

Personal Details Name: Giorgos Vasiliadis
Gender: Male
Date of Birth: January 31, 1985
Nationality: Greek
Languages: English, Greek
Military Service: Fulfilled (Feb 2009 - Jan 2010)

Education Ph.D. in Computer Science Feb. 2010 – May 2015
Computer Science Department, University of Crete, Greece
Thesis: *Accelerating Stateful Network Packet Processing Using Graphics Hardware*
Supervisor: Prof. Evangelos P. Markatos
Advisor: Dr. Sotiris Ioannidis

M.Sc. in Computer Science Oct. 2006 – Nov. 2008
Computer Science Department, University of Crete, Greece
GPA: 9.20 (out of 10)
Major: Parallel and Distributed Systems
Minor: Information Systems
Thesis: *Improving the Performance of Network Intrusion Detection Systems Using Graphics Processors*
Supervisor: Prof. Evangelos P. Markatos / Dr. Sotiris Ioannidis

B.Sc. Degree in Computer Science Sep. 2002 – Jul. 2006
Computer Science Department, University of Crete, Greece
GPA: 8.21 (out of 10); ranked *second* in class
Advisor: Prof. Evangelos P. Markatos

Work Experience Postdoctoral Researcher and R&D Engineer April 2017 – now
Distributed Computing Systems Lab, FORTH-ICS
• I participate in the coordination of the EU-funded I-BiDaaS and C4IIoT projects. I also work on the implementation of trusted execution environments for mobile devices, web browsers, and commodity operating systems. I also involved in the design and demonstration of a novel browser-based botnet, built solely using HTML5 APIs, as well in proposing possible defenses.

Research Scientist January 2016 – April 2017
Cyber Security, Qatar Computing Research Institute
• Along with the Cyber Security team, I built a real-time processing platform for network security analytics. The system has been used to visualize analytics about DRDoS attacks that go through Qatar using locally deployed honeypots.

Consulting Software Engineer June 2015 – December 2015
StealthSec Inc., Berkeley, CA
• As a part-time full stack developer, I worked remotely on the development of SSL/TLS interception techniques and applications, that were integrated in the main products of the company.

Research Intern March 2013 – June 2013
Symantec Research Labs, Los Angeles, CA
Supervisor: Petros Efstathopoulos
• Designed, implemented, and evaluated portable and robust security features in open-source web

proxies, such as Apache Traffic Server, Squid, and Nginx.

R&D Engineer / Research Assistant

March 2010 – December 2015

Distributed Computing Systems Lab, FORTH-ICS

- During my PhD studies, I worked as a research assistant, doing research on improving the performance of network packet processing applications using commodity heterogeneous commodity processors. Parts of this work, included the implementation of fast pattern matching algorithms on highly-parallel processors, in order to increase the performance of network intrusion detection systems and antiviruses, as well as the design of zero-copy network packet capturing techniques. Besides that, I also explored different ways on utilizing graphics processors (GPUs) for security applications.

R&D Engineer / Research Assistant

July 2005 – Sep. 2008

Distributed Computing Systems Lab, FORTH-ICS

- Participation in the development and implementation of the EU-funded projects LOBSTER (distributed passive network monitoring), and NoAH (network of affined honeypots). As part of my master thesis, I designed and implemented a prototype Network Intrusion Detection System, namely Gnort, using GPGPU programming.

Honors and Awards

Recipient of the Maria M. Manassaki Bequest Scholarship, University of Crete. Given to the *best* Ph.D. student of the Computer Science Department, 2013.

Recipient of the Symantec Research Labs Graduate Fellowship, 2012. Given annually to 2–4 outstanding Ph.D. students worldwide.

<https://www.symantec.com/about/careers/graduate-fellowship>

Scholarship and award by the State Scholarships Foundation of Greece for ranking *first* in average grade during the third year of my undergraduate studies, 2005.

