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 berely 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

Experience

2007   Hobby project

- **Obstacle avoiding robot for "Infobalt 2007" excibition**

  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, Servo.

  Reference: `http://blog.elektronika.lt/robotai/2007/10/28/reportazai-is-infobalt2007/`

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

- **Battery Management System "Emus BMS"**

  This Battery Management System is JSC "Elektromotus" product. I was one of the main developers of this system in 2011.

  Technologies: AVR, svn, GCC, Linux, Qt4.

  Reference: `https://emusbms.com/product-category/g1-control-unit`

- **Electric "Smart fourtwo" conversion kit ECU.**

  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.

  Reference: `http://grynas.delfi.lt/tv/lietuviu-perdarytas-elektromobilis-100-km-nuvaziuoja-uz-7-litus.d?id=61776195`

- **Sensor network for Norwegian railways contact wire monitoring.**

  During this JSC "Elektromotus" project I and one of my colleagues developed a custom wireless sensor network system for acceleration and rotation measurements of contact wire. Due to high requirements for power consumption - we developed custom variable latency radio network protocol to allow radio hardware to be in low-power mode most of the time. The system was capable of measuring and reporting data for over a week on single charge even if sensors are scattered over 1 km range.

  Technologies: ARM-Cortex M3, Linux kernel device drivers, GCC, git, MEMS, 2.4Ghz radio, Raspberry pi, GSM, VPN, VPS.

  Reference: `https://www.sciencedirect.com/science/article/pii/S221439981630012` `1`

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

- **MegaMatcher Accelerator Cluster**

  During this JSC "Neurotechnology" project, I, together with one of my colleagues, developed large scale distributed biometric identification system on principles of virtual synchrony model and Neurotechnology's proprietary biometric algorithms. We achieved linear scalability in capacity and speed with cluster sizes up to 30 nodes. The cluster is capable of storing 1.6 billion fingerprint records while matching at the speed of 3 billion fingerprints per second when used without GPU acceleration. Other modalities, like Face and Iris are also supported. The system has been successfully deployed for multiple countries national ID and border control projects.

  Technologies: Linux, Docker, Kubernetes, helm, C++, mysql, corosync, Neurotechnology Biometric SDK.

  Reference: `https://www.neurotechnology.com/megamatcher-accelerator.html`

Skills

Tools and Technologies

- Docker, LXC

- Kubernetes, Helm

- Apache kafka, Apache zookeeper

- MySQL, Galera

- Jenkins

- git, svn

- 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

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`

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`