wDAQ: Project Plan

TEAM 19 (LISA, ADAM, HENRY, VAUGHN)

Project Overview

Project: Wireless Data Acquisition (wDAQ) system to capture/transmit high-frequency analog signals to a device in real time using Wi-Fi technology

- The DAQ will amplify a 1 mV analog input signal to approximately 1-2 V before digitizing it
  - ADC will have a 12-bit resolution
- Wi-Fi will be used to wirelessly transmit signals to a computer
  - Bluetooth can be used for signal transmission, but has a significantly lower data transfer rate than Wi-Fi
- The DAQ will be fabricated on a small PCB with surface-mount components
- A graphical user interface (GUI), written in LabVIEW, will be used to analyze data

Project Management Style

- Project management Style: Agile
  - Remain flexible
  - Consistent communication (Snapchat, Teams, Email, and Face-to-face)
  - Medium levels of planning
- Client Meetings: Weekly meetings every Wednesday
  - Presentations
  - Updates
  - Action plans for the following week
- Advisor meetings: Every other Friday
  - High level presentation of progresses
- Indvidual/Team workdays: Flexible to the needs of the task
  - Team workdays are by request

Task Decomposition

Phase 1: Project Planning

- Gather & understand needs & requirements of client & users
- Create a loose plan of work
- Break down work into tasks and assign individual & team responsibilities
- Complete design and order parts

Phase 2: Prototype Build

- Solder PCBs according to design
- Verify proper electrical connections on PCB
- Develop user interface to accommodate software communication with the device
- Test & observe results and discuss shortcomings/areas of improvement

Phase 3: Final Product Build

- Request user evaluation and analyze feedback alongside results to determine areas of improvement
- Implement changes, rebuild, and test device

Gantt Chart

As our Figma Gantt Chart shows, our tasks are split across the work periods of January to May and August to December 2024, with more tasks and deliverables being crammed into the Spring semester, because we are striving to complete our first two targets (project planning and prototyping) during this semester, leaving the Fall semester entirely for the final design and implementation.

Milestones and Criteria

Planning: determine a high-level understanding of the project
- Researching similar products and components
- Simulate devices

Design: Design parts of the project
- Design Schematics and PCB with input impedance of 50Ohm
- Part selection must have surface mount technology
- ADC circuit must have 12-14 bits of resolution
- Develop Dev Environments
- Realtime communication of ESP32 based on IEEE 802.11

Test and Verification: Test components to ensure they meet specification
- Input signal amplified to 1V signal
- System bandwidth of 100MHz
- Signal rise time of 100nS

Finalize prototype: Make adjustments if components didn't meet specification in previous milestones
- Compile everything into one single PCB

Reproduce results: Reproduce half a dozen WDAQs for Client

Risks and Risk Mitigation

Significant Risks (incurs significant delays and additional costs):

- **High Likelihood:** None right now
- **Low Likelihood:** Copyright infringement; final PCB does not work; software doesn't work with the device; device doesn't meet size requirement after completion

Insignificant Risks (easily mitigated and incurs minimal delays or costs):

- **High Likelihood:** Accidentally ordering incorrect parts or quantities of parts; Wi-Fi lags/delays; parts in design are out of stock
- **Low Likelihood:** Ordered parts don't work

Mitigation Strategies:

- Careful soldering of PCBs to avoid accidentally shorting pins, components, etc.
- Verifying and double-checking Bills of Materials for accuracy & availability prior to ordering parts
- Constantly keeping track of the size of the device and individual parts to avoid exceeding constraints

Conclusions

Through the use of our agile project management style, our group will be able to successfully navigate through our tasks and avoid risks on the path to meeting our milestones.

By being aware of the different risks we are facing and the severity/likelihood of each risk, we can apply mitigation strategies to avoid risks as much as possible.

By separating our tasks into a Gantt Chart with dates, we will be able to visualize the completion of the project more easily.