Dwight Look College of
ENGINEERING
TEXAS A&M UNIVERSITY

Project name: Fuel Cell Monitor

Team members: Rana Kortam
Jessica Odutola
Sameer Osama
Russell Wells
Sponsor: John Lusher

Project description

- 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. The goal of this project is to design a monitor that displays individual cell voltages within a stack and warns the user of cell abnormalities as well as which cell requires maintenance or attention.

Diagram of subsystems and interface

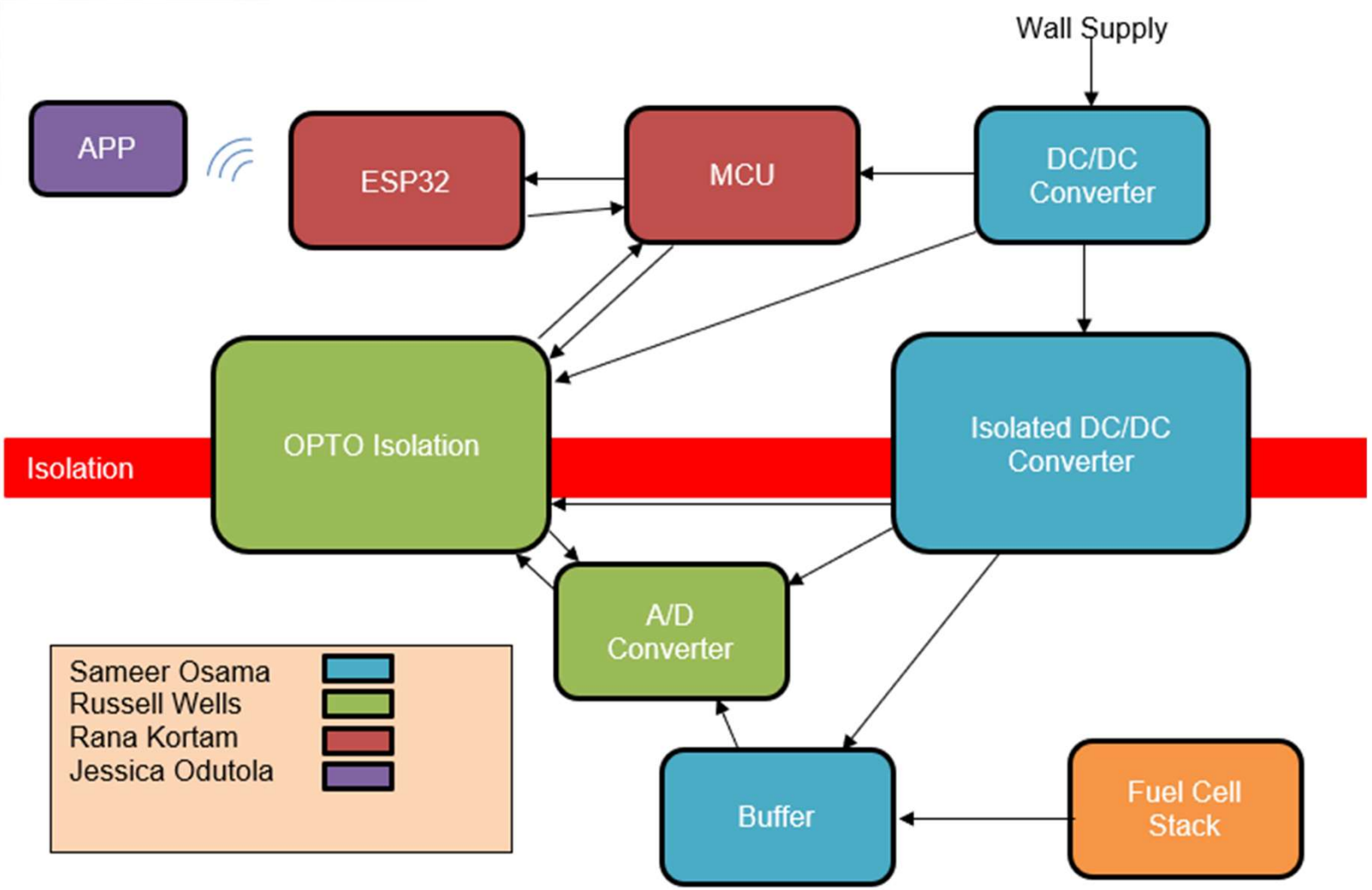
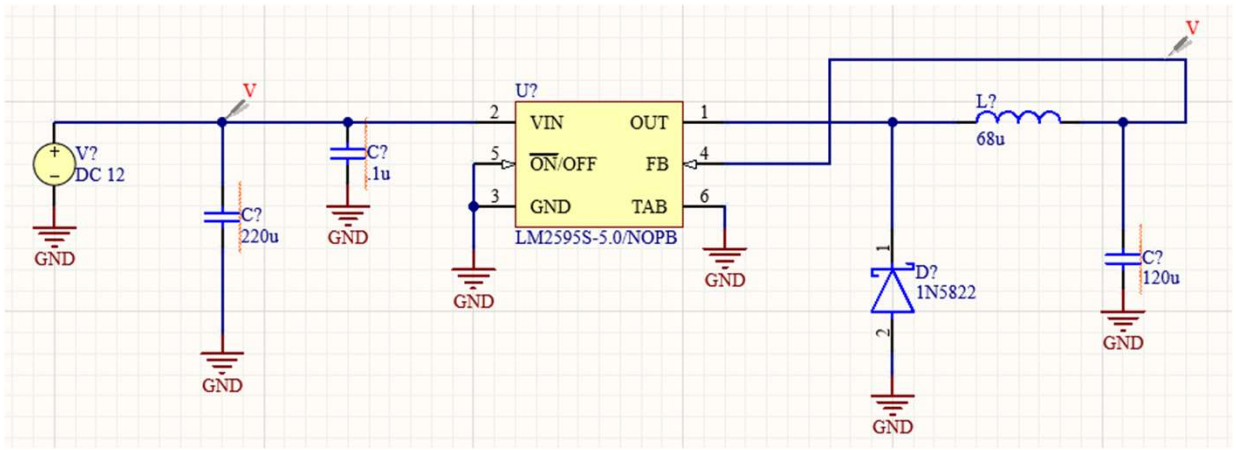
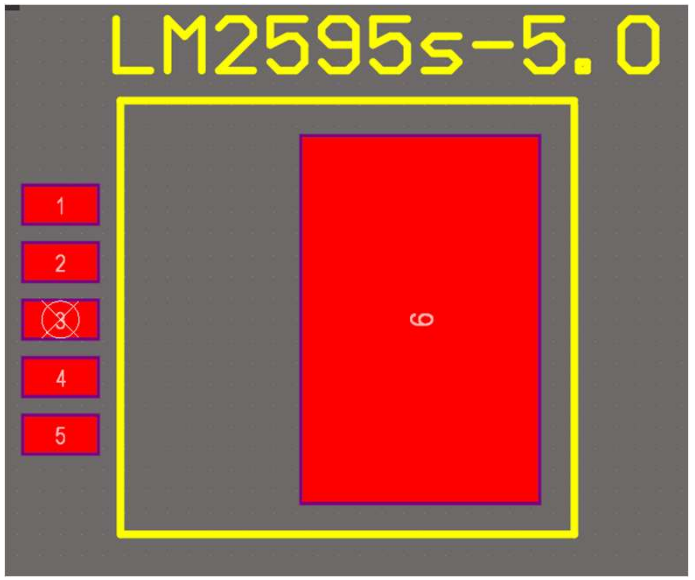


