

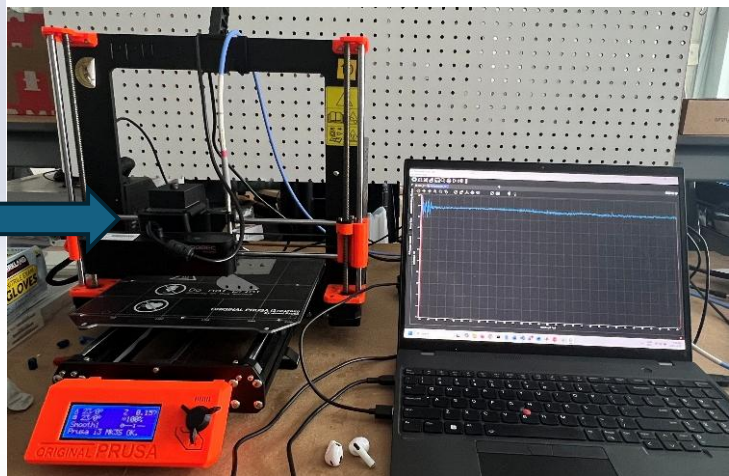
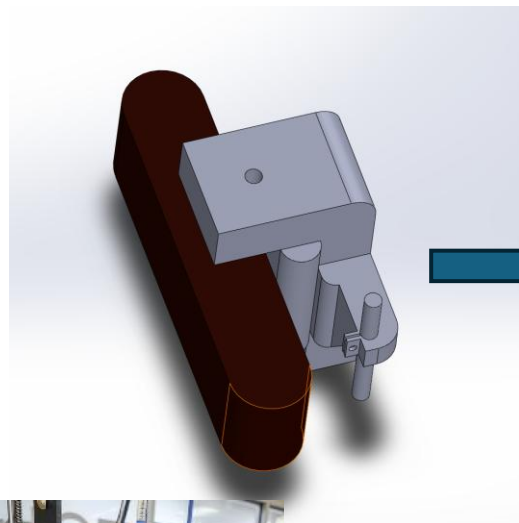
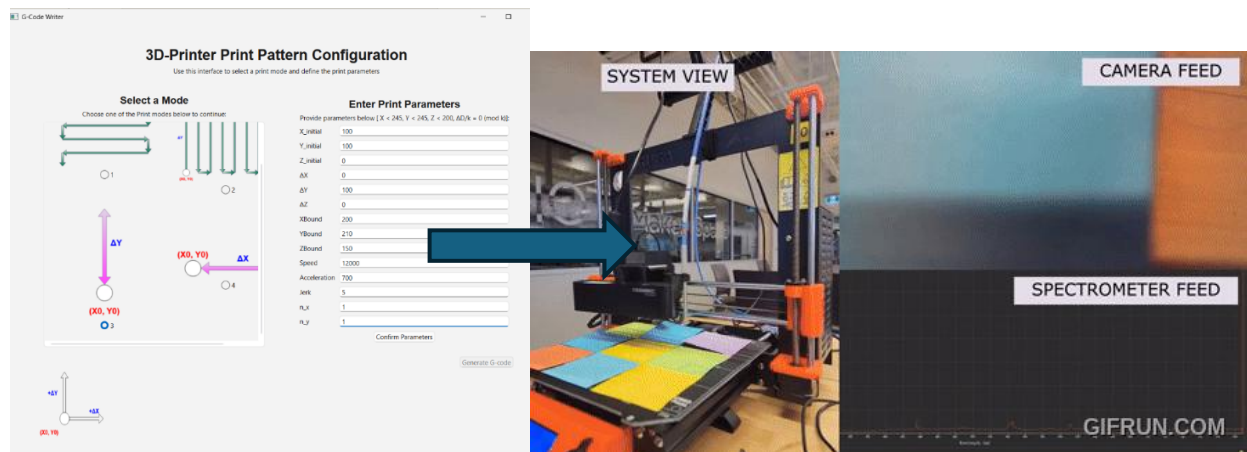
Alex Zheng Portfolio

