Ramy Sandouk

Candidate to the Engineering profession
Ordre des ingénieurs du Québec

(438) 936-3308
rsandouk@hotmail.com

Education

Bachelor of Engineering in Computer Engineering   May 2018
Concordia University, Montreal, QC
Graduated with a GPA of 3.20.

Associate's of Arts in Liberal Arts   Sep 2009
Northern Virginia Community College, Annandale, VA

General Educational Development Diploma   Feb 2005
High school equivalency diploma awarded by the
Virginia Department of Education, Arlington, VA

High School International Baccalaureate Certificate in   Mar 2002
Chemistry, standard level
George C. Marshall High School, Falls Church, VA

Work Experience Highlights

- Driver and system level development for custom device platforms on Linux and Windows with C++ and C.
- Real-time systems development.
- Numerous communication protocols: TCP/IP, USB, UART, SPI, PCIe, PTP (precise time protocol).
- Experience in broadcast-quality video system development adhering to SMPTE standards.
- Experience with medical systems engineering and ultrasound systems.
- FPGA-VHDL register transfer level module development and testbenchs for Xilinx FPGAs.
- Implemented complex algorithms with C++ using CUDA libraries for GPUs. Algorithms included FIR (finite impulse response) filters and ultrasound beamforming algorithms.
- Capable with scripting languages: Bash and Powershell.
- Worked in Agile environments using standard industry tools: Git, Jira, Bitbucket.

Work Experience

Firmware developer   Jan 2022 to
Zimmer Biomet Montreal, Quebec   Jan 2023
Consultant under Actalent, Allegis group

- Firmware developer for a new ultrasound guidance device sub-system for a robotic surgery system. The robot helps surgeons perform knee replacement surgeries. The ultrasound guidance system is a belt that will track the femur and tibia in 3 dimensional space and alleviate the need for more invasive methods of spatial tracking.
- The new device connected to a standard Linux desktop system through a USB interface. My primary task was to develop the Linux USB device drivers and other host system

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modules for control and data transfers with the device. I was also tasked with developing the application programming interface used by the ultrasound engineers to use the device.

- The device was a reference design by a major integrated circuit maker. The reference design incorporated their ultrasound integrated circuits and a Xilinx Artix 7 FPGA for control and data transfers. I had to reverse engineer the existing FPGA design to determine the control and data transfer protocols.
- The hardware/firmware design included a high-speed USB port, UART and SPI communication between ICs, and a high speed 32 bit synchronous slave FIFO connection between the FPGA and the Cypress FX3 USB IC.
- I implemented many changes to the FPGA firmware in VHDL at the register transfer level to accomplish the project's control and data transfer requirements. I developed many simulation testbenchs in VHDL. I also developed many live system tests for the complete host and device system.
- I implemented the ultrasound sound image reconstruction algorithm on GPU on the Linux host system in C++ and CUDA.
- FPGA firmware development was accomplished with Xilinx Vivado and Artix-7 FPGAs.
- Host applications and drivers were developed on Linux systems with standard and Linux libraries. Projects were managed with makefiles.
- The project was system level in scope with many software and firmware layers communicating with each other and operating under time and performance constraints.
- All development was accomplished in C, C++, and VHDL.
- The project employed Agile methodology.

Software designer   Jul 2018 to
Matrox Electronic Systems, Dorval, Quebec   Dec 2021
- Software developer with the Video Products Group.
- Member of an engineering team developing device drivers, system level software, and a software development kit (SDK) for real-time broadcast quality video co-processor cards for Windows and Linux based systems.
- The platforms were FPGA based co-processor cards which connected to the host computer systems through PCIe x8 and x16 interfaces. We worked closely with the digital design team and other hardware teams to develop the device drivers to integrate and to control the cards in Windows and Linux operating system environments. We also developed the application programming interface used by our original equipment manufacturer clients to control the video cards.
- The product adhered to numerous official standards defined by the Society of Motion Picture and Television Engineers (SMPTE). Certain variants of the cards transmitted over Internet Protocol, which also adhered to more general IP networking standards.
- The project employed Agile methodology with 3 week long sprints. We worked closely with the product managers, the hardware engineers, the testing group and the application engineers to advance the product's capabilities according to schedule while satisfying quality requirements. We spent two thirds of our time developing new features, and one third of our time fixing and improving issues reported by our clients. Our work was organized using Jira Scrum boards and Kanban boards. We used Git with Git Extensions and Bitbucket for version control.