Figure 1: Fuel Cell Monitor Block Diagram

Power Subsystem Sameer Osama

Accomplishments since the last presentation 30 hrs	Ongoing progress/problems and plans until the next presentation
• Ordered main components for subsystem • Finished schematics for subsystem • Created PCB footprints for most parts	• Order other components (resistors, capacitors, inductors) • Finish creating PCB footprints • Create PCB design and send Gerber files to FEDC • Test out components on circuit board

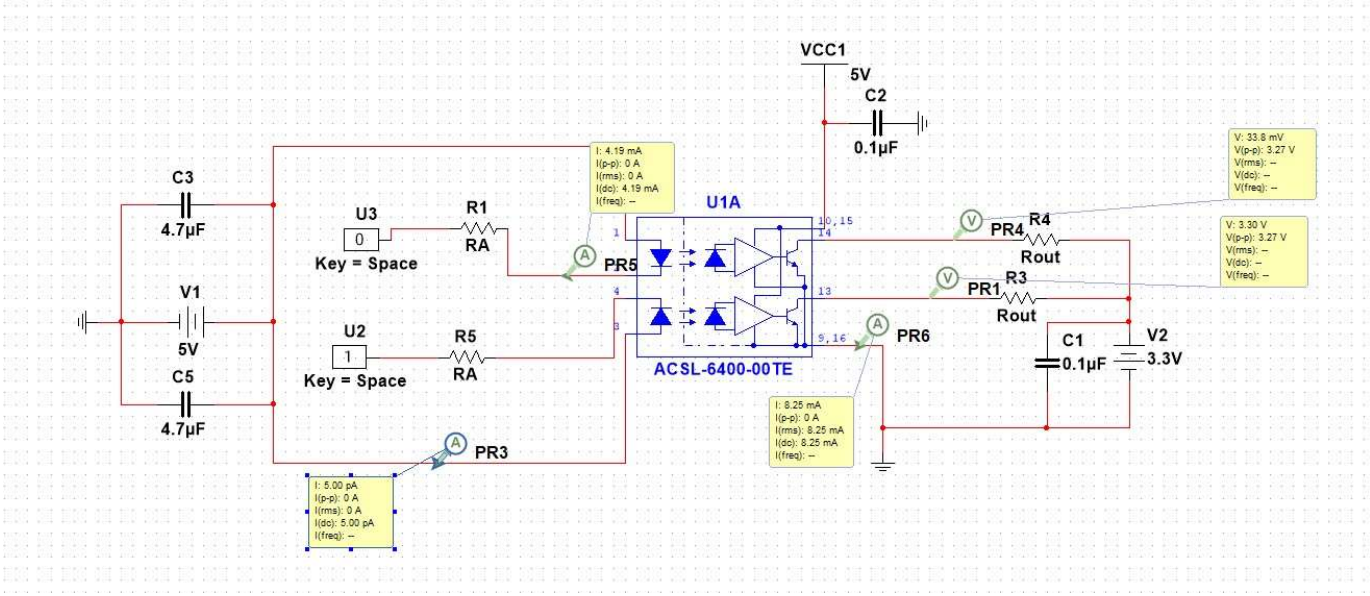




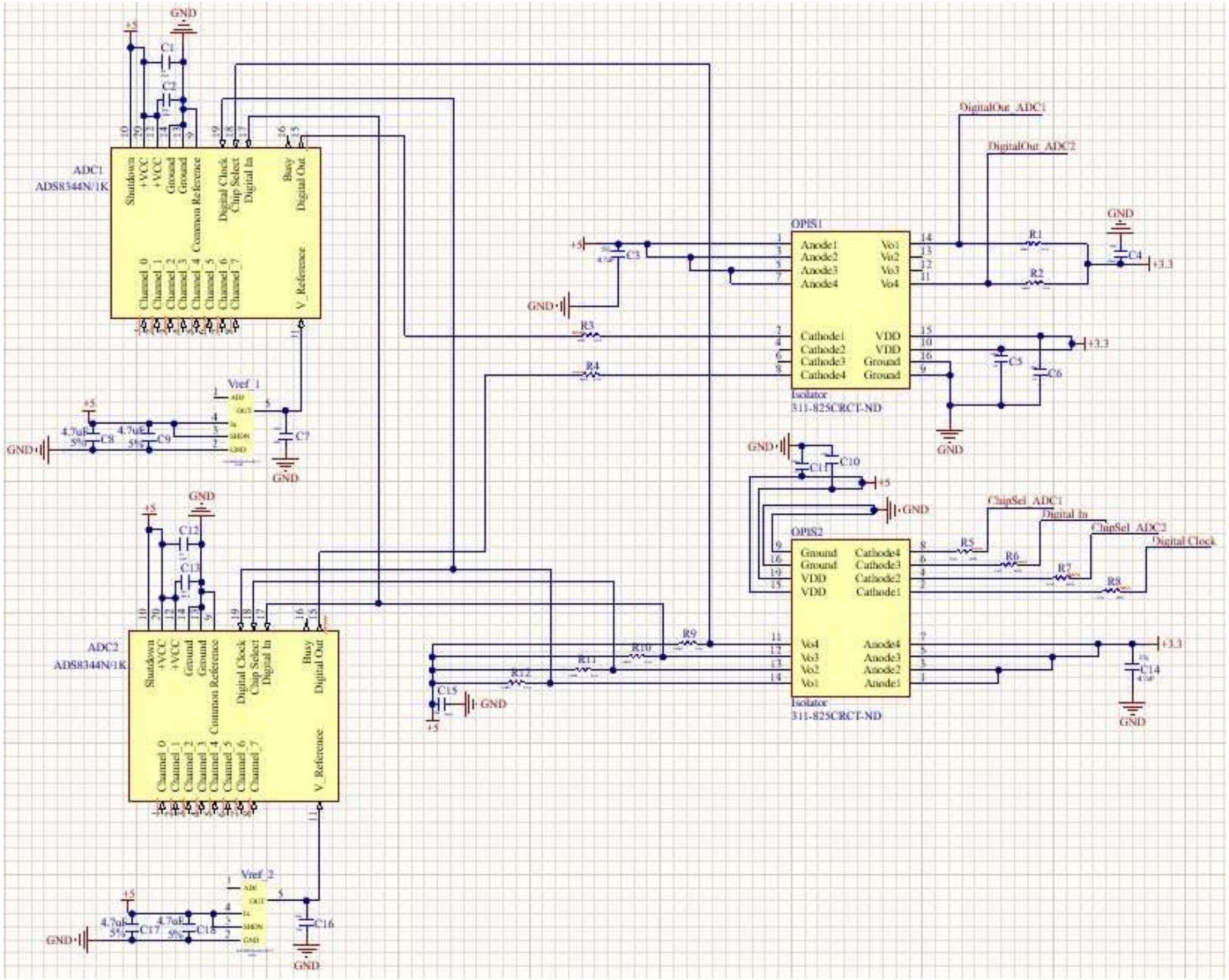
Internal Signal Transfer and Manipulation Subsystem

Russell Wells

Accomplishments since the last presentation 30+ hrs	Ongoing progress/problems and plans until the next presentation
• Subsystem design is complete with Opto-isolator simulation. • All parts for PCB and for testing have been ordered. • PCB Schematic symbols and footprints created.	• Complete PCB Schematic and PCB Design • Assemble breadboard test circuit. • Order PCB



