

# Paul Irofti

Lecturer PhD  
Operating Systems  
Antivirus Technologies  
Security Applications  
Signal Processing  
GPU Parallel Algorithms

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## Education

Ph.D. in Systems Engineering,  
thesis "*Parallel Dictionary Learning Algorithms for Sparse Representations*",  
Polytechnic University of Bucharest, Bucharest, 2011–2015  
  
Engineer, Computers and Automata Faculty,  
Polytechnic University of Bucharest, Bucharest, 2003-2008  
  
Mathematics and Computer Science, Saint Sava National College, Bucharest, 1999-2003  
  
Waldorf School, Bucharest, 1991-1998

## Fields of Interest

Reverse Engineering, Static and Dynamic Analysis, Operating Systems,  
Signal Processing, Parallel Algorithms

## Experience

### *University of Bucharest*

Lecturer in the Department of Computer Science at the Faculty of Mathematics and Computer Science,  
February 2018 – Present

### *Politehnica University of Bucharest*

Postdoc at Faculty of Automatic Control and Computers, "Implementation and development of algorithms for the dynamic motion planning of robotic systems", CEC 2017 project, 2017

- Navigation algorithms for robotic systems
- Generate trajectories which fulfill optimally costs
- ROS-based Gazebo implementation for TurtleBot

Postdoc at Faculty of Automatic Control and Computers, "Set-theoretic approaches for fault tolerant control of complex systems", TE 2015 project, September 2015 - December 2017

- Sensor placement using sparse representations and dictionary learning
- Applications in water distribution networks

Research Assistant at Faculty of Automatic Control and Computers, "Sparse representations in signal processing", IDEI 2011 project, January 2014 - September 2016

- Parallel algorithms for sparse and redundant representations for dictionary learning and training
- Applications in image processing (reconstruction, compression, noise reduction etc.)
- Heterogenous implementations on the GPU and CPU via OpenCL

*FileMedic*

Project Lead: AntiMalware Emulator Implementation, 2011-2013  
Build, Test and Report Infrastructure, autumn 2011 - spring 2012  
Internal Telephony Infrastructure Setup, spring 2011  
Static Antivirus Engines Development, winter 2010 - 2011  
Developing a Generic Server/Router Security Solution, 2010

*OpenBSD*

ACPI resource parsing improvements, autumn 2016  
Intel Extreme Tuning driver acpibtu(4), autumn 2016  
Flash memory driver conforming to CFI specifications, summer 2015  
Octeon-specific driver for the USB Host Controller Interface, summer 2014  
Broadcom PHY driver for BCM53115 found on the Octeon DSR-500, spring 2014  
Driver implementation for the DS1337 TOD clock for the Octeon platform, winter 2014  
USB device drivers clean-up, autumn 2014  
Driver implementation for the hardware random number generator on the Octeon platform, autumn 2014  
Porting OpenBSD to the Octeon-based D-Link DSR-500, summer 2013  
Hibernate support for the Loongson platform, summer 2013 (work in progress)  
Statistic clock support for the Loongson platform, winter 2013  
CPU scaling support for the Loongson CPU, 2010-2013  
Porting the System for the Itanium Platform, 2011 (work in progress)  
Futex Implementation, summer 2011  
Expanding the Emulation Layer for Linux Binaries, 2010-2011  
Suspend/resume support for the Loongson Platform, 2010-2011  
Porting Mathematical Applications: Octave, GiNaC, CLN and others, 2009-2010  
Driver Implementation for Sony Specific Functionality, acpisony(4), 2010  
Generic Kernel Framework for suspend/resume, 2009-2010  
Expansion of the Device Autoconfiguration Framework, autumn 2009  
Real-mode Emulator Kernel Integration for the Video BIOS, 2009  
Driver Implementation for Power Resource Management, acpipwrres(4), summer 2009  
Driver Implementation for Video Adjustment, acpivout(4), 2008 - summer 2009  
Driver Implementation for Multiple Video Output, acpivideo(4), 2008 - summer 2009  
ACPI Framework Development, 2008-2010

*BitDefender*

64-bit JIT support for the emulator, summer 2010  
IEEE 754 Floating Point Support, 2010  
Themida Unpacker, 2009  
Native Decryption methods for SVKP unpacking, spring 2009

Vmprotect Unpacker, winter 2008-2009  
 API Emulation: VB.NET, VBScript, 2008  
 tELock Unpacker, summer 2008

### *Unidec*

Project Lead: Implementing a Generic Telephony-server Solution, 2007-2008  
 IVR Implementation, 2007  
 VoIP Protocol Implementation (IAX2, SIP), 2006  
 VoiceMail Solutions Development for NEC America, 2005-2006

