

# Rytis Karpuška

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## About me

Since my childhood I was interested in exact sciences like math, physics, etc. When I was 11-12 years old, physics attracted me the most, however, over time, electronics became the most interesting branch to me. I started soldering simple devices like LED blinkers, audio amplifiers etc. Few years in, I came across microcontrollers and after writing my first assembler "program" which was capable of turning on LED - I got hooked on programming. This was turning point in my life. Since then, I have been working on projects related to programming in professional and hobby settings constantly.

## Education

**2011 - 2015** University of Vilnius Bachelors degree in Software Engineering - University of Vilnius  
First and second semesters - 90+% Average

**2011** Andrew Ng online course "Machine Learning". <http://ml-class.org>

## Professional experience

**2011 - 2015** JSC "Elektromotus", Žirmūnų g. 68, Vilnius, Lietuva  
*Architect, Software engineer*

**2015 - now** JSC "Neurotechnology", Laisvės pr. 125A, Vilnius, Lietuva  
*Software engineer*

## Projects

**2007** Obstacle avoiding robot for "Infobalt 2007" exhibition.  
<http://blog.elektronika.lt/robotai/2007/10/28/reportazai-is-infobalt2007/>  
This is one of the most interesting works from my early ages. Robot was controlled by AVR ATmega microcontroller and had some IR sensors for obstacle detection.  
**Technologies:** AVR, GCC.

**2011 - 2012** Battery Management System "Emus BMS"  
<https://emusbms.com/product-category/g1-control-unit>  
This Battery Management System is JSC "Elektromotus" product. I was one of the main programmers of this system in 2011. One of the most notable uses of this system is "ACCIONA" team in Dakar rally.  
**Technologies:** AVR, svn, GCC, Linux, Qt4.

- 2012 - 2013** Electric "Smart fourtwo" conversion kit ECU.  
<http://grynas.delfi.lt/tv/lietuviu-perdarytas-elektromobilis-100-km-nuvaziuoja-uz-7-litus.d?id=61776195>
- During this JSC "Elektromotus" project electric conversion kit for "Smart fortwo" car has been developed. I have designed and programmed firmware for main ECU unit which controlled engine, gearbox, cooling and communicated to other systems over CAN bus.
- Technologies:** ARM-Cortex M3, Linux, GCC, git, CAN.
- 2014 - 2015** Sensor network for Norwegian railways contact wire monitoring.  
<https://www.sciencedirect.com/science/article/pii/S2214399816300121>
- During this JSC "Elektromotus" project a custom wireless sensor network system has been developed for acceleration and rotation measurements of contact wire. Due to high requirements for power consumptions - custom variable latency radio network protocol has been developed to allow radio hardware to be in low-power mode most of the time. Modified version of sliding window protocol has been implemented to allow reliable data transmission over the network. Communication stack has been implemented in ARM Cortex-M3 and also as a linux kernel device driver. The whole system has the ability to be controlled over the internet.
- Technologies:** ARM-Cortex M3, Linux kernel device drivers, GCC, git, MEMS, 2.4Ghz radio, Raspberry pi, GSM, VPN, VPS.
- 2016 - now** MegaMatcher Accelerator Cluster  
<https://www.neurotechnology.com/megamatcher-accelerator.html>
- During this JSC "Neurotechnology" project, large scale distributed biometric identification system was developed based on principles of Virtual Synchrony model and Neurotechnology's proprietary biometric algorithms. Linear scalability has been achieved in capacity and speed with cluster sizes up to 30 nodes. The cluster is capable of storing 160 million records (10 fingerprints per record) while matching at the speed of 300 million records per second when used without GPU acceleration. The system is a CP system which achieves sequential consistency on per subject basis at the cost of being unavailable if quorum is lost. Separate asynchronous replication protocol was implemented to provide weaker consistency guarantees, but achieve high availability.
- Technologies:** Linux, Docker, Kubernetes, helm, C++, mysql, corosync.

## More notable contributions to open source projects

### ■ OpenAPI

Multiple contributions to OpenAPI C++ code generator:

- <https://github.com/OpenAPITools/openapi-generator/pull/732>
- <https://github.com/OpenAPITools/openapi-generator/pull/731>
- <https://github.com/OpenAPITools/openapi-generator/pull/640>
- <https://github.com/OpenAPITools/openapi-generator/pull/631>

### ■ Corosync

Multiple contributions to Corosync Cluster Engine:

- <https://github.com/corosync/corosync/pull/335>
- <https://github.com/corosync/corosync/pull/321>
- <https://github.com/corosync/corosync/pull/320>
- <https://github.com/corosync/corosync/pull/300>
- <https://github.com/corosync/corosync/pull/297>

## ■ Zookeeper C++ client library

Multiple contributions to zookeeper-cpp library

- <https://github.com/tgockel/zookeeper-cpp/pull/111>
- <https://github.com/tgockel/zookeeper-cpp/pull/110>
- <https://github.com/tgockel/zookeeper-cpp/pull/109>

## ■ Picom

Implementation of a new feature for X11 compositor which helps to lower eye strain

- <https://github.com/yshui/picom/pull/247>

# Skills

## Tools and Technologies

- Docker, Linux namespaces
- Kubernetes, Helm
- Apache kafka, Apache zookeeper
- MySQL, Galera
- Jenkins
- git, svn
- Bash
- GCC, GDB, GNU make, cmake
- Linux, Debian

## Programming languages

- C, C++
- Assembler
- Python
- Bash

## Embedded Systems

- STM32F series microcontrollers
- Atmel AVR series microcontrollers
- Cross-compilation with GCC, GDB

# Interests

- Large scale distributed computing, Open Source, Embedded systems, Linux
- White hat hacking and CTF competitions: <https://ctftime.org/user/75218>
- "Encounter" urban games: <http://vilnius.en.cx/UserDetails.aspx?uid=1405002>