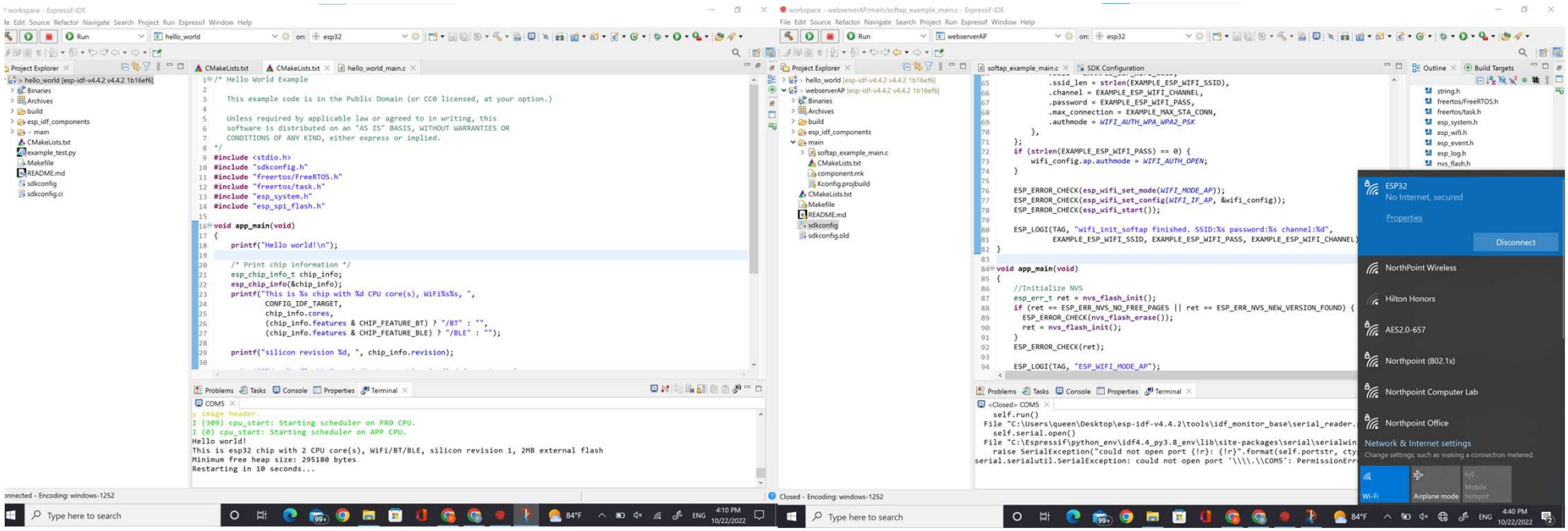
Internal Signal Subsystem Schematic



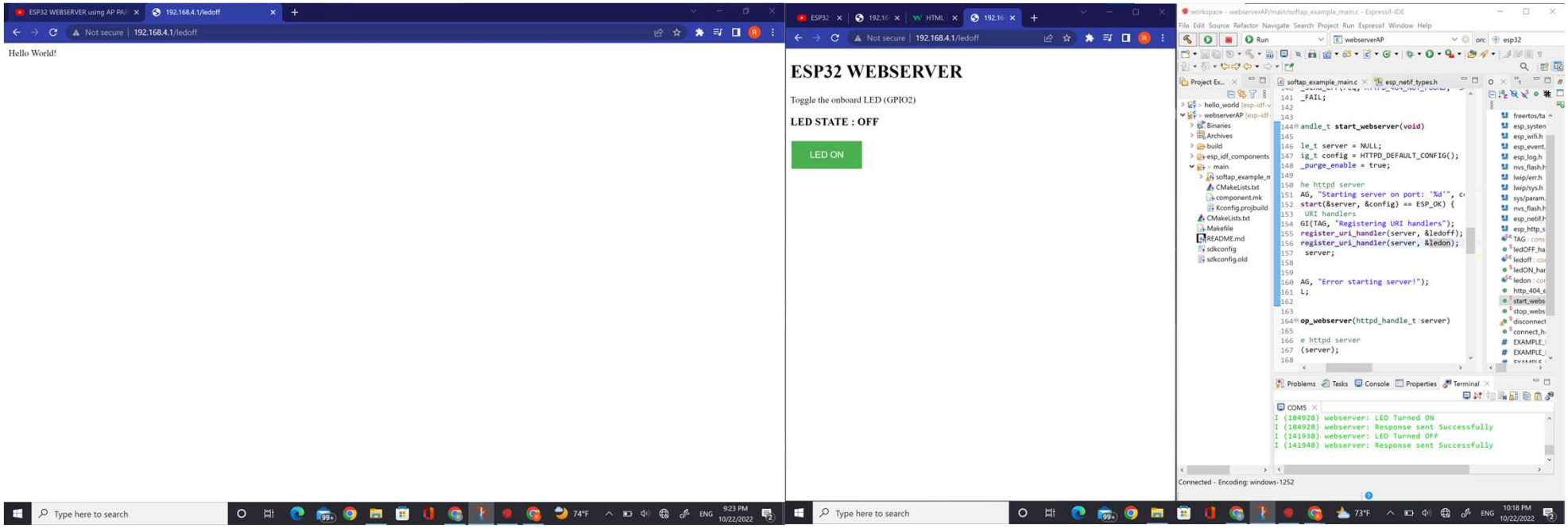
MCU and ESP32

Rana Kortam

Accomplishments since the last presentation 30+ hrs	Ongoing progress/problems and plans until the next presentation
• Order parts • Implemented hello world on ESP32 • Created a webserver on ESP32 • UART code on ESP32 • Implemented hello world on PIC32	• Finish coding PIC32 • Connect ESP32 to database

