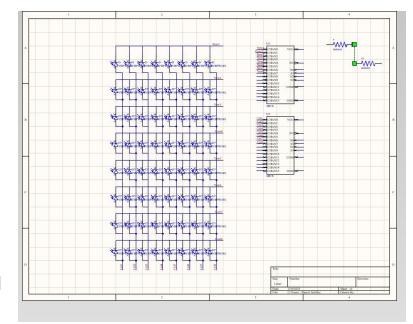
- Place order for PCB this weekend after Altium designs are finalized.
- Work with Viktor and Angel with any coding optimizations while waiting for boards.
- Begin developing final report and educational manual.

### Alina

#### This week:

 Worked on the schematic for the photodiode board on Altium to begin routing.

- PCB Design Work on the assembly of the photodiode board if it arrives
- Hardware Test out the ways of how to get ADC working



### Viktor

#### This week:

- Worked through issues with grounding causing erroneous readings on the ADC and Multiplexers.
- Updated PSoC code that allowed ADC readings to occur at the same time as multiplexer switching causing erroneous readings.

- Receive photodiode PCBs and begin assembly.
- Work with team on developing final report.

# Angel

#### This week:

- Hardware: Figuring out a way to communicate to a LCD screen with I2C to display text for User Interface.
- Code: Debugged Viktor's Psoc code to read the correct ADC values into putty for image processing.
  - Researched further on UART communicating through MatLab directly from the Psoc port. Cassandra was able to implement the readings using this method, and potentially have a live code.

- Start thinking about the enclosure based on all the components that we will have.
- Focus on soldering the new PCB that will be sent to manufacture today, hopefully receive it next week.



#### The test firmware

### Cassandra

#### This week:

- Software Upgraded MATLAB image processing code - 2 new versions
  - Reads and processes data from a PuTTY log file
  - Reads the serial data stream directly (shown in images)

```
for (;;)
/* Place your application code here. */
if(lUL == Cy GPIO Read(PO 4 PORT, PO 4 NUM))
else
                                                                                                        The resulting image,
            printf("200 400 600 800 1000 1200 1400 1600 1800 e \n\r");
            CyDelay(100);
                                                                                                        read through serial
            CyDelay(100);
                   displayImage_serial.m 🗵 🛨
                          %% serial comms processing
                                                                                    File Edit View Insert Tools Desktop Window Help
                         % Adapted from code created by YouTube channel @PSoCProjects
                                                                                    serial_PSoC-serial('COM5', 'BaudRate',115200, 'Parity', 'none', 'DataBits',8,
                          set(serial_PSoC, 'InputBufferSize',5); % number of bytes in each read
                          set(serial_PSoC, 'Terminator',' '); % terminator so MATLAB knows the data is
                          fopen(serial PSoC); % open the serial port
                          fprintf(serial_PSoC, '%c', 'l'); % display serial port?
                          reading = fscanf(serial_PSoC, '%c');
                          data = [];
                         while (~contains(reading, 'e') == 1)
                            data = [data, reading];
                             reading = fscanf(serial PSoC, '%c');
```

n = sqrt(length(data)); % determines the size of the square inArray = reshape(data,[n,n])'; % reshapes the data into a square array

% iterates through rows and columns of array and converts the 12-bit ADC

test = bitget(inArray(row, col), 11:-1:4, "int16"); % get 8 relevant MSBs of ADC input % note that bit 12 is the sign bit, and since we have a positive

 $convertedArray(row, col) = test(1)*2^7 + test(2)*2^6 + test(3)*2^5 + test(4)*2^4 + test(5)*2^3 + test(6)*2^2 + test(7)*2 + test(8);$ 

inArray = abs(inArray);

col = 1;

% data to an 8-bit grayscale image

% reading we do not want this bit % turn the truncated data into an integer

for row = 1:size(inArray,1) for col = 1:size(inArray,2) 200

2.5

- Firmware/Software test and better integrate MATLAB code with real data acquisition
- Hardware assist with assembly, if parts arrive
- Documentation assist with documentation

