EE/CprE/SE 491
wDAQ System (sddec24-19)
Weekly Report 3

Feb 20, 2024
Client: Manojit Pramanik and Avishek Das
Faculty Advisor: Manojit Pramanik

TEAM MEMBERS

Adam Shoberg [EE] - Circuit Design & Simulation, PCB Design, Team Communications Leader

Henry Chamberlain [EE] - PCB Design & Construction

Lisa Tordai [SE] - Software Development, Wireless Data Sharing

Vaughn Miller [CprE] - Computer Engineering

SUMMARY

This past week, we received the low-noise amplifier parts we ordered from Digikey and Amazon through ETG and made some test evaluations. The major breakthroughs occurred with the 60 dB, 0.1 ~ 2000 MHz multistage LNA circuit we ordered on Amazon, where we were able to obtain reliable data for the gain at different frequencies. With that, the other amplifiers we ordered were tested and analyzed on a breadboard with less fruitful results. Also, decisions were made on what type of microcontroller and ADC would be best for our design requirements.

ACCOMPLISHMENTS

Adam:

- Tested high-gain wideband multistage LNA from Amazon using SMA-BNC cables
- Soldered MAR-6SM+ and MAR-3SM+ LNAs to jumper wires, replicated Mini-Circuits evaluation circuits for the LNAs on breadboard and tested the design (failed to obtain accurate or desirable results)
- Compiled simulation results to share with Avishek in weekly presentation
- Started discussion on powering the device

Henry:

- Tested high-gain wideband multistage LNA from Amazon using SMA-BNC cables
- Soldered MAR-6SM+ and MAR-3SM+ LNAs to jumper wires, replicated Mini-Circuits evaluation circuits for the LNAs on breadboard and tested the design (failed to obtain accurate or desirable results)
- Created a BOM and ordered components from ETG for LNA testing & evaluation: surface mount & through hole capacitors, inductors, and resistors; prototyping PCBs

Lisa:

- Presented options for wireless communication
- Connected Arduino to show live data to a graph GUI
- Team made a decision on what wireless communication module to use and ordered parts

Vaughn:

- Compared two popular microcontroller options, the STM32 being the most capable and one of the few to meet our requirements
- Got dev environment setup
- Programmed personal test board to run at full speed and generate a clock signal

PENDING ISSUES

Adam:

- Waiting for next parts order to ship to ETG to continue breadboard & PCB evaluation of MAR-3SM+ and MAR-6SM+ LNAs

Henry:

- Waiting for next parts order to ship to ETG to continue breadboard & PCB evaluation of MAR-3SM+ and MAR-6SM+ LNAs
- No one (including Avishek) has been successful with finding SPICE files for MAR-3SM+ and MAR-6SM+ circuits in Multisim

Lisa:

- Working on test set up for transferring live data from Arduino and temperature sensor to PC through a Bluetooth module
- Deciding a way to handle data from wireless device into LabVIEW

Vaughn:

- No significant pending issues, just researching and programming for the time being

INDIVIDUAL CONTRIBUTIONS

Member	Contributions	Weekly Hours	Total Hours
Adam	Tested Physical circuits	6	18
Henry	Tested Physical circuits Ordered Parts	6	18
Lisa	Ordered parts Developing test set up with Bluetooth Started LabVIEW VI	6	18
Vaughn	Continued research into data flow into ADC, between MCU and ADC, and out of MCU, began programming	6	18

COMMENTS AND EXTENDED DISCUSSION

Adam:

- Want to start looking at battery protection systems. Looking at a few Type-C options that have files available for PCB layout.

Henry:

- Avishek wants to start looking at potential types of batteries to use (NiCd, NiMH, Li-ion).
- Avishek will look at ADC options.
- We want to build our MAR-3SM+/6SM+ test circuit on both the breadboard and PCB as soon as parts arrive

Lisa:

- Decide how to gather transmitted data and stream into LabVIEW

Vaughn:

- Will be ordering an ESP wifi board to test data transfer from the STM MCU
- Need to keep researching on the fastest way to interface with the ADC

ACTION ITEMS FOR UPCOMING WEEK

Item	Member(s) Assigned	Desired Completion
Start working with PCB layout and overall device layout. As we wrap up the individual parts the integration of everything together must be done	Adam	03/05/2024 (Most likely won't be completed by then but the ball should be rolling).
Continue working with Arduino and Bluetooth setup. Connect with LabVIEW	Lisa	02/21/2024
Build amplifier circuits on breadboard with parts ordered from ETG	Adam, Henry	02/28/2024
Build & test MAR-3SM+ and MAR-6SM+ evaluation circuits on prototyped PCB (at ASC)	Adam, Henry	02/28/2024
Find and agree upon suitable Bluetooth/Wifi Device	Vaughn	02/21/2024
Determine wireless communication method (WiFi vs. BT) based on speed	Vaughn, Lisa	02/28/2024
Determine what is necessary to run MCU IC with only data input, debug, and data output	Vaughn	02/28/2024

SUMMARY OF ADVISOR MEETINGS

Weekly Client Meeting (2/14):

- Discussed Battery protection systems
- Discussed results of physical LNA
- Narrowed down devices for bluetooth/wifi devices.
- Discussed action plan with ADC
  - Avishek will take over looking for best ADC
- Discussed tasks & desired deliverables for 2/21/2024 meeting
  - Breadboard results

- Amplifier parts order from ETG
- Further research into ADC and microcontroller components