Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Team 38: Fuel Cell Monitor
Bi-Weekly Update 3

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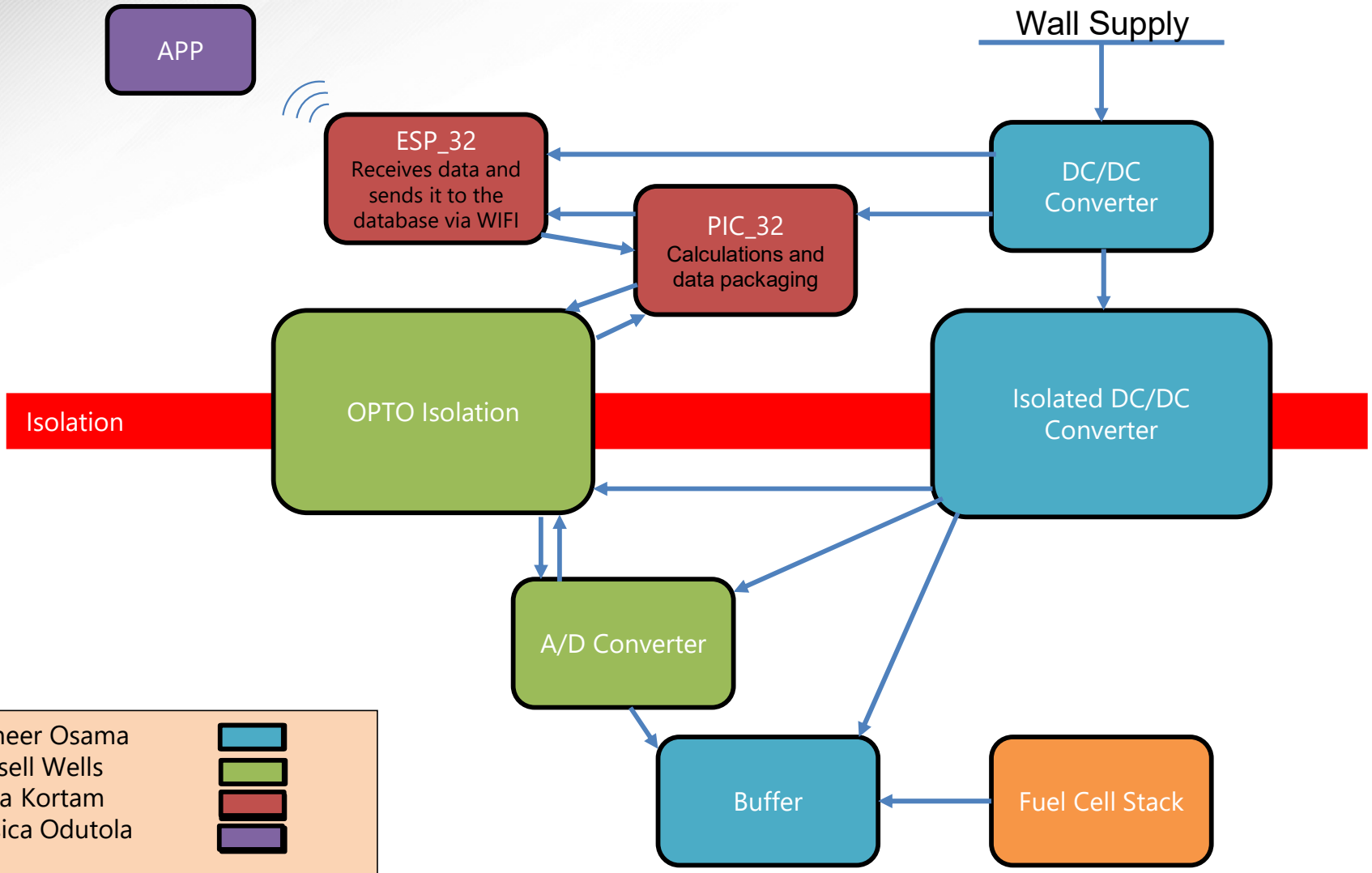
Project Summary

- Problem statement: A single fuel cell is an easy power source to monitor, but to achieve any level of real usable power they must be connected in a stack. If only monitored as a whole, each cell would have to be tested individually to determine the issue. This causes longer down times and more technician wages to trouble shoot.
- The Fuel Cell Monitor System will give the operator real time voltages of both the individual cells and stack. The voltages will be monitorable from an android based mobile app. In case of over or under voltage, the app will notify the operator of not only the error but which cell has fallen or risen outside of expected ranges. Saving both time and money for repairs.