- The software modules were 90% written in C++. 70% of those modules were kernel driver modules and 30% were user space modules. We were also responsible for creating and supporting automated testing applications and manual testing applications used by the testing team and our original equipment manufacturer clients. Some of the testing applications included graphical user interfaces. Besides C++, the testing applications were developed with Java, MFC, Powershell, and Bash.

Store clerk   Aug 2008 to
Virginia Department of Alcoholic Beverage Control, McLean, VA   Mar 2009
                                                                                       (8 months)

- Cashier, inventory, and maintenance.

Office coordinator   Mar 2003 to
E-TRADE Financial, Arlington, VA   Aug 2003
                                                                                       (6 months)

- Coordinator for a mortgage underwriting department for secondary mortgage market.
- Communication with vendors, filing, data processing, and office services.

Shift manager, minor automotive technician, and station attendant   Aug 2001 to
Chevron Gas and Service Station, McLean, VA   Mar 2003
                                                                                (1 year, 8 months)

- Cashier, inventory, and store maintenance.
- Minor automotive repair and maintenance.
- Training and supervising new employees.

Skills and Assets

Computer languages: C++, C, VHDL, SQL, Powershell, Python, Java.

Languages:
- English, fluent, spoken and written.
- French, fluent, spoken and written.
- Arabic, conversational knowledge, spoken but not written.

Citizenship:
- Canadian citizen since 1986.
- United States citizen since 2009.

Candidate to the Engineering profession with the OIQ (Ordre des ingénieurs du Québec)
Admitted as a candidate in December 2019. On track to being admitted as a full member. OIQ number: 6027086.

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Awards

1st place at the Hovercraft Design Project competition
Concordia Electrical and Computer Engineering Department, Fall of 2016.

Technical Hobbies

General purpose computing applications on Linux systems
- C/C++ user applications developed with Eclipse CDT as makefile projects
- GTK/gtkmm front ends
- systemd services
- SQLite databases
- Socket communication
- LAMP remote servers (Linux, Apache, PHP, MySQL)
- The use of various free and open source libraries: Lucene, OpenSSL, Crypto++, libcurl, libsoup, JsonCpp, etc.

Embedded IoT projects with Arduino.

Technical School Projects

Capstone Computer Engineering Design Project (COEN 490)   Fall 2017-
                                                                                                                                    Winter 2018

- Hydrogen fuel cell power storage and management system.
- Cyber-physical system integrating real-time control, power management and performance tracking.
- The real-time aspect of the system was comprised of a 2 kW hydrogen fuel cell, a Texas Instruments LM5170 bidirectional current controller for dual voltage systems, a Texas Instruments C2000 real-time control microcontroller, and a super-capacitor for power storage.
- The goal was to stabilize the current drawn from the generator at the optimal level by storing excess power in low demand times and supplementing with power from storage in excess demand times.
- The project also had a user application aspect. The system controller (the TI C2000 MCU) was connected to a Bluetooth Low Energy module for wireless communication with a Universal Windows Platform (UWP) application (C#, XAML) running on a Bluetooth enabled PC.
- The remote application could receive telemetry data from the power control system and could also change settings on the power control system.

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Computer Engineering Product Design Project (COEN 390)　　　　　Winter 2017
- Project was under the supervision and assistance of the Montreal start-up Sensequake.
- Building/infrastructure structural integrity monitoring system integrating a mobile application and a sensor node using Bluetooth Low Energy communication.
- The sensor node was an Arduino Bluetooth enabled micro-controller with an attached high precision Analog Devices accelerometer to acquire vibration data from building structures.
- The sensor data was transferred via Bluetooth to an Android application on a smart phone for long term storage and later signal analysis.

Introductory Engineering Team Design Project (ENGR290)　　　　　Fall 2016
- Designed and implemented a hovercraft with commercially available components.
- Sub-system requirements and design (power, control, propulsion, lift) were developed using Matlab and Simulink models and programs.
- Awarded 1st place prize in the final competition.