Rachad El Moutaouaffiq

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Technical Skills

Software: Googling, Git, Unix commands, Multithreading, Python, Java, C/C++, Verilog, ARM assembly.
Hardware: Microcontrollers, Oscilloscopes, Switches, High Voltage, Soldering, FPGA (DE1-SoC), Capacitors.

Evidence Of Excellence

- Initiated and led multiple projects, notably the pool-playing robot *BilliardBot*, expanding it to a 5-person team. Initially, I worked on developing robot firmware, UI, computer vision, and circuit design. As the team grew, my role shifted to system integration. Leading this project enhanced my ability to work in multidisciplinary teams and manage trade-offs within budget constraints, all while balancing university coursework.
- During my gap year at my previous IT help desk job, I encountered numerous repetitive tasks. To address this, I developed Python scripts for parcel tracking and automated emails using Win32com.client, increasing my efficiency by 10%. My manager appreciated my initiative, and the solution was adopted by 2 other coworkers. *More info*.

Personal Projects

BilliardBot VisionAI, *Demo* | *OpenCV, ESP-32 Server, Tkinter(GUI), Circuit, System Integration* Oct. 2023 – present

- Building a pool-playing robot, using OpenCV for ball detection and a high-voltage powered solenoid for cue striking.
- Designed and debugged robot circuitry and seamlessly integrating firmware with ESP-32 wireless connections for precise control. Achieved ±0.2° degree or ±0.06mm margin of error.
- Developed OpenCV algorithms for spatial measurement and object detection via HSV thresholds; currently exploring YoloV8 for enhanced ball classification.
- Designed a Tkinter UI for robot control, enabling real-time troubleshooting and fine-tuning of OpenCV sensitivity parameters. Ensured seamless integration between the UI, computer vision, and firmware.
- Exploring graph theory and statistical analysis with my team to optimize shot sequences for optimal follow-up shots.

384V Multistage Coil Gun, *Demo* | *Thyristors, Optocoupleur, Capacitors, Oscilloscope, Interrupts* Jan. 2023

- Constructed a 384V coil gun with high-voltage capacitors and switches like optocouplers and SCR-thyristors.
- Selected high-current/voltage components through datasheet analysis and diagnosed errors with an oscilloscope.
- Built an IR speedometer using interrupt functions for accurate projectile exit velocity measurements, tweaking variables like winding turns and distances, resulting in 17m/s and 3 Joules of energy.

Automatic Xylophone, *Demo* | *Homemade Solenoids, Transistors, MIDI* Aug. 2022

- Built an automated electromagnetic Xylophone with 24 transistors, DIY solenoids, and nails for key strikes, controlled through MIDI and serial communication. My project was featured on the *Arduino-website*.

Technical Experience

Software Subteam Member Sep. 2022 – May. 2023
Thunderbots | *Autonomous soccer playing robot design team* *Vancouver, BC*

- Enhanced software development skills through code reviews, Git& version control, and managing merge conflicts.
- Collaborated on Pybind tickets to integrate C++ and Python, enabling variable access across files for our UI.
- Contributed to improving the goalie's decision-making and enhancing the overall game strategy.

IT Consultant Aug. 2021 – Aug. 2022
CGI / Bank of Montreal (BMO) *(Remote)*

- Assisted bank employees with group policy permissions, software and VDI technical issues.

Technical Support Agent Mar. 2021 – Aug. 2021
Advanced Skyline Technology *Markham, ON*

- Supported end-users with OS related issues such as boot sequence and drivers, and handled warranty claims.

Education

The University of British Columbia Sep. 2022 – Jun. 2027
Bachelor of Applied Science - Computer Engineering | Dean's Honour List 2022/23 *Vancouver, BC*