🛠️ MEC 427 Advanced Sensors and Actuators Challenges 1-5

🗓️ Date & Time

- **Report Date:** 10-18-2025
- **Time Block:** 10-13 – 10-18
- **Time Spent This Session:** 5 hours / minutes
- **Cumulative Time on Project:** 9 hours / minutes

🗁 Project Overview

- **Project Title:** MEC 427 Advanced Sensors and Actuators Challenges 1-5
- **Project Objective:** Complete Challenges 1-5 for MEC 427 Advanced Sensors and Actuators course.
- **Current Phase:** Sketching and Planning Phase

🔧 Task / Activity Details

- **Module / Subsystem:** Development Plans research and documentation
- **Specific Task or Activity:** Planning and research for Challenges 1-5
- **Time Spent on This Task:** 5 hours
- **% of Total Time:** 100%
- **Resources Used:**
    - **Hardware:**
    - **Software:**
    - **Tools:** Internet resources, Grok AI, VScode, Markdown, Copilot
    - **Documentation:**

🗠 Progress Tracking

- **Task/Module Completion Status:** 85% complete (estimated)
- **Project Completion Status:** 15% complete (estimated)
- **Milestones Reached:** Development Plans drafted for Challenges 1-5
- **Blockers or Issues:**
- **Next Steps / Planned Actions:** Build water tank prototype for Challenge 1-3, start developing code for CPX microcontroller, build water tower fixture.

📦 Results & Deliverables

- **What Was Achieved:** 3 development plans drafted for Challenges 1-5
- **Artifacts Created:** Development plan documents

- **Validation / Testing Outcomes:**
- **Changes Made to Design or Approach:**

📄 Narrative & Observations

> *Use this section for detailed descriptions, reflections, and context. Include technical notes, emotional observations, and rationale for decisions.*

- **Narrative Summary:**
- I reviewed my Adafruit CPX microcontroller kit and found that it came with all the necessary components to build a smart sensor/actuator system. I worked with Grok AI to brainstorm ideas for my system. I will be creating a water tower and container system were capacitive sensors will detect the water level in the container and a servo motor controlled pinch valve will stop the water flow when water reaches a certain level in the container. The water "tower" will be made of PVC pipes with rubber tubing fixed to a hole at the bottom of the tank. The pinch valve I can design with CAD or I could find an existing design I can modify and print. Construction of the tower should be simple. I set up a Python development environment using VSCode and installed the necessary libraries to program the CPX. I finished the initial development plans for Challenges 1-5, challenges 4 and 5 I will need to do more research/sketching on. I'll need to ask if a tension wire fixture will be provided making one might be an issue at home. The CPX has built in accelerometer I can use as a balance sensor. The actuator will need more thought.
- **Technical Notes:** ''
- **Lessons Learned / Insights:** Marveling a bit at how productive AI tools can be for brainstorming, planning, and documentation. Feeling optimistic about the project direction so far.