**UGRC Weekly Project Report**

**Date:** 15/08/2025

**1. Temperature Controller**  
I was tasked with building a temperature controller for a PPLN crystal. After discussing with Guru, we decided to use a TEC (Thermoelectric Cooler) for this purpose. Initially, I researched about how a TEC works and looked at various implementations, most of which used the TEC as a cooler with a heatsink on the hot side.

Before this research, Guru and I spoke to Ashutosh about a possible circuit design to use the TEC, but he had not gone into detail. He only mentioned that it would be possible to use the TEC as an actuator, similar to replacing the fan/heater in the Arduino-based chamber temperature control project. Guru confirmed that it is possible to use a TEC for heating as well, but I haven’t found a resource for this. He said he was discussing an idea with another student for using the TEC as a heater and that he’d get back to me soon.

**2. Suspension Control**  
I have had multiple meetings with my CFI teammates to bring them up to speed on suspensions, controllers, and the control loop in general. Guru and I also spoke to Ashutosh about what controller would be suitable for the long-term project. He asked whether my project should focus on designing a controller or on implementing and working with controls. I decided that focusing more on controls would be a better approach.

After discussions with the ex-team, we established that our system operates in the range of about 0.1 Hz to 10 kHz. Based on this, a Red Pitaya seems like a good choice, as it samples at 125 MS/s. I talked to Ashutosh about the issue of multiple channels, but he said we could sync multiple red pitayas so that shouldn’t be an issue. Since cost is not a major issue, I am inclined to pursue this method and would like your input on it.

**Plans for Next Week**  
For the temperature controller, I will work with Guru to find an implementation that allows the TEC to function as a heater. Additionally, if possible, we can finalize the circuit and order the necessary parts.

For the suspension and controls, I am currently unsure of the exact next step and wanted to discuss this further with you. I have gathered the electronic components ordered last year, although some soldering and connections are still pending. While I have a general understanding of the final goal, I am struggling to break it down into a step by step approach. My minimum goal for next week is to create this step by step plan and approach for the coming weeks. I also want to speak to Suresh sir to ask him if he has any suggestions.