Jakub Jan **Duchniewicz**

Software Engineer · Embedded and Game Engine Developer

+48 695 671 937 | j.duchniewicz@gmail.com | www.jduchniewicz.com | JDuchniewicz | jduchnie

Summary

I recently graduated with M. Sc. in Embedded Systems at KTH Royal Institute of Technology, Stockholm and University of Turku, Finland. My experience ranges from embedded and systems programming, through FPGAs, audio/video processing, game engine development to Machine Learning and DevOps. I am proficient with C++98-17 and C89-20 in video/sound processing, networking and real-time or multiprocess systems.

Currently my focus is in the area of embedded Machine Learning, Rust language and Embedded Health applications. Being a team player, I often mentor other people, be it at work or during game jams/hackathons. I often share my knowledge on my personal website via blog posts.

Education

EIT Digital Master School

Europe

M.Sc. in Embedded Systems

Sept. 2020 - Nov. 2022

- Holder of EIT Excellence Scholarship
- Winner of Digital Health Summer School with ”Medpipe” - personalized tracker for recovery in endoprosthetic surgeries.

KTH Royal Institute of Technology

Stockholm, Sweden

M.Sc. in Embedded Systems

Sept. 2021 - Nov. 2022

FPGA accelerated packet capture with eBPF.

- Implemented packet capturing offload from Linux network stack to FPGA.
- Implemented Avalon MM host and target with bursting and stalling capabilities.
- Patched stmmac Ethernet driver to accelerate ingress packets on FPGA.
- Wrote userspace .pcap capturing and testing programs.
- Tested the solution using ModelSIM and SignalTap simulators.
- Achieved performance gains while maintaining power consumption.

University of Turku

Turku, Finland

M.Sc. in Embedded Systems

Sept. 2020 - Aug. 2021

Warsaw University Of Technology

Warsaw, Poland

B.Sc. in Computer Science and Networks

Oct. 2016 - Aug. 2020

FPGA based hardware accelerator for musical synthesis for Linux system.

- Nomination to IEEE Polish Diploma Contest
- Implemented DDS sythesis, filtering and sample accumulation in Verilog in a streamlined fashion.
- Implemented polyphony and various waveform shapes.
- Synchronized the programmable logic with the MCU.
- Deployed the solution in the De0 Nano SoC FPGA.
- Implemented Linux kernel drivers for communication with the FPGA and ALSA subsystem.
- Implemented the ALSA soundcard driver.
- Wrote userspace application for communicating MIDI commands to the FPGA via a kernel driver.
- Tested the solution to ensure smooth and high-fidelity sound.

Experience

TietoEVRY

Remote

Embedded and Software Engineer

Dec. 2021 - Present

- Leading, supporting and coaching a team of engineers.
- Development and maintenance of ORAN compliant FlexRAN fork.
- Implementation of novel ORAN features in translation module between IAPI and FAPI.
- Architected, planned and implemented L2 ORAN compliant application in C++.
- Ported FlexRAN project from icc to icx compiler.
- Fuzzing of L1-L2 interface in FlexRAN with libfuzzer.
- Debugging and fixing issues found in DPDK drivers.

Google Summer of Code, beagleboard.org

Remote

Embedded Software Engineer

May. 2021 - Aug. 2021

- Using OpenGL ES 2.0 and EGL for GPGPU computation accelerations on BeagleBone Black with SGX 5xx GPU's.
- Wrote library in C which makes these computations easier.
- Implemented most popular computations (scalar operators, array operations, 2D convolution).
- Wrote both single-shot and chain API (for combining computations).
- Benchmarked the library on various data sizes.
- Documented the project on a blog.

Samsung Electronics

Warsaw, Poland - Suwon, South Korea

Junior Software Engineer

Feb. 2018 - Mar. 2020

- Improved Tizen Operating System Broadcast middleware (C++/C/Arm assembly).
- Managed performance in an embedded system, through code restructurization and thread-wise code improvement.
- Improved performance of code in major broadcasting pipelining module by aware refactorization and smart usage of C++17 STL and Boost library.
- Improved overall health of code, by analysis of coredumps and various system logs. When deemed necessary provided other teams with ready solution.
- Developed from scratch a multithreaded C and C compliant middleware process, with custom threaded work queue implementation.
- Worked with version control tools (git, p4) and in an agile environment (scrum).
- Developed bash and python scripts aiding development and analysis of problems.
- Developed python utility program for automation of defect analysis.
- Traveled to South Korea to aid with defects management during commercialization and to offer quick support.
- Worked in a diverse multi-cultural environment (directly with a group of 30 people), giving helping hand those who needed it.