Teaching Experience

Teaching Assistant

September 2006 – September 2014

University of Crete

CS100 – Introduction to Computer Science. Fall 2010

CS120 – Digital Design. Fall 2012

CS150 – Programming in C/C++. Spring 2011, Fall 2011

CS335 – Computer Networks. Spring 2008, Spring 2012

CS345 – Operating Systems. Fall 2006, Fall 2007, Fall 2013

CS459 – Internet Measurement. Spring 2010, Spring 2014

CS463 – Information Retrieval Systems. Spring 2007

Mentoring

Supervision of Graduate Students

September 2010 – September 2014

University of Crete

During my PhD studies, I had the opportunity to work with undergraduate and graduate students on some of the research projects that I envisioned at the time.

Lazaros Koromilas – Work on fast network traffic processing using accelerators.

Evangelos Ladakis – Implementation of stealthy keyloggers and fast x86 disassemblers.

Dimitris Deyannis – Accelerating strategies for distributed memory caching systems.

External Service

Publicity Chair for the 18th International Symposium on Research in Attacks, Intrusions and Defenses (RAID 2015).

Program Committee member for the 2019 ACM Cloud Computing Security Workshop (CCSW 2019).

Program Committee member for the International workshop on Information & Operational Technology (IT & OT) security systems (IOSec 2019).

Program Committee member for the 14th International Workshop on Security Organization (IWSEC

2019).
 Program Committee member for the 12th European Workshop on System Security (EuroSec 2019).
 Program Committee member for the 10th IEEE International Workshop on Information Forensics and Security (WIFS'18).
 Program Committee member for the 13th International Workshop on Security Organization (IWSEC 2018).
 Program Committee member for the 11th European Workshop on System Security (EuroSec 2018).
 Program Committee member for the 9th IEEE International Workshop on Information Forensics and Security (WIFS'17).
 Program Committee member for 22nd IEEE Symposium on Computers and Communications (ISCC 2017).
 Program Committee member for the 12th International Workshop on Security Organization (IWSEC 2017).
 Program Committee member for the 10th European Workshop on System Security (EuroSec 2017).
 Program Committee member for the 8th IEEE International Workshop on Information Forensics and Security (WIFS'16).
 Program Committee member for the 22nd IEEE International Conference on Parallel and Distributed Systems (ICPADS 2016).
 Program Committee member for the 11th International Workshop on Security Organization (IWSEC 2016).
 Program Committee member for the 9th European Workshop on System Security (EuroSec 2016).
 Technical Program Committee member for the 2015 IEEE JSAC Special issue on Measuring and Troubleshooting the Internet (JSAC-SI-MT).
 Program Committee member for the 6th European Workshop on System Security (EuroSec 2013).
 Program Committee member for the 5th European Workshop on System Security (EuroSec 2012).
 Program Committee member for the 7th European Conference on Computer Network Defense (ec2nd 2011).

Major Projects

C4IIoT 2019 – 2021
<https://www.c4iiot.eu>

Funded by the European Commission (SU-ICT-01-2018) (Budget 6,288,708.75)

C4IIOT (Cyber security 4.0: protecting the Industrial Internet Of Things) will design, build and demonstrate a novel and unified Cybersecurity 4.0 framework that implements an innovative IoT architecture paradigm to provide an end-to-end holistic and disruptive security-enabling solution for minimizing the attack surfaces in Industrial IoT systems. C4IIOT bridges cyber assurance and protection, machine (deep) learning (ML/DL), edge/cloud computing, blockchain and Big Data technologies to provide a viable scheme for enabling security and accountability, preserving privacy, enabling reliability and assuring trustworthiness within evolving IIoT applications and processes (e.g. automotive). C4IIOT novel cybersecurity mechanisms are carefully orchestrated across all infrastructure elements involved within an IIoT system (e.g., IIoT devices, field gateways, cloud resources) and is based upon analysis of various data flows (e.g., IIoT device data, encrypted network flows).

I participate in the coordination and management of the project. I am also part of the core technical team responsible for the development cycle of the project, from the requirements analysis phase and design till implementation phase and performance evaluation.

