Nikolay Efanov

Over 10 years in computer science and software engineering.
PhD in mathematical modeling, numerical methods & packages (2020).

141701 Pervomayskaya Street
Dolgoprudny, Moscow Region
(916) 091-11-08
nefanov90@gmail.com

EXPERIENCE

Huawei Moscow Research Center, System Engineering Lab — Senior Software Engineer / *Group Leader*

September 2016 - PRESENT

Sre Perf Tool project (2020):

- Architecture design and development of performance monitoring tools for SRE OS.

Model-Based Performance Engineering project (2020-2021):

- Construction and evaluation of statistical and topological models for static software performance prediction
- Development of approaches to design of performance models from complex software packages
- Implementation of static performance predictor POC using IR2Vec flow-aware embedding model.

X Compiler - OpenArkCompiler project (since 2021):

- Group leading, project works coordination
- Implementation of compiler features end-to-end: intrinsics, extra floating-point data types, etc
- Compiling infrastructure improvement
- Frontend improvement for C99/GNU extensions support
- Benchmarking, testing, code delivery/review.
- Interns supervising

Another activities (continuously):

- Article reviews
- Coordination of work with MIPT base department
- Participation in Math and Algorithm RRI Commitees
- Participation in cooperations and workshops

Moscow Institute of Physics and Technology, Department of Multimedia Technologies and Telecommunications — *Associate Professor*

September 2021 - PRESENT

Students supervising; planning of research tracks and courses for the department. Coordination of cooperations with Huawei RRI.

RESEARCH SKILLS & ACTIVITIES

High Math, Physics, Theoretical Mechanics and Physics courses - at PhD / MIPT graduate student level.

Professional research interests:

- Discrete analysis
- Poset algebras, lattices, graphs and their applications to computing
- Graph rewriting systems
- Formal languages theory, algorithms, applications for graphs path-queuing
- Modern principles of parallel computing and concurrency
- Computer vision and applied optics
- Communication systems

PROGRAMMING SKILLS

- Python, C, C++ Programming
- Software engineering
- Userspace programming using OS and architecture instruments and features.
- Linux Kernel, FreeRTOS
- System Programming
- Embedded Systems
- Parallel programming
- Data analysis, statistical modeling

(See extended list of skills below).

Moscow Institute of Physics and Technology, Department of Informatics — *Associate Professor (since 2021; in 2016-2021 — teaching assistant)*

September 2016 - PRESENT

Students / PhD student supervising; planning of research tracks for the department (also joint with Department of Theoretical and Applied Informatics).

Faculty Courses Lecturer:

- Programming basics (C language, 2016)
- Computer Architecture basics (ARM/x86 architectures, 2017)
- Operational Systems Basics (Since 2017)
- Computer Technologies, 4th term (Since 2021)
- Theory of Formal Languages on Practice (Since 2022) (self-developed facultative)

Author's Course on MIPT "CDPE" platform (Distant):

- Fundamentals of reverse engineering and programs optimization for ARM architecture: https://mipt.ru/cdpo/programs/software/supervised_learning.php?ELEMENT_ID=1845794

Moscow Institute of Physics and Technology, Digital Special Purpose Systems Lab — *Software Developer*

September 2017 - 2019

- DSO SLAM algorithms research and experiments
- Control system development for self-driving car
- Hybrid optics calibration system development
- Multi-modem system routing software development
- OpenCV and ffmpeg-based computer vision tasks
- Development of orchestration system for machine learning experiments: GPU tasks scheduling, database and statistics collecting
- Backend developer (Django, Flask)

Research under the InfoTeKS-Academy grant, "Study of safe character input from keyboards" — *Researcher/Developer.*

June 2016 - January 2017

Research on input injections in modern Linux Kernel-based OS and development of 2 anti-keylogger input solutions; X-Server patching.

Virtuozzo, Storage Team — *Junior Software Developer*

January 2016 - July 2016

Distributed storage development: iSCSI drivers adaptation; Docker

LANGUAGES

Russian, Ukrainian - native, English - MIPT basic PhD course + "Advanced & speaking skills (MIPT)"

Swarm integration.