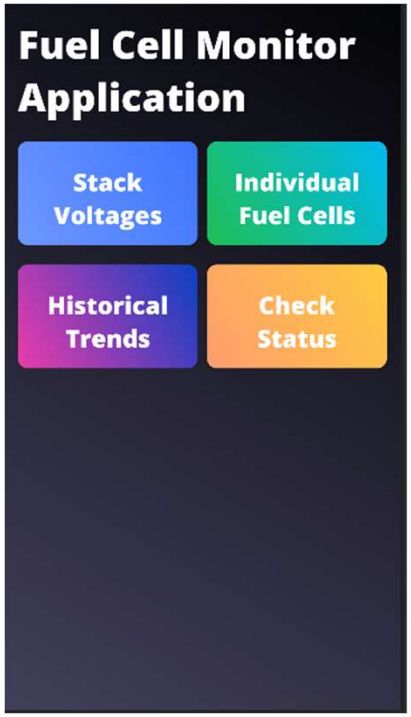


MCU and ESP32 Rana Kortam

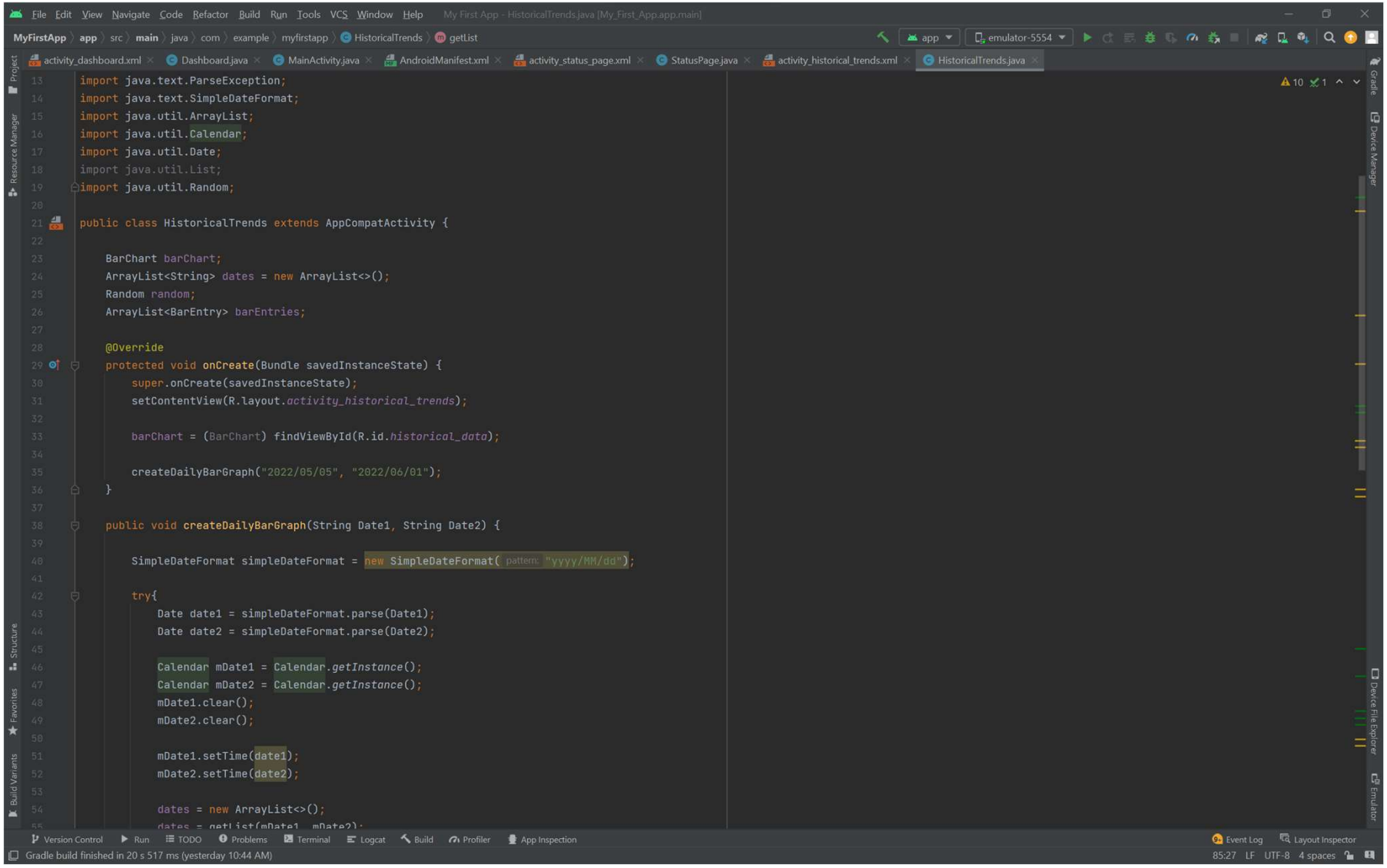


Android Application Jessica Odutola

Accomplishments since the last presentation 40+ hrs	Ongoing progress/problems and plans until the next presentation
• Gained understanding of Android Studio • App displays "Hello World" • All pages of App completed and connect to each other • AWS Database created	• Populate database with necessary tables and data • Issues with emulator/virtual device in Android Studio (might get actual device to test on)



Android Application Jessica Odutola



Execution Plan

	9/5/2022	9/12/2022	9/19/2022	9/26/2022	10/3/2022	10/10/2022	10/17/2022	10/24/2022	10/31/2022	11/7/2022	11/14/2022	11/21/2022	11/28/2022	DATE
TEAM DELIVERABLES														
Understand Project Problem														
Project design Overview														Completed
Divide Into Subsystems														In Progress
ConOps Report														Not Started
Create Major Parts List														Behind Schedule
FSR, ICD Report														
Midterm Presentation														
Order Major Parts														
Status Update Presentation														
Final Presentation														
Final Demo														
Final Report														
POWER SUBSYSTEM														
Determine IC Components														
Design Schematics														
Order IC components														
Create PCB footprints in Altium														
Create PCB design in Altium														
Make Gerber files and send to														
Test components on circuit board														
INTERNAL SIGNAL SUBSYSTEM														
Determine IC Components														
Design System														
Order Components														
Create PCB Schematic														
Assemble and Test Demo														
Create PCB Design														
Order PCB														
Beggin Assembling PCB														
MICRO CONTROLLER SUBSYSTEM														
Determine Microcontrollers in use														
Learn IDE to code microcontroller														
Implement "Hello World" on ESP32														
Webserver on ESP32														
UART on ESP32														
Code on PIC32														
Connect ESP32 to database														
Connect PIC32 and ESP32														