# Reference Images

Fig 1.1 New Multiplexer Layout

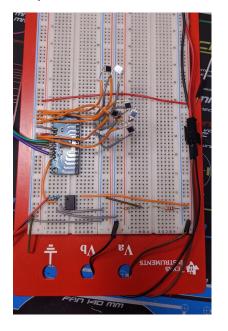


Fig 1.2 Whole Schematic Diagram

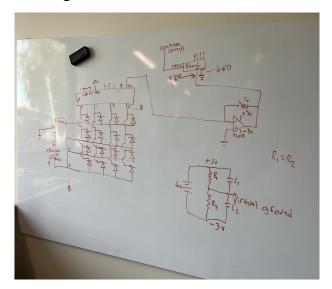
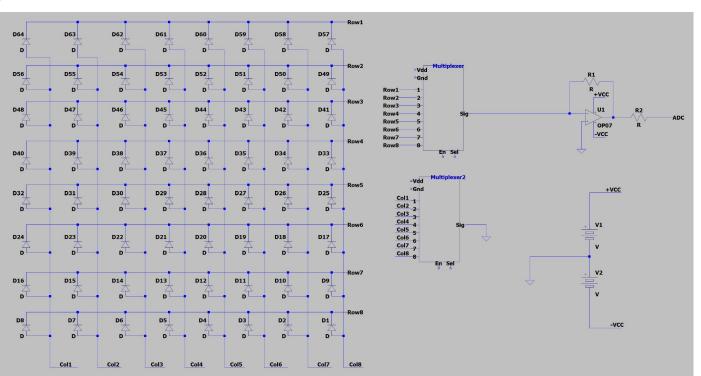


Fig 1.3 PsoC PCB Assembly

# Reference Images

Fig 1.4 Sensor PCB Schematic



	PROJECT TITLE	Digital Cam	era							C	ОМРА	NY NA	AME	EEC	136	В															
	PROJECT MANAGER	Waylon										D	ATE	2/10	)/23																
							PHASE ONE PHASE TWO																								
WBS NUMBER	TASK TITLE	TASK OWNER	START	DUE DATE	DURATION	PCT OF TASK COMPLETE			Jan 9-:		WEEK	_		_	_		_		_	_	_	-	_		_	_	_	-	-		-
1	Project Conception																														
1.1	Concept Design	Casandra	1/9/23	1/27/23	18	100%																									
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	80%																									
2.2	Photo Diode Board	Alina	1/13/23	2/10/23	27	75%																									
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	100%						5	0 0		dr s								,								
3-4	Displaying Files	Angel	2/4/22	2/25/22	21	90%																									
4	PCB Assembly																														
4.1	Parts Order Placed	Waylon	1/13/23	2/3/23	20	95%																									
4.2	PCB Boards Order Placed	Angel	1/13/23	2/3/23	20	80%																									
4-3	Soldering	Waylon	2/11/22	2/18/22	7	15%																									
4.4	Continuity Testing	Waylon	2/25/22	3/4/22	9	10%																									
5	Enclosure Design																														
5.1	3D Model	Victor	1/14/22	2/11/22	27	5%							0 0		àr :																
5.2	3D Print	Victor	1/28	2/11/22	13	5%																									
5-3	Assembly		2/11/22	2/18/22	7	0%									9-																
5.4																															

### **Gantt Chart Google Slides Link**

### Bill of Materials Page 1 of 2

Item	Part No.	QTY	Cost	Received
Photodiode (final board)	VBPW34S	64	\$54.00	
MOSFET (n-type)	SQ1922AEEH-T1_GE3	200	\$60.20	X
Button	474-COM-08720	5	\$5.25	X
Header Pins	HDR100IMP40M-G-V-TH	10	\$4.95	X
PSOC	CYBLE-416045-02	2	TBD	X
Crystal Oscillator	ECS-2520MV-250-CL-TR	1	TBD	X
Battery	LIPO Battery (3.7V)	1	\$10.95	X
OLED Display	LCD-13003	2	\$35.76	
Tri-LED	HSMD-C191	5	TBD	X
Multiplexer	BOB-13906	2	\$5.90	

# Bill of Materials Page 2 of 2

Item	Part No.	QTY	Cost	Received
10KΩ Resistor	3503G2B10K7FTDF	4	\$6.56	Х
0Ω Resistor	MCT0603HZ0000ZP500	10	\$6.10	Х
1KΩ Resistor	RA73F1J143RBTDF	2	\$3.88	Х
10uF Capacitor	GMK316BJ106KL-T	1	\$0.33	Х
22pF Capacitor	12065A220JAT2A	2	\$2.80	Х
4.7KΩ Resistor	<u>263-4.7K-RC</u>	2	\$0.20	Х
330Ω Resistor	CMP0805-FX-3300ELF	1	\$0.21	Х
220Ω Resistor	CRGCQ2512F220K	8	\$3.68	Х
470Ω Resistor	CRG0603F470R	1	\$0.14	Х