Parallels, Core Team — *Junior Software Developer*

June 2014 - January 2016

ARM Virtualization tasks (basically, periphery support):

- Development of Net-over-USB emulation (SMSC95xx-based)
- Minor bug fixing in network/USB subsystems

Parallels MIPT LAB, DPM project — *Researcher*

July 2013 - January 2014

Research on dynamic power management under the Ministry of Education grant:

- Research of Dynamic Power Management for cloud systems
- Research of HDD Dynamic Power Management

Institute of Space Research (RAS), O.L.Vaisberg's group — *Researcher*

January 2013 - August 2013

Tasks on wide-angle ion optics modeling and data analysis:

- Ion optics modeling (with Matlab, SimIon etc)
- Decoding and processing data from "MARS-96" mission

Crimean Astrophysical Observatory — *Developer, laboratory assistant*

June2009 - July 2010

Tasks on solar telescope automation and data processing :

- BST-2 telescope automation
- Development of "fast" filters for spectral data processing

EDUCATION

Moscow Institute of Physics and Technology, Dolgoprudny — *PhD*

October 2016 - June 2020

Department of Informatics and Computational Mathematics

Moscow Institute of Physics and Technology, Dolgoprudny — *Master of Science*

September 2014 - July 2016

Department of Theoretical and Applied Informatics

Moscow Institute of Physics and Technology,
Dolgoprudny —Bachelor

September 2010 - July 2014

Department of Applied Mechanics

Tavrida National University, Simferopol — *Bachelor (Incomplete)*

September 2007 - June 2010

Department of Applied Mathematics

Math and CS Skills

- MIPT courses background: Mathematical and Functional Analysis, Computational Mathematics, Theoretical Mechanics and Physics etc.
- Knowledge of Discrete analysis, Data structures, Algorithms and Complexity theory.
- Researches on a list of CS and applied discrete math directions for:
    - dynamic power management systems
    - reconstruction formalisms for checkpoint-restore
    - applied algebras, operations reconstruction
    - algorithms of syntactic analysis (including graph reachability and graph-rewriting systems)
    - statistical software performance prediction & analysis
- List of publications: https://raw.githubusercontent.com/nefanov/about_me/master/publications.md
- Patents: https://raw.githubusercontent.com/nefanov/about_me/master/patents.txt

    Scopus ID: 57200398623

    https://www.researchgate.net/profile/Nikolay_Efanov

    mathnet: http://www.mathnet.ru/rus/person140046

    Google Scolar: https://scholar.google.com/citations?user=CzqvqtMAAAAJ

Software Engineering Skills

<u>Programming:</u>

Userspace programs: knowledge and experience in IPC, network, parallel programming, communication with periphery, backend-programming.
System, Kernel and Embedded programming: knowledge of some principles and experience in system and virtualization technologies, In-kernel perf using PMU Counters

<u>Programming Languages:</u>

Python, C, C++, (ba,z)sh, C#, Go, Lua, Matlab, Flex/Bison, Verilog etc.

<u>Compilers:</u>
LLVM/Clang: usage in different projects, optimizing passes writing.
OpenArkCompiler: key features implementation / contribution to mainstream.

<u>Operating systems:</u>

Unix-like (mostly Linux and FreeRTOS-based) - kernel (modules, drivers) / userspace development, IPC, multiprocessing & multithreading, network, periphery.

Windows - Userspace, IPC, parallel programming; little experience with drivers, system services,

reverse-engineering.

<u>Processor architectures:</u>
- x86, ARM, principles of virtualization and vector submodules.
- Little experience with VLIV (Elbrus) and CUDA.

<u>Communication protocols:</u>
- OSI Model / Linux TCP/IP stack programming experience, net device emulation experience.
- USB, UART, CAN.

<u>Data analysis & machine learning:</u>
- Python (anaconda, spyder): numpy, pandas, scipy, scikit.learn.
- ML: caffe, (a bit) keras and theano.

<u>Team work & revision control systems:</u>
- Git, SVN, DVC (for ML)
- Youtrack/Atlassian products

Author's Projects
- Pathfinder: CFL-R infrastructure for code static analyzers https://github.com/mipt-cs/pathfinder
- Generalized framework for correct process tree reconstruction
- IR2Vec for static cache usage predictor
- KPS/VIS - solutions on safe keyboard input