

# Theofilos Petsios

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## Research Interests

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I am interested in all aspects of systems and software security, with a focus on application security, binary analysis, and privacy.

## Education

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### Ph.D. in Computer Science

COLUMBIA UNIVERSITY

New York, USA

2012 - 2018

- Ph.D. Thesis: "Compiler-Assisted Adaptive Software Testing"
- Academic Advisors: Angelos D. Keromytis & Steven M. Bellovin

### M.Phil. in Computer Science

COLUMBIA UNIVERSITY

New York, USA

2015

### M.Sc. in Computer Science (GPA 3.9 / 4)

COLUMBIA UNIVERSITY

New York, USA

2012 - 2014

### B.S. in Electrical Engineering & Computer Science (GPA 8.2/10)

NATIONAL TECHNICAL UNIVERSITY OF ATHENS (NTUA)

Athens, Greece

2005 - 2011

- B.S. Thesis: "Term suggestion mechanisms for Scientific Database Systems"
- Thesis Advisor: Timos Sellis

## Professional Appointments

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### Capsule8

RESEARCH SCIENTIST

New York, NY, USA

April 2018 - Present

### Microsoft Research

RESEARCH INTERN

Cambridge, UK

October 2017 - December 2017

- Systems and Networking Group: Developed a framework for large-scale network traffic analysis and prediction for the Iris Project

### Trail of Bits

RESEARCH INTERN

New York, NY, USA

May 2017 - August 2017

- Worked on the Manticore symbolic execution engine, adding support for symbolic execution of Binary Ninja IL, and performed security audits.

### Symantec Corporation

RESEARCH INTERN

Herndon, VA, USA

June 2015 - August 2015

- Developed an ELF binary rewriting library for ARM. Designed and implemented interfaces supporting binary rewriting, injection of anti-debugging features, injection of new modules into an existing binary, as well as detection of packers and backdoors.

### Greek Army (Obligatory Service)

IT SUPPORT & WEBSITE ADMINISTRATOR

Athens, Greece

August 2011 - June 2012

- Responsible for the backup & maintenance of the servers hosting the website of the Greek Ministry of National Defence.

### Cybex S.A.

SYSTEM ADMINISTRATOR & WEB DEVELOPER

Athens, Greece

January 2011 - July 2011

- Responsible for the administration of the server infrastructure, as well as the hosting and domain name registration services of the company.

## Talks & Media Coverage

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### CONFERENCE TALKS

November 2017	“SLOWFuzz : Automated Domain-Independent Detection of Algorithmic Complexity Vulnerabilities”	ACM CCS, Dallas, USA
May 2017	“NEZHA : Efficient Domain - Independent Differential Testing”	S&P, San Jose, USA
December 2015	“DYNAGUARD : Armoring Canary-Based Protections against Brute-force Attacks”	ACSAC, Los Angeles, USA

### INVITED TALKS

August 2017	Empire Hacking NYC: “Extending Manticore with Binary Ninja”.	MongoDB, New York, USA
March 2017	Guest Lecture on “Fuzz Testing” for Graduate-Level Course “Reliable Software”.	Columbia University, USA
October 2016	Empire Hacking NYC: “Differential Fuzzing with LLVM’s LibFuzzer”.	TwoSigma, New York, USA

### MEDIA COVERAGE

November 2017	“Found: Our Best Future Cyber Protectors in World’s Biggest Student-Led Cybersecurity Games”	Morning Star
August 2014	NYT Bits: “XRay: A New Tool for Tracking the Use of Personal Data on the Web”	The New York Times

## Skills

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<b>Programming</b>	C/C++, Python, Go, E <sub>2</sub> X, HTML, CSS, Javascript, SQL, PHP, Java, Vimscript
<b>Technologies</b>	LLVM & GCC internals, Intel PIN, Pandas, Bokeh
<b>Languages</b>	Greek ( <i>Native</i> )   English ( <i>Proficient</i> )   French, Spanish ( <i>Elementary proficiency - ILR scale 1+</i> )

## Honors & Awards

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2012-2018	<b>Fellowship</b> , Graduate Research Assistantship (GRA), Columbia University	New York, USA
2017	<b>2nd Place at NYU-CSAW Applied Research Competition</b> , New York University (NYU)	New York, USA
2017	<b>Finalist Travel Grant for NYU-CSAW</b> , New York University (NYU)	New York, USA
2014	<b>Bug Bounty Grant</b> , Facebook	New York, USA
2014	<b>Scholarship (for Ph.D. studies)</b> , Gerondelis Foundation	New York, USA
2005	<b>Scholarship (for B.S. studies)</b> , Eurobank EFG	Athens, Greece

## Service

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### PROGRAM COMMITTEE

**CSAW** CSAW Research Competition: 2018

### REVIEWER

**TOSEM** ACM Transactions on Software Engineering and Methodology (TOSEM): 2018

### EXTERNAL REVIEWER

<b>USENIX</b>	USENIX Security Symposium: 2017
<b>CCS</b>	ACM Conference on Computer and Communications Security: 2013, 2014
<b>IWSEC</b>	International Workshop on Security: 2014
<b>MTD</b>	ACM Workshop on Moving Target Defense: 2015
<b>IET</b>	IET Information Security: 2014

## Open-Source Software

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<b>BibTeX entry from URL</b>	A Chrome extension that produces BibTeX entries from the active URL (Users > 8500, Rating: 5 stars).
<b>LBSProximityAuditor</b>	An auditing framework for Location Based Services.
<b>NEZHA</b>	A differential fuzzing framework built on top of libFuzzer.
<b>SQLRand</b>	A compiler pass that guards against SQL injections.
<b>INTFLOW</b>	An LLVM pass to detect integer errors with low false positives.
<b>DYNAGUARD</b>	A Set of protections of canary-based defenses against brute-force attacks.

