

Srivatsan Ravi

Assistant Professor of Research, Dept. of Computer Science
Research Scientist, Information Sciences Institute
University of Southern California

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Education

Ph.D in Computer Science (2015), Technische Universität Berlin, Germany

Advisors: Anja Feldmann and Petr Kuznetsov

Thesis: On the Cost of Concurrency in Transactional Memory

Masters in Computer Science (2010), Cornell University, U.S.A

Bachelors in Computer Science (2007), Anna University, India

High School (2003), D. A. V Boys, Central Board of Secondary Education, Gopalapuram, India

Research Interests

Algorithms and lower bounds for distributed systems

Distributed programming models and fault-tolerance

Modelling and application of distributed computing techniques in computational sciences

Research Awards and Grants

Lead projects

Key Personnel; Secure, Adaptive, roBust, Resilient, and Efficient Slices (SABRES)

Sponsor: US Defense Advanced Research Projects Agency (DARPA) I2O Program on OPS-5G

9/15/20 - 9/14/24

Amount: \$8,388,215

Joint with Satish Thittamarahalli (USC-ISI), John Heidemann (USC-ISI), Erik Kline (USC-ISI), Christopher Garner (Lumen Technologies, formerly CenturyLink, Inc.), David Cousins (Duality Technologies)

Key Personnel; Secure Heterogeneous Learning Federation with Information-Theoretic Guarantees (SHELFI)

Sponsor: US Defense Advanced Research Projects Agency (DARPA) Cooperative Secure Learning (CSL) Program on Explorations in Artificial Intelligence

7/21/20 - 4/20/21

Amount: \$500,000

Joint with Jose Luis Ambite (USC-ISI), Greg ver Steeg (USC-ISI), Muhammad Naveed (USC-CS), Paul Thompson (USC Keck Medicine)

Key Personnel; Privacy Preserving Entity Resolution

Sponsor: Alfred P. Sloan Foundation, via Actuate innovation

8/5/20 - 5/5/21

Amount: \$125,000

Joint with Pedro Szekely (USC-ISI)

Key Personnel; Accurate and Precise Recognition of Obscured Payloads In Operational Systems (APRO-POS)

Sponsor: US Defense Advanced Research Projects Agency (DARPA) I2O Searchlight Program

04/15/2019 to 07/08/2023

Amount: \$5,000,000

Joint with Genevieve Bartlett (USC-ISI), Wes Hardaker (USC-ISI), Erik Kline (USC-ISI), Kevin Mcbride (CenturyLink Inc.)

Principal Investigator; A Scalable and Secure Edge for Internet-of-Things

Sponsor: Northrop Grumman Research Consortium

October 1, 2019 to December 31, 2020

Amount: \$150,000

Joint with Muhammad Naveed (USC-CS)

Principal Investigator; Future of Autonomous Decision Making in Safety-Critical Cyber Environments

Sponsor: Air Force Office of Scientific Research (AFOSR): Science and Technology Study

March 1, 2018 to September 28, 2018

Amount: \$190,000

Joint with Christophe Hauser (USC-ISI)

Principal Investigator; Byzantine-resilient Software-Defined Network Provenance

Sponsor: Northrop Grumman Research Consortium

October 1, 2017 to August 31, 2019

Amount: \$225,000

Contributing projects**Contributing Scientist; Dispersed Computing Testbed and Experiment Support**

Sponsor: US Defense Advanced Research Projects Agency (DARPA) I2O Program on Dispersed Computing

02/28/2018 to 03/31/2021

USC-ISI Principal Investigators: Stephen Schwab and Ryan Goodfellow

Co-Principal Investigator; CSR: Small: Elastic and Robust Cloud Programming

Sponsor: National Science Foundation (NSF) Award number 1618923

October 1, 2016 to September 30, 2019

Principal Investigators: Xiangyu Zhang and Patrick Eugster (Purdue University)

Amount: \$458,504

Internal USC grants

Concurrency challenges in Cryptocurrencies: A privacy and security perspective on building next generation Smart Contract ecosystems

Sponsor: USC Undergraduate Research Associates Program
2019-20 Academic year

Principal Investigator; Building and Securing the next-generation Smart Contract Ecosystem

Sponsor: Information Sciences Institute New Initiatives Award
June 1, 2018 to May 31, 2019
Joint with Christophe Hauser (USC-ISI) and Muhammad Naveed (USC-CS)

Book chapters and Journals

"RoSCo: A Robust and Scalable Software-defined Network Controller"