## Collaborations

MTier, Oil Industry: Native Binary Emulation of Linux Executables on OpenBSD, 2010, 2012  
 Bitfusion.io, I.T. Supercomputing Industry: Optimization and scaling of OpenCL workloads, 2015  
 Parta, I.T. Security Industry: Driver implementation and application porting for OpenBSD, 2014, 2015

## Scholarships and Research Grants

BRD Data Science Research Fellowships, 2019  
 BSD Fund: Futex Implementation for OpenBSD, 2011

## Academic Research

### *Publications*

#### **Books**

1. B. Dumitrescu and **P. Irofti**, *Dictionary Learning Algorithms and Applications*, Springer, 2018

#### **Journal**

1. F. Stoican and **P. Irofti**, "Aiding Dictionary Learning Through Multi-Parametric Sparse Representation," *Algorithms*, vol. 12, no. 7, pp. 131, 2019
2. B. Dumitrescu and **P. Irofti**, "Regularized K-SVD," *IEEE Signal Processing Letters*, vol. 24, no. 3, pp. 309–313, March 2017
3. **P. Irofti**, "Efficient Parallel Implementation for Single Block Orthogonal Dictionary Learning," *Journal of Control Engineering and Applied Informatics*, vol. 18, no. 3, pp. 101–108, 2016
4. **P. Irofti**, "Efficient Dictionary Learning Implementation on the GPU Using OpenCL," *U.P.B. Scientific Bulletin, Series C*, vol. 78, no. 3, pp. 39–50, 2016

#### **Conference**

1. **P. Irofti** and A. Băltoiu, "Malware Identification with Dictionary Learning," in *27th European Signal Processing Conference*, 2019, pp. 1–5
2. **P. Irofti** and B. Dumitrescu, "Pairwise Approximate K-SVD," in *Acoustics Speech and Signal Processing (ICASSP), 2019 IEEE International Conference on*, 2019, pp. 1–5

3. **P. Irofti** and F. Stoican, "Dictionary Learning Strategies for Sensor Placement and Leakage Isolation in Water Networks," in *The 20th World Congress of the International Federation of Automatic Control*, 2017, pp. 1589–1594
4. B. Dumitrescu and **P. Irofti**, "Low Dimensional Subspace Finding via Size-Reducing Dictionary Learning," in *2016 IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2016, pp. 1–6
5. **P. Irofti**, "The Effect of Atom Replacement Strategies on Dictionary Learning," in *International Traveling Workshop on Interactions Between Sparse Models and Technology*, 2016, pp. 10–11
6. **P. Irofti** and B. Dumitrescu, "Overcomplete Dictionary Learning with Jacobi Atom Updates," in *39th International Conference on Telecommunications and Signal Processing*, 2016, pp. 421–424
7. **P. Irofti** and B. Dumitrescu, "Regularized Algorithms for Dictionary Learning," in *2016 International Conference on Communications (COMM)*, 2016, pp. 439–442
8. **P. Irofti**, "Sparse Denoising with Learned Composite Structured Dictionaries," in *19th International Conference on System Theory, Control and Computing*, 2015, pp. 331–336
9. **P. Irofti** and B. Dumitrescu, "Cospase Dictionary Learning for the Orthogonal Case," in *19th International Conference on System Theory, Control and Computing*, 2015, pp. 343–347
10. **P. Irofti** and B. Dumitrescu, "Overcomplete Dictionary Design: the Impact of the Sparse Representation Algorithm," in *The 20th International Conference on Control Systems and Computer Science*, 2015, pp. 901–908
11. **P. Irofti** and B. Dumitrescu, "GPU Parallel Implementation of the Approximate K-SVD Algorithm Using OpenCL," in *22nd European Signal Processing Conference*, 2014, pp. 271–275

### Projects

- "Innovation Hub for Advanced Cyber-Security Technologies", PCCDI project 2018-2020
- "Implementation and development of algorithms for the dynamic motion planning of robotic systems", CEC 2017 project, 2017
- "Set-theoretic approaches for fault tolerant control of complex systems", TE 2015 project, 2015-2017
- "Sparse representations in signal processing", IDEI 2011 project, 2014-2016

### Teaching Classes

- "Using Operating Systems",  
Bachelor Program "Computer and Information Tehnology",  
Faculty of Mathematics and Computer Science  
University of Bucharest, 2017-present
- "Operating Systems", Bachelor Program "Informatics",  
Faculty of Mathematics and Computer Science  
University of Bucharest, 2017-present
- "Computation for Complex Systems", (with Prof. B. Dumitrescu),  
Master Program "Complex Systems",  
Faculty of Automatic Control and Computer Science  
Polytechnic University of Bucharest, 2017-2018
- "Numerical Methods" (Prof. B. Dumitrescu),  
Bachelor Program "Automatic Control and Systems Engineering",  
Faculty of Automatic Control and Computer Science  
Polytechnic University of Bucharest, 2014-2018