## Teaching and Mentorship

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### Instructor, Introduction to Programming in C

New York, USA

COLUMBIA UNIVERSITY

Summer 2014

- Designed and taught a three week summer intensive course for the School of Continuing Education at Columbia University (Students: 16)

### Teaching Assistant

New York, USA

COLUMBIA UNIVERSITY

Summer 2013 - Fall 2016

- Fall 2016: Head Teaching Assistant (TA) for Network Security (Graduate level. Instr. Debbie Cook. Students: 34)
- Spring 2015: TA for Network Security (Graduate level. Instr. Debbie Cook. Students: 33)
- Fall 2013: Head TA for Data Structures & Algorithms (Undergraduate level. Instr.: Shlomo Hershkop. Students: 70)
- Spring 2013: Head TA for Advanced Programming (Undergraduate level. Instr.: Shlomo Hershkop. Students: 14)

### Student Mentor

New York, USA

COLUMBIA UNIVERSITY

2016

- Fall 2016: Jason Zhao (undergraduate student). Project: Guided fuzzing for resource exhaustion bugs.
- Spring 2016: Benjamin Low (undergraduate student). Project: Towards a taxonomy of the security properties of major OSes.

## Publications

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### CONFERENCE PUBLICATIONS

- Theofilos Petsios**, Jason Zhao, Angelos D. Keromytis, and Suman Jana. “SlowFuzz : Automated Domain-Independent Detection of Algorithmic Complexity Vulnerabilities. ”. In Proceedings of the 24th ACM Conference on Computer and Communications Security (CCS), Dallas, TX, November 2017.
- Theofilos Petsios**, Adrian Tang, Salvatore Stolfo, Angelos D. Keromytis, and Suman Jana. “NEZHA : Efficient Domain - Independent Differential Testing”. In 38th IEEE Symposium on Security and Privacy (S&P), San Jose, CA, May 2017.
- Marios Pomonis, **Theofilos Petsios**, Angelos D. Keromytis, Michalis Polychronakis, Vasileios P. Kemerlis. “k<sup>R</sup>X : Comprehensive Kernel Protection against Just-In-Time Code Reuse”. In Proceedings of the 12th European Conference on Computer Systems (EuroSys), April 2017.
- Theofilos Petsios**, Vasileios P. Kemerlis, Michalis Polychronakis, Angelos D. Keromytis. “DynaGuard: Armoring Canary-based Protections against Brute-force Attacks”. In Proceedings of the 31th Annual Computer Security Applications Conference (ACSAC), December 2015.
- Iasonas Polakis, George Argyros, **Theofilos Petsios**, Suphannee Sivakorn, Angelos D. Keromytis. “Where’s Wally? Precise User Discovery Attacks in Location Proximity Services”. In Proceedings of the 22nd ACM Conference on Computer and Communications Security (CCS), October 2015.
- Marios Pomonis, **Theofilos Petsios**, Kangkook Jee, Michalis Polychronakis, and Angelos D. Keromytis. “IntFlow: Improving the Accuracy of Arithmetic Error Detection Using Information Flow Tracking”. In Proceedings of the 30th Annual Computer Security Applications Conference (ACSAC), December 2014.
- M. Lecuyer, G. Ducoffe, F. Lan, A. Papancea, **T. Petsios**, R. Spahn, A. Chaintreau, and R. Geambasu. “XRay: Enhancing the Web’s Transparency with Differential Correlation.”, in Proceedings of the USENIX Security Symposium, August 2014.

## JOURNAL PUBLICATIONS

- J1 George Argyros, **Theofilos Petsios**, Suphannee Sivakorn, Angelos D. Keromytis, and Jason Polakis. “*Evaluating the Privacy Guarantees of Location Proximity Services*”. In ACM Transactions on Privacy and Security (TOPS) (formerly known as TISSEC).
- J2 Marios Pomonis, **Theofilos Petsios**, Angelos D. Keromytis, Michalis Polychronakis, Vasileios P. Kemerlis. “*Kernel Protection against Just-In-Time Code Reuse*”. In ACM Transactions on Privacy and Security (TOPS) (formerly known as TISSEC).

## OTHER PUBLICATIONS

- O1 **Theofilos Petsios**, Adrian Tang, Dimitris Mitropoulos, Salvatore Stolfo, Angelos D Keromytis, Suman Jana. “*Tug-of-War: Observations on Unified Content Handling*”, arXiv preprint arXiv:1708.09334, August 2017.
- O2 George Argyros, **Theofilos Petsios**, Dimitris Mitropoulos Yunhui Zheng, Angelos D. Keromytis, and Junfeng Yang. “*Towards Scalable Symbolic Execution in Interpreted Languages*”, in RSAC Security Scholar Poster Exhibition, RSA Conference, February 2017.