Samsung Electronics

Warsaw, Poland

Intern

Dec. 2017 - Feb. 2018

- Supported in project management and knowledge transfer from other R&D Institute.
- Based on good performance and analytical skills got an offer for full-time work.

BoSport/Beskid Ski Arena

Chałupy/Szczyrk, Poland

Kite/Wind/Ski Instructor

Jun. 2014 - Sep. 2017

- Worked with all kinds of people, teaching them and maintaining good relations througout the years following.
- Taught in various changing conditions, always taking responsibility for life of others.
- Taught in both Polish and English in groups up to 10 people.

Extracurricular Activity

BIBoP

Warsaw - Poland

Programming and Electronics Lead

Mar. 2021 - Jun. 2021

- Wrote project architecture and data collection from sensors.
- Created a ML model for Blood Pressure predictions from PPG.
- Deployed the model on AWS Lambda with custom hooks.
- Implemented networking over MQTT protocol.
- Soldered and assembled the prototype.
- Designed and soldered analog Galvanometer.

Envidrawer

Warsaw - Poland

Programming and Electronics Lead

Sept. 2020 - Jan. 2021

- Designed a sustainable, automated plant growing solution working in varying climate conditions.
- Programmed a sensor-monitoring system and a visualisation web-based service.
- Designed and implemented an analog control ciruit as well as 12 V powering circuit.
- Nurtured friendly atmosphere and healthy work-life balance during the project with 2 other members.

BEYOND 2030 Challenge

Turku - Finland

Mentor

Oct. 2020 - Nov. 2021

- Guided a group of 2 high-school students in their environmentally sustainable project - Smart bee-hive.
- Provided support in technical and project management matters.
- Gave support where needed, pulling the students instead of pushing.

PolyEngine *Warsaw - Poland*

Developer *Oct. 2017 - Present*

- Reimplemented Entity Component System systems.
- Refactored code and cleaned architecture of engine.
- Developed various necessary features during gamejams (both gameplay and engine-wise).
- Developed 3 games during Global Game Jam 18/19 and Slavic Game Jam 18.
- Developed efficient data structures for a game engine: string and queue with STL compliance.

KNTG Polygon *Warsaw - Poland*

Vice President and Event Organiser *Oct. 2017 - Jun. 2019*

- Organised weekly meetings for student game development group Polygon.
- Gave two talks on Modern C++ usage and easily overlooked nuances.
- Planned and realised two 4-meeting editions of Game Dev Fest: invited lecturers and managed sponsorship of both events.
- Managed sponsorship funds and promotion of both events.
- Helped organise game jams (Polyjam 2018/2019).

Skills

Programming	C++{98,11,14,17,20}, C{89,99,11,17}, C#, Rust, ARM/x86 assembly, AVX2/512, Python, Bash, Verilog, SystemVerilog, VHDL, OpenGL ES, Make, CMake, LaTeX
Technical	FPGA, Electronics, Microcontrollers, Bootloaders, SoC, RTOS, Linux Kernel, DSP, ROS, CUDA, PyTorch, Deep Learning, DSP, Hardware Accelerators, GPGPU, Network Stack, 5G L1/L2, DPDK, Fuzzing, IoT, Compilers, Game Engine Architectures
Languages	Polish, English, German, Spanish

Honors & Awards

2021 **Winner - Best Enterpreneurial Team**, EIT Digital Summer Health SChool 2021 *Talinn, Estonia*
"Medpipe" - an application that will help people managing their treatment timeline and supporting materials (diet, exercises, lifestyle) before and after surgery.

2019 **Honorable mention**, Warsaw Film School Game Jam VI *Warsaw, Poland*
"Eternal Feud" - Low-poly, competitive co-op, made in a duo team.

2018 **Honorable mention**, Static Code Analysis Competition - Samsung Electronics *Global*

2017 **2nd Place Overall, 2nd Place in Innovation**, Polyjam, Global Game Jam 2017 *Warsaw, Poland*
"Ommm" - Controlling a monk with the power of your voice.