

# Jakub Jan Duchniewicz

SOFTWARE ENGINEER · EMBEDDED AND GAME ENGINE DEVELOPER

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## Summary

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I am a student of Embedded Systems Master Degree 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 C89-17 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

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### EIT Digital Master School

Europe

M.Sc. IN EMBEDDED SYSTEMS

Sept. 2020 - Present

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

### KTH Royal Institute of Technology

Stockholm, Sweden

M.Sc. IN EMBEDDED SYSTEMS

Sept. 2021 - Present

### 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 synthesis, 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

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### TietoEVRY

Remote

SOFTWARE ENGINEER

Dec. 2021 - Present

- Development of FlexRAN 5G solution.
- Implementation of L1 related features.
- Implementation of L2 related features.

### 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

Chatupy/Szczyrk, Poland

KITE/WIND/SKI INSTRUCTOR

Jun. 2014 - Sep. 2017

- Worked with all kinds of people, teaching them and maintaining good relations throughtout 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

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### 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 circuit 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

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### Programming

C++{98,11,14,17}, C{89,99,11,17}, C#, Rust, ARM/x86 assembly, Python, Bash, LaTeX, Verilog, SystemVerilog, VHDL, OpenGL ES

### Technical

FPGA, Electronics, Microcontrollers, Bootloaders, SoC, RTOS, Linux Kernel, DSP, ROS, CUDA, PyTorch, Deep Learning, DSP, Hardware Accelerators, GPGPU, Network Stack, 5G L1/L2, IoT, Compilers, Game Engine Architectures

### Languages

Polish, English, German, Spanish

## Honors & Awards

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|------|---|-----------------|
| 2021 | <b>Winner - Best Entrepreneurial Team</b> , EIT Digital Summer Health School 2021<br>“Medpipe” - an application that will help people managing their treatment timeline and supporting materials (diet, exercises, lifestyle) before and after surgery. | Talinn, Estonia |
| 2019 | <b>Honorable mention</b> , Warsaw Film School Game Jam VI<br>“Eternal Feud” - Low-poly, competitive co-op, made in a duo team.  | Warsaw, Poland  |
| 2018 | <b>Honorable mention</b> , Static Code Analysis Competition - Samsung Electronics   | Global          |
| 2017 | <b>2nd Place Overall, 2nd Place in Innovation</b> , Polyjam, Global Game Jam 2017<br>“Ommm” - Controlling a monk with the power of your voice.  | Warsaw, Poland  |