James Lembke, Srivatsan Ravi, Patrick Eugster, Stefan Schmid
IEEE Journal on Selected Areas in Communications, 2020

"Generalized Paxos made Byzantine (and Less Complex)"

Miguel Pires, Srivatsan Ravi, Rodrigo Rodrigues
By invitation for MDPI Algorithms Special Issue on Symposium on Stabilization, Safety, and Security of Distributed Systems 2018

"Inherent limitations of hybrid transactional memory"

Dan Alistarh, Justin Kopinsky, Petr Kuznetsov, Srivatsan Ravi and Nir Shavit
Distributed Computing (DC) Journal, Springer, 2018
Full version of conference paper from International Symposium on Distributed Computing 2015

"Lower bounds for transactional memory"

Srivatsan Ravi
Bulletin of the European Association for Theoretical Computer Science (EATCS), Vol. 121, 2017

"Grasping the gap between blocking and non-blocking transactional memories"

Petr Kuznetsov and Srivatsan Ravi
Journal of Parallel and Distributed Computing (JPDC), Elsevier, 2017
Full version of conference paper from International Symposium on Distributed Computing 2015

"Safety and deferred update in transactional memory"

Hagit Attiya, Sandeep Hans, Petr Kuznetsov, and Srivatsan Ravi
Transactional Memory. Foundations, Algorithms, Tools, and Applications, Volume 8913 of Lecture Notes in Computer Science, Springer International Publishing, 2015

Conference Publications

"Revisiting Nakamoto Consensus in Asynchronous Networks: A Comprehensive Analysis of Bitcoin Safety and Chain Quality"

Muhammad Saad and Afsah Anwar and Srivatsan Ravi and David Mohaisen
ACM Conference on Computer and Communications Security (CCS) 2021

"Consistent and Secure Network Policy Updates"

James Lembke, Srivatsan Ravi, Patrick Eugster, Pierre Louis Roman
ACM Middleware 2020

"Scalable and Serializable Networked Multi-Actor Programming"

Bo Sang, Gustavo Petri, Srivatsan Ravi, Pierre Louis Roman, Patrick Eugster
Proceedings of the ACM on Programming Languages (PACMPL): Object-oriented Programming, Systems, Languages, and Applications (OOPSLA 2020)

"Programmable elasticity for stateful serverless computing applications"

Bo Sang, Pierre-Louis Roman, Patrick Eugster, Hui Lu, Srivatsan Ravi, Gustavo Petri
Fifteenth EuroSys Conference 2020

"Generalized Paxos made Byzantine (and Less Complex)"

Miguel Pires, Srivatsan Ravi, Rodrigo Rodrigues
19th International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS 2017)

"Cost of Concurrency in hybrid transactional memory"

Trevor Brown and Srivatsan Ravi
Distributed Computing - 31th International Symposium (DISC 2017)
Short version also appeared in 12th ACM SIGPLAN Workshop on Transactional Computing

"Concurrency and privacy with payment-channel networks"

Pedro Moreno-Sanchez, Giulio Malavolta, Aniket Kate, Matteo Maffei, Srivatsan Ravi
ACM Conference on Computer and Communications Security (CCS 2017)
Short version also presented in Scaling Bitcoin 2017: Stanford Workshop

"A concurrency-optimal binary search tree"

Vitaly Aksenov, Vincent Gramoli, Petr Kuznetsov, Anna Malova and Srivatsan Ravi
23rd Intl. European Conference on Parallel and Distributed Computing (EURO-PAR 2017)

"In the search for optimal concurrency"

Vincent Gramoli, Petr Kuznetsov, and Srivatsan Ravi
Structural Information and Communication Complexity - 23rd International Colloquium (SIROCCO 2016)

"Programming scalable cloud services with Atomic Events and Ownership Network (AEON)"

Bo Sang, Gustavo Petri, Masoud Ardekani, Srivatsan Ravi, and Patrick Eugster
17th International Middleware Conference (2016)

"Grasping the gap between blocking and non-blocking transactional memories"

Petr Kuznetsov and Srivatsan Ravi
Distributed Computing - 29th International Symposium (DISC 2015)

"Inherent limitations of hybrid transactional memory"

Dan Alistarh, Justin Kopinsky, Petr Kuznetsov, Srivatsan Ravi, and Nir Shavit
Distributed Computing - 29th International Symposium (DISC 2015)
Short version also appeared in 6th Workshop on the Theory of Transactional Memory