Fuel Cell Monitor Subsystem Diagram

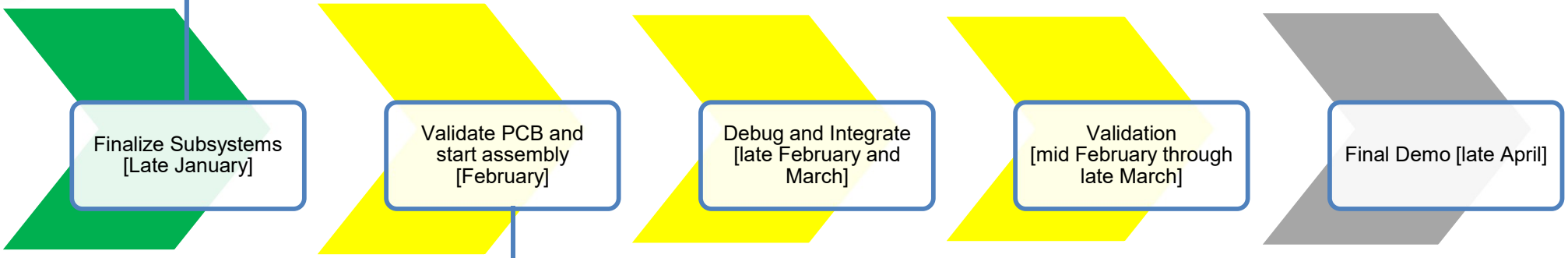


Sameer Osama
Russell Wells
Rana Kortam
Jessica Odutola

Figure 1: Fuel Cell Monitor Block Diagram

Project Timeline

Power system issue resolved, Burnt out Op-Amp was the issues. SPI communication needs to be validated.



Currently soldering integrated PCB. Power is Soldered and is being tested

Power Supply

Sameer Osama

Accomplishments since Update 2 9 hrs of effort	Ongoing progress/problems and plans until the next presentation
- Power Subsystem works completely	- Ongoing: Soldering power subsystem on integrated PCB

Power Supply

Sameer Osama

-Soldering and testing power subsystem on integrated PCB.

-All components output voltages as expected.

E-load measurements:

3.3V DC/DC		5V DC/DC		Isolated DC/DC	
No Load	Max Load	No Load	Max Load	No Load	Max Load
0A → 3.27V	1A → 3.2V	0A → 5V	1A → 4.9V	0A →5.28V	.15A →4.53V

Internal Signal Transfer and Conversion

Russell Wells

Accomplishments since Update 2 10 Hours Worked	Ongoing progress/problems and plans until the next presentation
Integrated PCB has been ordered and received.	Ongoing: Solder and Test Integrated PCB. Update PCB Design as needed.

Internal Signal Transfer and Conversion

Russell Wells

PCB Design Changes so far.

- Add Screw Holes
- Increase Trace width for power system.
- Update footprint for 0.100” connector. Through Hole size is too Small.
- Update wall supply barrel jack foot print.

PIC32 and ESP32

Rana Kortam

Accomplishments since update 2 15 hrs of effort	Ongoing progress/problems and plans until the next presentation
N/A	Ongoing: SPI communication is finished and reviewed with Dr. Lusher. SPI code needs to be validated Future: integration with Internal Signal Transfer and Conversion subsystem.

Android Application

Jessica Odutola

Accomplishments since update 2 12 hrs of effort	Ongoing progress/problems and plans until the next presentation
- Discussed changes to historical graph with Lusher. - Fixed asynchronous timing issue with displaying values on graph.	- Ongoing: Restructuring historical graph to meet the wants of sponsor. - Future: Improve overall UI. Begin integration efforts with the rest of the team.

Execution Plan

	1/17/2023	1/24/2023	1/31/2023	2/7/2023	2/14/2023	2/21/2023	2/28/2023	3/7/2023	3/14/2023	3/21/2023	3/28/2023	4/4/2023	4/11/2023	4/18/2023	4/25/2023		DATE
TEAM DELIVERABLES																	
Solder and Test Power																	Completed
Solder and Test Signal Transfer																	In Progress
Solder and Test Micro Controllers																	Not Started
PCB/System redesign and order for Test Problems and Pactec Enclosure																	Behind Schedule
Full System Assembly and Testing																	
POWER SUBSYSTEM																	
Troubleshoot system																	
Order extra parts if need be																	
INTERNAL SIGNAL SUBSYSTEM																	
Integrated PCB Design																	
Order Integrated PCB																	
MICRO CONTROLLER SUBSYSTEM																	
SPI communication with ADC																	
Review SPI communication with Dr. Lusher																	
Order for Test Problems																	
APP SUBSYSTEM																	
App Reads Values from Database																	
Integration with Microcontroller																	
Full System Assembly and Testing																	

Validation plan

Paragraph #	Test Name	Success Criteria	Methodology	Status	Responsible Engineer(s)	Notes
3.2.1.1	Handle Negative voltages	Capable of handling negative voltage without damaging system	Apply sustained negative voltage	Untested	Team	
3.2.1.1	overcurrent protection	How long will it stand an overvoltage or short on the input	What happes if we short the cell inputs or have a dead cell	Untested	Team	
3.2.4.2	discontinuous cell	Device is capable of handling up to twice the maximum voltage input without damage to system	Apply voltages up to twice the expected input range	Untested	Team	
3.2.4.2	power outage restart time	The device should boot up back within seconds	Disconnect and time reboot,	Untested	Team	
5.1.1.1	power outage connection.	The system connects back to wifi within a couple of seconds and it will not need to be programmed again.	disconnect power and time until reconnection to app.	Untested	Rana	
3.1.1.1	Mass	Mass of the fuel cell monitor shall be less than or equal to 0.25 kilograms	meaure the fuel cell monitor with digital scale	Untested	Team	
				Untested		

Thank you!
Any questions?