I-BiDaaS 2018 – 2020
<https://www.ibidaas.eu>

Funded by the European Commission (ICT-16-2017) (Budget 4,997,035.00)

I-BiDaaS (Industrial-Driven Big Data as a Self-Service Solution) targets to empower users to easily utilize and interact with big data technologies, by designing, building, and demonstrating, a unified framework that: significantly increases the speed of data analysis while coping with the rate of data asset growth, and facilitates cross-domain data-flow towards a thriving data-driven EU economy. I-BiDaaS will be tangibly validated by three real-world, industry-lead experiments, in the domains

of banking, manufacturing, and telecommunications.

I participate in the coordination and management of the project. I am also part of the core technical team responsible for the development cycle of the project, from the requirements analysis phase and design till implementation phase and performance evaluation.

GANDALF

2014 – 2015

<http://www.gandalf.gr>

Funded by the General Secretariat for Research and Technology, Excellence Award, Investigator Driven Research (Budget 236,000 Euros)

GANDALF (A GPU-based Architecture for Network and Data Level Flows) is a novel GPU-based middlebox architecture and framework for building efficient and feature-rich data flow processing applications, that facilitates the rapid development of GPU-based applications and improves the performance of data movement between graphics processors and other system components. Besides providing rich functionality and high-level programming primitives to application developers, the proposed architecture offers significant performance improvements through OS-level support for high-throughput cross-device communication, and increased scalability through transparent load balancing across multiple GPUs.

I was the author and technical manager responsible for the total development cycle of the project, from the requirements analysis phase and design till implementation phase and performance evaluation.

LOBSTER

2004 – 2007

<http://www.ist-lobster.org/>

Funded by the European Commission

Lobster (Large Scale Monitoring of BroadBand Internet Infrastructure) is an advanced European Infrastructure for accurate Internet traffic monitoring. It is based on a novel Distributed Monitoring Application Programming Interface which enables the creation of sophisticated applications and empowers a large number of researchers and system administrators into reaching a better understanding of the kind of traffic that flows through their networks.

I primarily involved in the implementation of the programming interface, as well as in the task of fixing the bugs reported by the users and for taking care of enhancements suggested by users.

NoAH

2005 – 2008

<http://www.fp6-noah.org/>

Funded by the European Commission

NoAH (A European Network of Affined Honeypots) aims to gather and analyse information about the nature of Internet cyberattacks. The infrastructure developed is able to detect and provide early warning of such attacks, so that appropriate countermeasures may be taken to combat them.

I was involved in the implementation of the core infrastructure.

Puggle

2006 – 2010

<http://puggle.sourceforge.net>

A graphical desktop search application that was started on my spare time, enabling the user to search documents, music, photos, web pages and more that are stored locally on a computer. It is written in Java and it is portable to both Linux and Microsoft Windows. The project is open-source and it is available online at <http://puggle.sourceforge.net>.

Peer-reviewed Conference Publications

Ioannis Arapakis, Yolanda Becerra, Omer Boehm, George Bravos, Vassilis Chatzigiannakis, Cesare Cugnasco, Giorgos Demetriou, Iliada Eleftheriou, Julien Etienne Mascolo, Lidija Fodor, Sotiris Ioannidis, Dusan Jakovetic, Leonidas Kallipolitis, Evangelia Kavakli, Despina Kopanaki, Nicolas Kourtellis, Mario Maawad Marcos, Ramon Martin de Pozuelo, Nemanja Milosevic, Giuditta Morandi, Enric Pages Montanera, Gerald Ristow, Rizos Sakellariou, Raul Sirvent, Srdjan Skrbic, Ilias Spais, Giorgos Vasiliadis, and Michael Vinov. Towards Specification of a Software Architecture for Cross-Sectoral Big Data Applications. In *Proceedings of the 2019 IEEE World Congress on Services (SERVICES)*.

July 2019, Milan, Italy.

