EE/CprE/SE 4920
wDAQ (sddec24-19)
Status Report 5

November 1st - November 14th, 2024
Client: 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

During the past two weeks, our team made considerable headway on the software front and made some important decisions on the hardware side as we began to approach the final faculty & industry panel and presentations and the end of the semester and project. After attempting to troubleshoot the problem we encountered during the previous reporting period with the shorted trace on the ADC board, we made the call that we would likely be unable to resolve the issue and order new boards in an acceptable time frame, given that PCBs typically have a two to four week lead time from the date of order for part collection, assembly, and shipping. Given this, we made the decision to scrap our design efforts and use an existing (marketplace) 12-bit ADC circuit that we have tested and determined is compatible with the rest of our design. All that remains to be implemented is the battery and battery management system, which we have selected and are preparing to order soon. In terms of software progress, we have finished implementing the code for SPI (Serial Peripheral Interface) and are continuing to troubleshoot and explore different configurations of 32-bit serial communication. We now hope to push the data rate higher by utilizing more efficient programming techniques for data transfer, beyond simple functionality.

MILESTONES REACHED

Adam:

- Attempted to troubleshoot ADC circuit
- Discussed plans for ADC and integration within full design moving forward
- Sourced appropriate components for battery and Battery Management System (BMS)

Henry:

- Discussed plans for ADC and integration within full design moving forward
- Explored potential options for battery and Battery Management System (BMS)

Lisa:

- Adapted ESP32 program for STM SPI connection
- Successfully interfaced ESP and STM SPI communications
- Tested STM to ESP interface
- Tested STM, ESP, and LabVIEW integrated connection

Vaughn:

- Programmed basic SPI capabilities into STM
- Tested STM with ESP and ADC
- Improved data output quality and speed

INDIVIDUAL CONTRIBUTIONS

Member	Contributions	Period Hours	Total Hours
Adam	Soldered, tested, and troubleshot ADC PCB with client	4	84
Henry	Soldered, tested, and helped troubleshoot ADC PCB	4	85
Lisa	Programming ESP, Testing ESP and STM, Modifying LabVIEW GUI	5	85
Vaughn	Programming STM32, Testing ADC data flow, improving code efficiency	5	81

PLANS FOR NEXT REPORTING PERIOD

Item	Member(s) Assigned	Desired Completion
Test battery and BMS upon order/arrival	Adam, Henry	11/22
Improve appearance of LabVIEW GUI	Lisa	11/22
Develop and demonstrate functioning STM32F Wi-Fi communication to LabVIEW	Lisa, Vaughn	11/12
Assemble complete design or portions of design that will be presented to faculty/industry	Adam, Henry, Lisa, Vaughn	12/06

PROJECT WORK

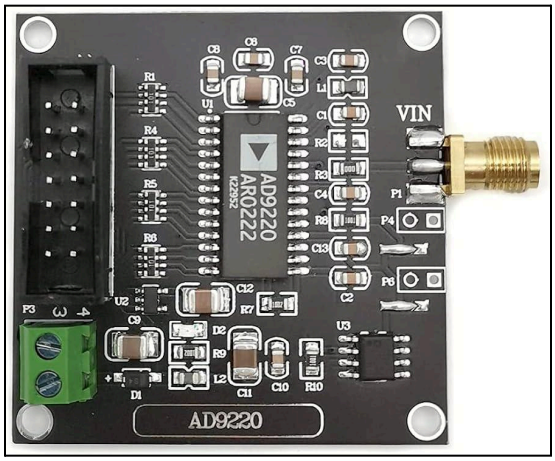

Figure 1: AD9220 IC and Development Board to be used for our ADC circuit

SUMMARY OF MEETINGS

Biweekly Team/Advisor Meeting (11/12/2024):

- Discussed team progress and plans for remaining weeks of the semester
- Discussed expectations for faculty & industry panels and poster presentation

Weekly Team/Client Workday (11/07/2024):

- Discussed and confirmed plans for ADC circuit and integration within full design
    - Decided on Analog Devices AD9220 12-bit ADC (has been previously tested for functionality and compatibility with our design)
- Discussed plans for battery and Battery Management System (BMS)
    - Plan to use a lithium battery with a buck converter or fixed IC voltage regulator with fixed 3.3V/5V output
- Finished SPI implementation with continued troubleshooting
- Continued to experiment with 32-bit serial communication

Weekly Team/Client Workday (11/12/2024): (moved to Tuesday due to scheduling conflicts)

- Continued troubleshooting SPI communication and 32-bit serial communication
- Continued testing STM32F to LabVIEW interaction with ESP32 Wi-Fi module
- Sourced and ordered parts for battery and BMS (found on Amazon) through ETG