"A concurrency-optimal list-based set (Short paper)"

Vincent Gramoli, Petr Kuznetsov, Srivatsan Ravi and Di Shang
Distributed Computing - 29th International Symposium (DISC 2015)

"Progressive transactional memory in time and space"

Petr Kuznetsov and Srivatsan Ravi
Parallel Computing Technologies - 13th International Conference (PaCT 2015)

"On partial wait-freedom in transactional memory"

Petr Kuznetsov and Srivatsan Ravi
International Conference on Distributed Computing and Networking (ICDCN 2015)

"Safety of deferred update in transactional memory"

Hagit Attiya, Sandeep Hans, Petr Kuznetsov, and Srivatsan Ravi
IEEE 33rd International Conference on Distributed Computing Systems (ICDCS 2013)

"From sequential to concurrent: correctness and relative efficiency (short paper)"

Vincent Gramoli, Petr Kuznetsov, and Srivatsan Ravi
Principles of Distributed Computing (PODC 2012)

"On the cost of concurrency in transactional memory."

Petr Kuznetsov and Srivatsan Ravi

International Conference on Principles of Distributed Systems (OPODIS 2011)

"Independent navigation and functioning of intelligent agents by social interaction"

K. Sakthivel, R. Venkatraghavan, S. Shivashankar, R. Srivatsan, and T. Srinivasan

International Conference on Computational Intelligence for Modelling Control and Automation and International Conference on Intelligent Agents Web Technologies and International Commerce (CIMCA 2006)

Articles and Technical reports

"HashSplit: Exploiting Bitcoin Asynchrony to Violate Common Prefix and Chain Quality"

Muhammad Saad and Afsah Anwar and Srivatsan Ravi and David Mohaisen

Cryptology ePrint Archive: Report 2021/299

Extended version of conference paper in ACM CCS 2021

"Separation and Equivalence Results for Crash-stop and Crash-recovery Shared Memory Models"

Ohad Ben-Baruch and Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/2012.03692, 2020

Full version of workshop paper in NVMW 2021

"Cybersecurity Experimentation for the Programmable Edge"

Terry Benzel, Ryan Goodfellow, Erik Kline, Jelena Mirkovic, Srivatsan Ravi, Stephen Schwab

Position paper, US-Japan Workshop on Programmable Networking, 2020

<https://sites.google.com/view/us-japan-workshop/workshop-report>**"High-fidelity cyber-experimentation for secure and dispersed smart edge ecosystem"**

Ryan Goodfellow, Srivatsan Ravi, Stephen Schwab

Position paper, NSF Midscale Experimental Research Infrastructure Forum (MERIF) 2020

Appears in Workshop Report on Midscale Experimental Research Infrastructures

<https://drive.google.com/file/d/18PT0QbivWwWxHFXPkftCOT9ywrk00fU0/view>**"Cost of Concurrency in hybrid transactional memory"**

Trevor Brown and Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/1907.02669, 2019

Extended version of DISC 2017 conference paper

"Merge: An Architecture for Interconnected Testbed Ecosystems"

Ryan Goodfellow, Lincoln Thurlow, Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/1810.08260, 2018

"Cyber-experimentation for secure and distributed software-defined networking infrastructures"

Srivatsan Ravi and Stephen Schwab

Position paper, Global Experimentation for Future Internet (GEFI 2018)

Appears in GEFI Report: ArXiv Computing Research Repository (CoRR), abs/1901.02929, 2019

"Concurrency and privacy with payment-channel networks"

Pedro Moreno-Sanchez, Giulio Malavolta, Aniket Kate, Matteo Maffei, Srivatsan Ravi

Cryptology ePrint Archive: Report 2017/820

Full version of conference paper in ACM Conference on Computer and Communications Security 2017

"A concurrency-optimal binary search tree"

Vitaly Aksenov, Vincent Gramoli, Petr Kuznetsov, Anna Malova, and Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/1702.04441, 2017

Full version of paper in European Conference on Parallel and Distributed Computing 2017

"On the Cost of Concurrency in Transactional Memory"

Ph.D thesis, Technische Universität Berlin

Committee: Hagit Attiya (The Technion), Anja Feldmann (Technische Universität Berlin), Rachid Guerraoui (EPFL), Petr Kuznetsov (Télécom ParisTech), Uwe Nestmann (Technische Universität Berlin), Michel Raynal (INRIA, Rennes)