Panagiotis Papadopoulos, Panagiotis Ilija, Michalis Polychronakis, Evangelos P. Markatos, Sotiris Ioannidis, Giorgos Vasiliadis. Master of Web Puppets: Abusing Web Browsers for Persistent and Stealthy Computation. In *Proceedings of the Network and Distributed System Security Symposium (NDSS)*. February 2019, San Diego, CA.

Giorgos Vasiliadis, Dusan Jakovetic, Ilias Spais and Sotiris Ioannidis. I-BiDaaS: Industrial-Driven Big Data as a Self-Service Solution. In *Proceedings of the 7th European Conference on Service-Oriented and Cloud Computing (ESOCC)*. September 2018, Como, Italy.

Dimitris Deyannis, Rafail Tsirbas, Giorgos Vasiliadis, Raffaele Montella, Sokol Kosta, and Sotiris Ioannidis. Enabling GPU-assisted Antivirus Protection on Android Devices through Edge Offloading. In *Proceedings of the 1st International Workshop on Edge Systems, Analytics and Networking (EdgeSys)*. June 2018, Munich, Germany.

Panagiotis Papadopoulos, Giorgos Vasiliadis, George Christou, Evangelos Markatos and Sotiris Ioannidis. No sugar but all the taste! Memory Encryption without Architectural Support. In *Proceedings of the 22nd European Symposium on Research in Computer Security (ESORICS)*. September 2017, Oslo, Norway.

Michael Aupetit, Yury Zhauniarovich, Giorgos Vasiliadis, Marc Dacier, Yazan Boshmaf. Visualization of actionable knowledge to mitigate DRDoS attacks. In *Proceedings of the 13th IEEE Symposium on Visualization for Cyber Security (VizSec)*. October 2016, Baltimore, MD, USA.

Lazaros Koromilas, Giorgos Vasiliadis, Elias Athanasopoulos, Sotiris Ioannidis. GRIM: Leveraging GPUs for Kernel Integrity Monitoring. In *Proceedings of the 19th International Symposium on Research in Attacks, Intrusions and Defenses (RAID)*. September 2016, Paris, France.

Panagiotis Papadopoulos, Thanasis Petsas, Giorgos Christou and Giorgos Vasiliadis. MAD: A Middleware Framework for Multi-Step Attack Detection. In *Proceedings of the 4th International Workshop on Building Analysis Datasets and Gathering Experience Returns for Security (BADGERS)*. November 2015, Kyoto, Japan.

Evangelos Ladakis, Giorgos Vasiliadis, Michalis Polychronakis, Sotiris Ioannidis, and Georgios Portokalidis. GPU-Disasm: A GPU-based x86 Disassembler. In *Proceedings of the 18th Information Security Conference (ISC)*. September 2015, Trondheim, Norway.

Giorgos Vasiliadis, Elias Athanasopoulos, Michalis Polychronakis and Sotiris Ioannidis. PixelVault: Using GPUs for securing cryptographic operations. In *Proceedings of the 21st ACM Conference on Computer and Communications Security (CCS)*. November 2014, Scottsdale, AZ, USA.

Dimitris Deyannis, Lazaros Koromilas, Giorgos Vasiliadis, Elias Athanasopoulos and Sotiris Ioannidis. Flying Memcache: Lessons Learned from Different Acceleration Strategies. In *Proceedings of the 26th International Symposium on Computer Architecture and High Performance Computing (SBAC-PAD)*. October 2014, Paris, France.

Lazaros Koromilas, Giorgos Vasiliadis, Ioannis Manousakis and Sotiris Ioannidis. Efficient Software Packet Processing on Heterogeneous and Asymmetric Hardware Architectures. In *Proceedings of the 10th ACM/IEEE Symposium on Architecture for Networking and Communications Systems (ANCS)*. October 2014, Los Angeles, CA, USA.

Giorgos Vasiliadis, Lazaros Koromilas, Michalis Polychronakis, and Sotiris Ioannidis. GASPP: A GPU-Accelerated Stateful Packet Processing Framework. In *Proceedings of the USENIX Annual*

Technical Conference (USENIX ATC). June 2014, Philadelphia, PA, USA.

