

EE/CPRE/SE 491 WEEKLY REPORT 08

INTRODUCTION

Date: 04/19/19

Group Number: 21

Project Title: Battery-less IoT Devices

Advisor: Dr. Henry Duwe

Clients: Dr. Nathan Neihart, Dr. Daji Qiao

Team Members:

Derek Nash – *Meeting Scribe, Power Systems Engineer, Test Engineer*

Matt Goetzman – *RF Systems Engineer, Test Engineer*

Mohamed Gesalla - *RF Systems Engineer, Test Engineer*

Adithya Basnayake – *Report Manager, Power Systems Engineer, Test Engineer*

Mohammed-AI-Mukhaini – *Meeting Facilitator, Embedded Systems Engineer, Test Engineer*

Bradley Rhein – *Embedded Systems Engineer, Test Engineer*

PAST WEEK ACCOMPLISHMENTS

Computational Team

Exploring our new Microcontroller this week, it shows great potential in serving and helping our end goal of this project. Here I'll try to discuss some of the key features:

- 1) MSP Ultra Low Power Fram Technology: Allow us better capabilities for data logging to both temperature and input voltage reading. We can use or store these values inside our MicroSD later on.
- 2) Energytrace++ Technology for Ultra-Low power debugging: Real-time power consumption readings & state update from the Microcontroller including CPU and peripheral state
- 3)Supercapacitor: A 220-mF capacitor is mounted onboard and allows powering the system without any external power. This will enable to stretch our time and power consumption taken by our Microcontroller
- 4) Onboard MicroSD card: Provide another cheap data logging method, the SD card library lets the user store data in the files with the name of our choice. This data can be later transferred with a PC later.

More Hardware Features:

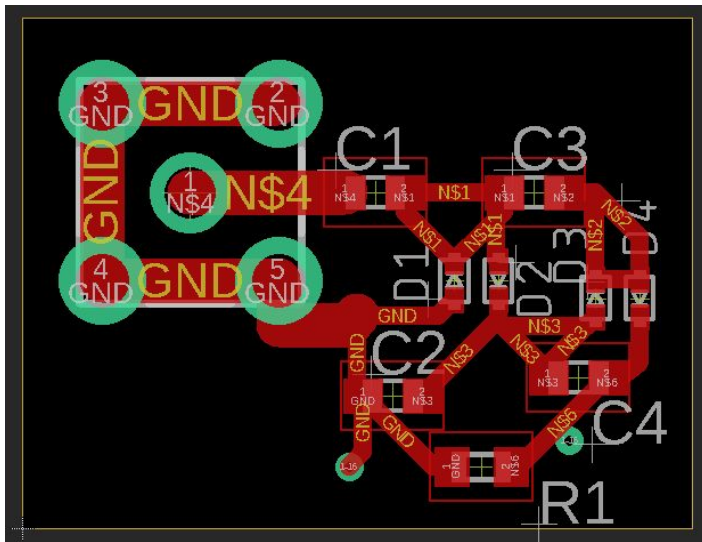
- 1) 1.8 V to 3.6 V
- 2) 16-channel 12-bit ADC
- 3) 256KB of FRAM and 8KB of SRAM
- 4) 16-channel analog comparator

RF and Antenna Team and Power Circuit Team

Team talked to grad students about modeling Schottky diodes using ADS and we found out that to model the Skyworks Schottky diodes that we will be using in our rectifier circuit, we have to use PSPICE since the datasheet for the Skyworks schottky diodes have PSPICE parameters.

Researched best materials to be used for the in-house etching process of our PCB board. Also, looked into parasitic values and how they affect PCB board design.

Designed a PCB for a Cockcroft-Walton multiplier with an SMA connector and 2 small vias for measuring voltage.



PENDING ISSUES

We need to finalize the layouts for the PCBs of the rectifier circuit.

INDIVIDUAL CONTRIBUTIONS

Team Member	Contribution	Weekly Hours
Derek Nash	Researched SMA connectors and their footprints. Designed and ordered new PCBs.	4
Matt Goetzman	Talked to Dr Neihart and grad students about using ADS and design issues that can rise in our layouts for the rectifier circuits. Went through a safety training for etching PCBs	6
Mohamed Gesalla	Researched parasitics values for the FR-4 material	3
Adithya Basnayake	Researched on possible starter circuits for the MCU	3
Mohammed-Al-Mukhaini	Learning and exploring applications for our new MSP430. Using energytace applications for power consumptions.	6
Bradley Rhein	Worked on our new MSP430 to understand its functionalities.	6

PLANS FOR THE UPCOMING WEEK

Team will prepare final project plan and prepare for the upcoming presentation. We should also hope to present more solid fundamental ideas that we would use from the computational team.

SUMMARY OF WEEKLY ADVISOR MEETING

Dr. Duwe emphasized the importance of looking back on similar projects from other universities. He also stressed that every aspect of the design be thoroughly thought through and documented, so that we could defend the design's feasibility in front of the graders.