Low-resolution reflectometry for inline thin-film inspection

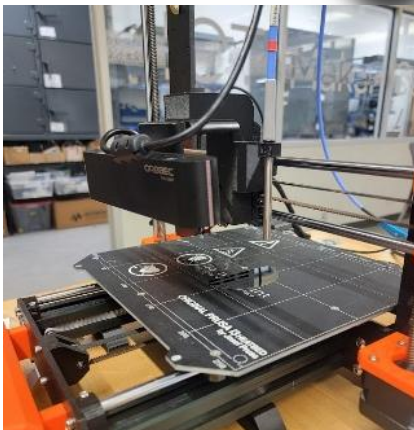
RESEARCH PAPER

SPIE Photonics West Conference link San Francisco

waterloo institute of nanotechnology CONFERENCE PRESENTATION



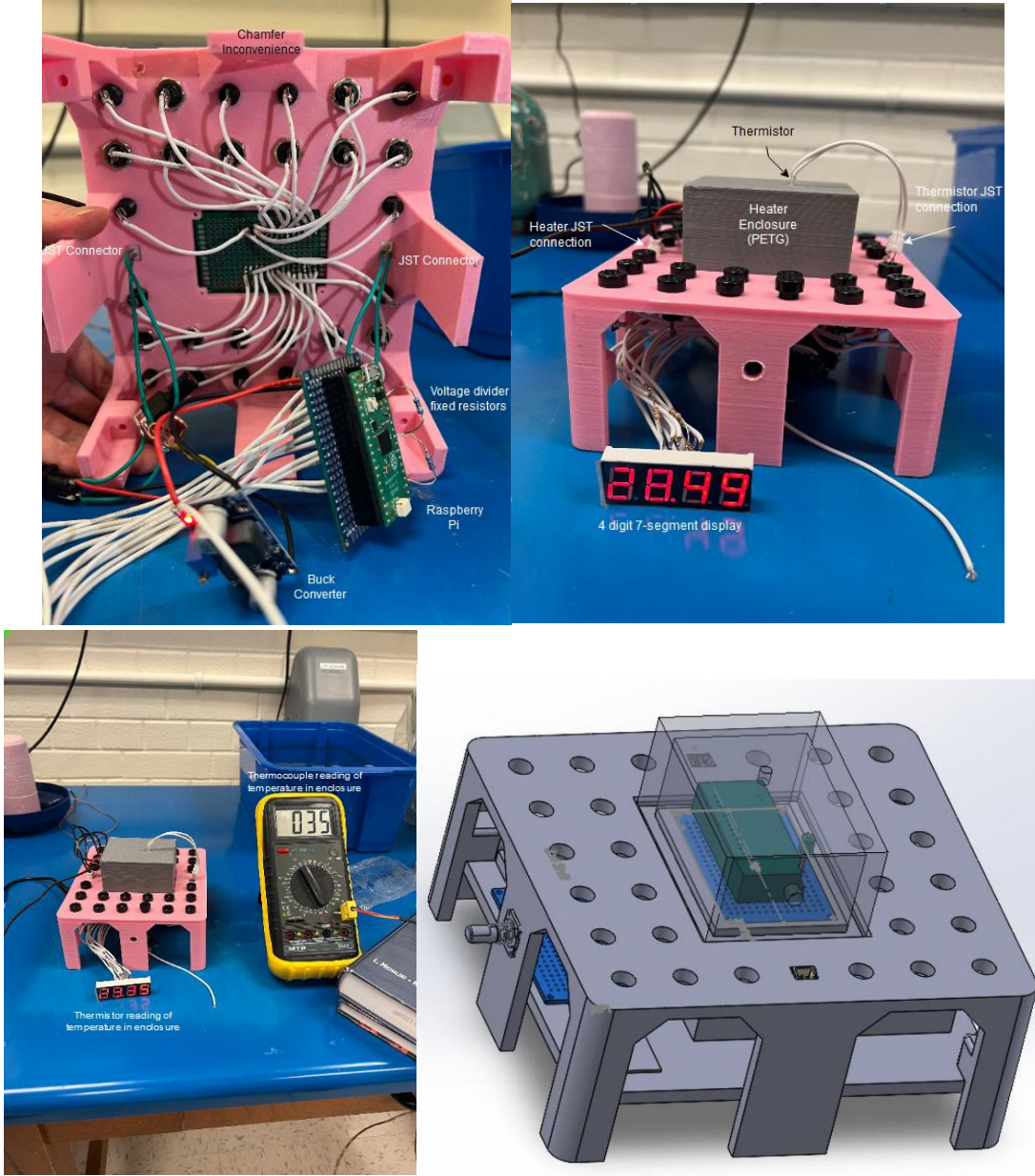
Time Synchronization Equations I generated:



$$\left\{ \begin{array}{l} \text{acceleration: } \frac{at^2}{2} + jt, 0 < t < \frac{v-j}{a} \\ \text{constant velocity: } \frac{v^2-j^2}{2a} + vt, \frac{v-j}{a} < t < \frac{v-j}{a} + \frac{S - \frac{v^2-j^2}{a}}{v} \\ \text{deacceleration: } S - \frac{v^2-j^2}{2a} + vt - \frac{at^2}{2}, \frac{v-j}{a} + \frac{S - \frac{v^2-j^2}{a}}{v} < t < \frac{v-j}{a} + \frac{S - \frac{v^2-j^2}{a}}{v} + \frac{v-j}{a} \end{array} \right.$$

Temperature Controlled IC Test Fixture

***PROJECT INFO (GITHUB) ***



PID and thermistor calibration equations I generated:

$$PID: u_{PWM} = ke(t_k) + k_i \frac{\Delta T}{2} \sum_{m=1}^k (e(t_m) + e(t_{m-1})) + k_d \left(\frac{e(t_k) - e(t_{k-1}))}{\Delta T} \right)$$

$$SH \text{ calibration: } T = \frac{1}{0.002843 + 0.00033803 * \ln R_t + 0.0000055534 * (\ln R_t)^3} - \frac{1000 * I^2 R}{8}$$

Miscellaneous:

- **Top 1% of all solvers** on Project Euler (solved 110 problems) by applying mathematical algorithms - applied *primality tests, continued fractions, dynamic programming, graph optimization, numerical interpolation*, etc. <https://github.com/al3xzheng/ProjectEuler>



<https://projecteuler.net/profile/alexzheng.png>

- Won **1x Gold and 3x Silver for Team Canada Dragon Boat 18U** at the 2023 World Dragon Boat Championships against China, USA, Thailand, Australia, Ukraine, and India in Pattaya, Thailand.
- **Sensor fusion** and data integration to produce a **2D simulation** of a robot moving according to sensor data. <https://github.com/Glen-Zheng/robotics-sensor-fusion>
- Battery State-Of-Charge PCB: schematic capture, layout, and assembly of a current-sense PCB for a shunt resistor and battery, tracking the battery level of a solar car using Altium.
- Coffee Can Antenna to study RF engineering
- *Many in progress, mediocre, or unimpactful projects (PCB test fixture, airplane design, PyGame) that I would love to share more with you!!*