Evangelos Ladakis, Lazaros Koromilas, Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. You Can Type, but You Can't Hide: A Stealthy GPU-based Keylogger. In *Proceedings of the European Workshop on System Security (EuroSec)*. April 2013, Prague, Czech Republic.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. Parallelization and Characterization of Pattern Matching using GPUs. In *Proceedings of the IEEE International Symposium on Workload Characterization (IISWC)*. November 2011, Austin, TX, USA.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. MIDeA: A Multi-Parallel Intrusion Detection Architecture. In *Proceedings of the 18th ACM/SIGSAC Computer and Communications Security Conference (CCS)*. October 2011, Chicago, IL, USA.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. GPU-assisted Malware. In *Proceedings of the 5th IEEE International Conference on Malicious and Unwanted Software (MALWARE)*. October 2010, Nancy, France.

Giorgos Vasiliadis and Sotiris Ioannidis. GrAVity: A Massively Parallel Antivirus Engine. In *Proceedings of the 13th International Symposium On Recent Advances In Intrusion Detection (RAID)*. September 2010, Ottawa, Canada.

Giorgos Vasiliadis, Michalis Polychronakis, Spiros Antonatos, Evangelos P. Markatos and Sotiris Ioannidis. Regular Expression Matching on Graphics Hardware for Intrusion Detection. In *Proceedings of the 12th International Symposium On Recent Advances In Intrusion Detection (RAID)*. September 2009, Saint-Malo, France.

Grigoris Antoniou, Antonis Bikakis, Polyvios Damianakis, Mixalhs Foukarakis, Giorgos Iacovidis, Marianna Karmazi, Haridimos Kondylakis, Antreas Makridakis, Giorgos Nikiforos, Grigoris Papadourakis, Manolis Papoutsakis, Aggeliki Psyharaki, Giorgos Stratakis, Panagiotis Turlakis, Petros Tsialiamanis, Giorgos Vasiliadis, Gerd Wagner and Dimitris Velegrakis. A Multi-agent Environment for Serving Proof Explanations in the Semantic Web. In *Proceedings of the 5th Hellenic Conference on Artificial Intelligence (SETN)*, October 2008, Syros, Greece.

Giorgos Vasiliadis, Spiros Antonatos, Michalis Polychronakis, Evangelos P. Markatos and Sotiris Ioannidis. Gnort: High Performance Network Intrusion Detection Using Graphics Processors. In *Proceedings of the 11th International Symposium On Recent Advances In Intrusion Detection (RAID)*, September 2008, Boston, MA, USA.

**Peer-reviewed
Journal
Publications**

Eva Papadogiannaki, Lazaros Koromilas, Giorgos Vasiliadis, Sotiris Ioannidis. Efficient Software Packet Processing on Heterogeneous and Asymmetric Hardware Architectures. In *IEEE/ACM Transactions on Networking, Volume 25, Issue 3*, June 2017.

Giorgos Vasiliadis, Lazaros Koromilas, Michalis Polychronakis, Sotiris Ioannidis. Design and Implementation of a Stateful Network Packet Processing Framework for GPUs. In *IEEE/ACM Transactions on Networking, Volume 25, Issue 1*, February 2017.

Giorgos Vasiliadis, Michalis Polychronakis, and Sotiris Ioannidis. GPU-assisted Malware. In *International Journal of Information Security, Volume 14, Issue 3, Page 289-297*, 2015.

Antonios Papadogiannakis, Giorgos Vasiliadis, Demetres Antoniadis, Michalis Polychronakis, Evangelos P. Markatos. Improving the Performance of Passive Network Monitoring Applications with Memory Locality Enhancements. In *Computer Communications, Volume 35, Issue 1, Pages 129-140*, January 2012.

Book Chapters Giorgos Vasiliadis (March 13th 2019). Security Applications of GPUs, High Performance Parallel Computing, Satyadhyan Chickerur, IntechOpen, DOI: 10.5772/intechopen.81885. Available from: <https://www.intechopen.com/books/high-performance-parallel-computing/security-applications-of-gpus>

Theses and Technical Reports Giorgos Vasiliadis. Accelerating Network Packet Processing Using Graphics Hardware. *Doctoral Dissertation, University of Crete*, December 2014.

