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.

PERSONAL PROJECTS

BilliardBot VisionAI, ⧉ | *OpenCV, ESP-32 Server, Tkinter, High-Voltage Solenoid/Capacitors*   Oct 2023 – present
- Developing a pool-playing robot, using OpenCV for ball detection and high-voltage circuits 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 to strategize shot sequences, ensuring optimal follow-up shots.

Multistage Coil Gun, ⧉ | *Thyristors, Optocoupleur, Capacitors, Interrupt functions, Oscilloscope*   Jan. 2023
- Constructed a 384V coil gun with high-voltage capacitors and switches such as optocouplers and SCR-thyristors.
- Analyzed datasheets to select high-current/voltage compatible components.
- Diagnosed errors by isolating specific components and assessing their behavior with a DMM and oscilloscope.
- Built an IR speedometer and used interrupt functions for precise measurement of projectile exit velocity.

Automatic Xylophone, ⧉ | *Homemade Solenoids, Transistors, MIDI*   Aug. 2022
- Constructed an automated electromagnetic Xylophone equipped with 24 transistors and DIY solenoids, which produce sound by striking the xylophone keys with nails.
- Enabled software-based control for the xylophone using the MIDI library and serial port communications.
- My project received recognition and 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 by conducting code reviews via GitHub, utilizing Git and version control in a Linux environment, and managing pull requests and merge conflicts.
- Collaborated on Pybind tickets to integrate C++ and Python, ensuring seamless variable retrieval across different files and languages for our user interface.
- 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*
- Provided phone and TeamViewer technical support to end-users.
- Created a Python application and scripts to automate recurring tasks like parcel tracking, customized client emails, and auto-filling database forms, employing Win32.com.client and pathlib. See *this link* for more details.

EDUCATION

Bachelor of Applied Science - Computer Engineering   Sep. 2022 – Jun. 2027
The University of British Columbia   *Vancouver, BC*