PCB design and assemble														
APP SUBSYSTEM														
App Displays "Hello World"														
App Displays Home Page														
App Displays all pages needed														
AWS Database Created														
Tables Populated in Database														
Connect Database to App														
App Sends Alerts to Users														
App Works with Test Data														
WiFi Connection with Microcontroller														

Validation Plan

Paragraph #	Test Name	Success Criteria	Methodology	Status	Responsible Engineer(s)
3.2.4.2	Power Devices On PCB	PCB transfers power without overheating or burnout	Power Board and watch, smell, listen	Untested	Russell, Sameer
3.2.1.1	Internal signal voltage range	System can properly handle the specified voltages with minimal difference between tests.	Introduce voltages of 0-4V and measure output signals	Untested	Russell
3.2.1.1	Differential voltage tests	Pass a differential voltage through the Opamp buffer and receive the proper digital signal from the optoisolator	Introduce a range of voltages including edge cases and ensure proper output	Untested	Russell, Sameer
3.2.4.4	Android application graphical functionality	Application can properly display accurate voltage levels to user.	Use application on android device and verify volatages are accurately displayed	Untested	Jessica
3.2.4.4	Android Application alarm functionality	Application send alarm to user when voltage goes above or below ranges	Add set points to app and introduce alarm level voltages	Untested	Jessica
3.2.4.2	Power system functionality test	Power is applied from wall outlet and proper power transfer is read at outputs	Apply power to system and read voltage output at device trace	Untested	Sameer
3.2.4.1	Opamp system functionality test	Differential voltages are passed to the opamp and expected voltage is seen on the output	Power opamps and apply varrying differential voltages and read output voltage	Untested	Sameer
N/A	PIC32 Microcontroller functionality test	The code for recieving the voltage signal for data acquisition	PCB board and coding on IDE	Untested	Rana
N/A	ESP32 Microcontroller functionality test	The code for communicating with the application	PCB board and coding on IDE	Untested	Rana