"Parallel and distributed processing of data and knowledge" (with Prof. B. Dumitrescu),  
Master Program "Intelligent Systems Control",  
Faculty of Automatic Control and Computer Science  
Polytechnic University of Bucharest, 2012-2017

"Modelling and Simulation" (Lecturer. F. Stoican),  
Bachelor Program "Automatic Control and Systems Engineering",  
Faculty of Automatic Control and Computer Science  
Polytechnic University of Bucharest, 2015-2016

## Conference and Seminar Presentations

Dictionary Learning Applications in Control Theory (slides)

Recent Advances in Artificial Intelligence, Bucharest, Romania June 19-20, 2017

Making OpenBSD Useful on the Octeon Network Gear (video)

European BSD Conference, Sofia, Bulgaria September 25-28, 2014

Dynamic Analysis: Knowing When to Stop

Dagstuhl Seminar

Challenges in Analysing Executables: Scalability, Self-Modifying Code and Synergy (14241)  
Schloss Dagstuhl, Leibniz-Zentrum für Informatik,  
Leibniz, Germany, June 9-13, 2014

Porting OpenBSD on the MIPS64-based Octeon Platforms

BSDCan Conference, Ottawa, Ontario, Canada, May 14-17, 2014

Emulator Design, Traps and Pitfalls

Dagstuhl Seminar Analysis of Executables: Benefits and Challenges (12051)  
Schloss Dagstuhl, Leibniz-Zentrum für Informatik,  
Leibniz, Germany, January 29th - February 3rd, 2012

OpenBSD's New Suspend and Resume Framework (presentation)

European BSD Conference, Maarssen, Utrecht, Netherlands, October 6-9, 2011

Asian BSD Conference, Tokyo, Japan, March 17-20, 2011 (canceled due to natural disasters)

On the Linux Compatibility Layer in OpenBSD 5.0

Slackathon Conference, Stockholm University, Stockholm, Sweden, August 6th, 2011

Image Processing with Wavelet Transformations (in romanian)

Faculty of Automatic Control and Computer Science,  
Polytechnic University of Bucharest,  
Bucharest, Romania, June, 2008

## Conferences and Workshops Attended

Ports Hackathon, Epitech École d'Informatique, Nantes, France, April 23-29, 2018

Ports Hackathon, IN-Berlin, Berlin, Germany November 1-6, 2017

General Hackathon, Computer Laboratory, Cambridge, UK August 30th - September 5th, 2016

Ports Hackathon, Epitech École d'Informatique, Nantes, France, April 25-29, 2016

General Hackathon, SAIT Polytechnic, Calgary, Canada July 15-21, 2015  
European General OpenBSD Hackathon, Ljubljana, Slovenia July 8-14, 2014  
General Hackathon, University of Toronto, Toronto, Canada May 29th - June 5th, 2013  
Network Hackathon, University of Otago, Dunedin, New Zealand January 13-19, 2013  
Hardware Hackathon, Coimbra University, Coimbra, Portugal November 14-20, 2012  
Network Hackathon, Starnberg, Germany September 17-21, 2012  
General OpenBSD Hackathon, Budapest, Hungary July 7-14, 2012  
Rthreads Hackathon, Henri Poincaré Institute, Paris, France April 10-14, 2012  
Ports Hackathon, Budapest, Hungary November 12-18, 2011  
European General OpenBSD Hackathon, Ljubljana, Slovenia September 16-23, 2011  
General OpenBSD Hackathon, University of Alberta, Edmonton, Canada July 2-9, 2011  
OpenBSD Kernel Hackathon, Hafnarfjörður, Iceland April 1-7, 2011  
Ports Hackathon, Budapest, Hungary, October 23-29, 2010  
Japan General Hackathon, Akiyamago, Sake Mura, Nagano, Japonia September 19-25, 2010  
General OpenBSD Hackathon, University of Alberta, Edmonton, Canada June 25th - 3rd July, 2010  
Hardware OpenBSD Hackathon, Coimbra University, Coimbra, Portugal November 21-27 2009  
Ports Hackathon, Budapest, Hungary October 9-16, 2009  
General OpenBSD Hackathon, University of Alberta, Edmonton, Canada, May 30th - June 7th, 2009  
Ports Hackathon, Budapest, Hungary October 24-31, 2008

## Other Activities

NewOrder Security Site Administrator.

Updated June 28, 2019