Giorgos Vasiliadis. Improving the Performance of Network Intrusion Detection Systems Using Graphics Processors. *Master Thesis, University of Crete*, November 2008.

Panagiotis Papadakis, Giorgos Vasiliadis, Yannis Theoharis, Nikos Armenatzoglou, Stella Kopidaki, Yannis Marketakis, Manos Daskalakis, Kostas Karamaroudis, Giorgos Linardakis, Giannis Makrydakis, Vangelis Papathanasiou, Lefteris Sardis, Petros Tsialiamanis, Georgia Troullinou, Kostas Vandikas, Dimitris Velegrakis and Yannis Tzitzikas. The Anatomy of Mitos Web Search Engine. In *CoRR, Information Retrieval, abs/0803.2220*, March 2008.

Invited Talks Security applications of GPUs. Seminar talk at the Cybersecurity and Privacy (CySeP) Summer School, June 2018, Stockholm, Sweden.

Security applications of GPUs: The Good, the Bad, and the Ugly. Keynote Talk. European Workshop on System Security (EuroSec), April 2015, Bordeaux, France.

PixelVault: Using GPUs for securing cryptographic operations. Free and Open Source Software Developers' European Meeting (FOSDEM), February 2015, Brussels, Belgium.

Signature-based Malware Detection using GPUs. Symantec Research Labs, April 2013, Culver City, CA, USA.

Press Selected Articles on our HTML5 Browser-based botnet

- ZDNet. New browser attack lets hackers run bad code even after users leave a web page. Catalin Cimpanu, February 2019.
- DARKReading. Researchers Build Framework for Browser-Based Botnets: HTML5 used to build persistent malware on victims' computers. Curtis Franklin Jr., February 2019.

Selected Articles on our stealthy GPU-based keylogger

- The Register. Infosec bods demo GPU keylogger. Don't tell the NS... oh, wait. John Leyden, May 2015.
- Ars Technica. GPU-based rootkit and keylogger offer superior stealth and computing power. Dan Goodin, May 2015.
- ComputerWorld. New Linux rootkit leverages GPUs to hide. Lucian Constantin, May 2015.
- PCWorld. New Linux rootkit leverages graphics cards for stealth. Lucian Constantin, May 2015.
- ExtremeTech. Proof-of-concept GPU rootkit hides in VRAM, snoops system activities. Joel Hruska, May 2015.
- SecurityAffaris. GPU-based malware, the evolution of rootkits and keyloggers. Pierluigi Paganini, May 2015.

Selected Articles on using GPUs for Intrusion Detection and Malware Scanning

- The Inquirer. Sotiris Ioannidis of FORTH-ICS on using GPUs for intrusion detection. Wendy M. Grossman, January 2011.

- ICAEW. Using GrAVity to defeat viruses. Leo Waldoock, August 2010.

Selected Articles on our GPU-assisted Malware study

- The Register. Researchers up evilness ante with GPU-assisted malware - Coming to a PC near you. Dan Goodin, September 2010.
- Slashdot. Malware Running On Graphics Cards. September 2010.
- HotHardware. New Whitepaper Claims GPUs Threaten Malware Security. Joel Hruska, September 2010.
- HardOCP. GPU Assisted Malware.

References

Sotiris Ioannidis. Principal Researcher. FORTH (sotiris@ics.forth.gr)

Michalis Polychronakis. Assistant Professor. Stony Brook University (mikepo@cs.stonybrook.edu)

Evangelos Markatos. Professor, University of Crete and FORTH (markatos@ics.forth.gr)

Petros Efstathopoulos. Technical Director. Symantec Research Labs (petros_efstathopoulos@symantec.com)

Elias Athanasopoulos. Assistant Professor. University of Cyprus (eliasathan@cs.ucy.ac.cy)