SHABD GUPTA

s28gupta@uwaterloo.ca
linkedin.com/in/ShabdGupta
github.com/Shabd034

EDUCATION

University of Waterloo, BASc, Mechatronics Engineering April 2027

- Academic average of **91.76% (3.94/4.00)**, Professor Igor Ivkovic Memorial Award, Dean's Honour List
- Relevant courses: Microprocessors, Sensor Interfacing, RTOS, Signals, Digital Logic, Controls, System Modelling

SKILLS

Languages: **C/C++, Python, C#, Bash/shell**, **GLSL**, MATLAB, VHDL, Verilog/SystemVerilog
Platforms: **Linux** (Desktop/Embedded), **Bare metal** (Xilinx/STM32), **Windows** (.NET/Win32), **FPGA** (Xilinx)
Libraries/Tools: **NumPy**, **openCV**, gRPC, MQTT, Redis, **OpenGL**, **Git**, Petalinux/Yocto, **AWS**, **Docker**, Jira, Vitis, STM IDE

EXPERIENCE

Factory Software Intern | Formlabs May 2025 – August 2025

- Developed calibration and manufacturing routines for **SLS/SLA 3D printers** to support production and **NPI** cycles.
- Utilized **Python** including packages like **OpenCV**, **NumPy**, and **SciPy** to implement **15%** of final test and calibration suite.
- Implemented **system-critical** calibration for **multi-pixel IR sensors** accounting for external optics and assembly.
- Updated process control software using **Python backend** and **React** to parallelize routines, reducing cycle time.
- Wrote **thread-safe** libraries and drivers to interact with **MQTT** broadcasts, **RTSP streams**, **DAQs** and **PID** controllers.
- Integrated various sub-system tests on the assembly line collaborating with R&D, manufacturing and embedded teams.

Sensor Software Developer Intern | Lumentum January 2024 – December 2024

- Contributed to the development of a **high-speed LIDAR** sensor for precision **metrology** applications.
- Utilized **C++** to Develop thread safe modules and features for the **kernel** and **user-space** in an **embedded Linux** system.
- Updated **Xilinx FSBL** and **U-Boot** code to implement boot redundancy and upgrades for **Ultrascale+** platform.
- Created **internal tooling** for the embedded system and **python packages** for R&D and process automation.
- Developed a **Windows user-space driver** using **COM**, **gRPC**, and **Win32** for communication with multiple sensors.
- Designed and implemented a **graph generator library** in **C++** to visualize sensor scan plan with a runtime under **3ms**.
- Implemented **Redis** as on sensor database, created **BitBake** files, Linux init scripts, utilized **Hiredis** for **C++** interfacing.
- Integrated **Xilinx Verification IP** for AXI4, AXI lite, and **AXI stream** protocols into simulation using **Verilog**.

Manufacturing Software Development Intern | Ford Motor Company May 2023 – August 2023

- Implemented **UDS over DoIP** protocol to support module factory deliverables in **C#** using **.NET**, **NUnit**, **Moq**.
- Created first unit tests using **GTest** to test C++ device deployment code for the manufacturing team.
- Updated **BitBake** recipes to facilitate build automation for **QEMU** and device platform through **Jenkins**.
- Automated chip image loading in EDL mode onto multi-chip devices, verify boot-up and collect logs using QPST.

PROJECTS

Ball Balancing Game August 2025

- Built an interactive Stewart platform simulation with kinematics and contact physics for a real-time ball balancing game.
- Used C++, OpenGL and GLSL for graphics and simulation, and GLFW for window management and input handling.

Graphics Rendering Engine using OpenGL/GLSL August 2024

- Developed a graphics engine to render STLs with lighting using Physically Based Lighting and Blinn-Phong techniques.
- Leveraged GLSL to implement vertex and fragment shaders to form a graphics pipeline and GLFW for user control.

Course Projects

- Two-axis gantry fine control using ADC inputs on an STM board and utilizing SPI based stepper motor driver.
- Real Time Operating system with multithreading capabilities implemented for a Cortex M4 chip on an STM32.
- Robotic chess player to precisely pick up and place pieces using a pulley system, various sensors and RobotC.
- Analysis in topics like signals, machine dynamics, numerical methods, calculus using MATLAB/Python.