**UGRC Weekly Project Report 3**

**Date:** 29/08/2025

**1. Suspension Work**

I found that the square photodiodes we currently have (BPW34) are not suitable for our setup because they cannot fit in the circular OSEM hole. After looking through last year’s quotation, I saw the PIN 3CDI photodiode which was the product which was supposed to be ordered so I found a vendor, and shared the purchase link. I also had a couple of discussions with Guru and Ashutosh about possible DAQ systems, and I’ve realized that my interest lies more in the controls side rather than working on the DAQ in detail. To get clarity on how to move forward, I’ve set up a meeting with Suresh sir.

On the hardware front, I’ve figured out how the OSEM fits on the PCB—which screws to use, the right orientation, and how to solder the LED and PD. Once the photodiodes arrive, we can go ahead with soldering. Since they are ESD sensitive, we’ll have to be extra careful when handling them.

**2. TEC-Based Temperature Controller**

For the TEC work, I started with a TEC1-12706 module. Guru and I first put together a simple circuit: a voltage divider with a temperature-dependent resistor to monitor the TEC temperature, feeding that signal into the Arduino’s analog input. The Arduino’s PWM output was then used to drive the TEC, with a current-limiting resistor added since the Arduino can only provide a voltage PWM.

This setup turned out to be far from sufficient—the TEC needs currents on the order of 5 A, while the Arduino can’t come close to that. I had also considered whether a fan or heatsink would be necessary, but since our case involves heating the crystal (rather than cooling, which is more common with TECs), it wasn’t a priority. After speaking with Ashutosh, we decided that the best path forward is to use a TEC driver evaluation board. I’ve looked into options and selected the LT8722, 4Awhich is available on Digi-Key. It can provide a maximum current of 4A but that should be enough to drive the TEC in the required range since we never actually drive at the Imax of the TEC.

**3. Future Work**

Going ahead, I want to quickly settle the question of which DAQ system we’ll be using. Alongside that, place the orders for the TEC driver eval board and the photodiodes. Once everything arrives, the plan is to solder the components onto the OSEM PCB and carry out the calibration experiment for the suspension. And for the TEC, to setup the circuit with the TEC eval board included this time.