ArXiv Computing Research Repository (CoRR), abs/1407.6876, 2015

"A concurrency-optimal list-based set"

Vincent Gramoli, Petr Kuznetsov, Srivatsan Ravi, and Di Shang

ArXiv Computing Research Repository (CoRR), abs/1502.01633, 2015

*Full version of paper in International Symposium on Distributed Computing 2015***"Why transactional memory should not be obstruction-free"**

Petr Kuznetsov and Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/1502.02725, 2015

"Optimism for boosting concurrency"

Vincent Gramoli, Petr Kuznetsov, Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/1203.4751, 2012

*Full version of paper in Principles of Distributed Computing 2012***"WTTM 2011: the third workshop on the theory of transactional memory"**

Petr Kuznetsov and Srivatsan Ravi

ACM Special Interest Group on Algorithms and Computation Theory (SIGACT) News, Vol. 43, 2012

"On the cost of concurrency in transactional memory."

Petr Kuznetsov and Srivatsan Ravi

ArXiv Computing Research Repository (CoRR), abs/1103.1302, 2011

*Extended version of paper in OPODIS 2011***"Transactional memory, linking theory and practice"**

Srivatsan Ravi, Vincent Gramoli, and Victor Luchangco

ACM Special Interest Group on Algorithms and Computation Theory (SIGACT) News, Vol. 41, 2010

Workshop papers

"Separation and Equivalence Results for Crash-stop and Crash-recovery Shared Memory Models"

Ohad Ben-Baruch and Srivatsan Ravi

12th Annual Non-Volatile Memories Workshop (NVMW) 2021

"Programmable Elasticity for Actor-based Cloud Applications"

Bo Sang, Srivatsan Ravi, Gustavo Petri, Masoud Ardekani, Najaf Zadeh Mahsa, Patrick Eugster

9th Workshop on Programming Languages and Operating Systems (PLOS 2017)

"Cost of concurrency in hybrid transactional memory"

Trevor Brown and Srivatsan Ravi

12th ACM SIGPLAN Workshop on Transactional Computing (Transact 2017)

"The misbelief in delay scheduling"

Derek Schatzlein, Srivatsan Ravi, Youngtae Noh, Masoud Ardekani, and Patrick Eugster

4th Workshop on Distributed Cloud Computing (DCC 2016)

"Forget about performance, think about concurrency"

Vincent Gramoli, Petr Kuznetsov, and Srivatsan Ravi

6th Workshop on the Theory of Transactional Memory (WTTM 2014)

"Inherent limitations of hybrid transactional memory"

Dan Alistarh, Justin Kopinsky, Petr Kuznetsov, Srivatsan Ravi, and Nir Shavit

6th Workshop on the Theory of Transactional Memory (WTTM 2014)

“Sharing a sequential data structure: correctness definition and concurrency analysis”

Vincent Gramoli, Petr Kuznetsov, and Srivatsan Ravi
4th Workshop on the Theory of Transactional Memory (WTTM 2012)

“What is safe in transactional memory”

Hagit Attiya, Sandeep Hans, Petr Kuznetsov, and Srivatsan Ravi
4th Workshop on the Theory of Transactional Memory (WTTM 2012)

Selected conference talks and Invited presentations

“High-fidelity cyber-experimentation for secure and dispersed smart edge ecosystem”

NSF Midscale Experimental Research Infrastructure Forum (MERIF) 2020

“Concurrency and Privacy Challenges for Multi-Hop Hash-Time Lock Contracts ”

Simons Workshop on Large-Scale Consensus and Blockchains
Part of UC Berkeley Simons Program on Proofs, Consensus, and Decentralizing Society, Fall 2019
Video link: <https://www.youtube.com/watch?v=qdpYhNWSwuI>

“Cyber-experimentation for secure and distributed software-defined networking infrastructures”

Global Experimentation for Future Internet (GEFI 2018)

“Cost of Concurrency in Hybrid Transactional Memory”

Workshop on Transactional Computing 2017, Austin, Texas

“Towards Scalable and Secure Software-defined Network Controllers”

Northrop Grumman University Research Symposium, Baltimore, April 2018

“Synchronization using Transactions: Lower bounds, Algorithms and Applications”

Information Sciences Institute, University of Southern California (September 2016)
Dept. of Computer Science, University of Southern California (April 2018)

“Towards Safe In-memory Transactions”

CERIAS Seminar, Purdue University (August 2016)
Video link: <https://www.youtube.com/watch?v=NiwkUPL7urw>

“Grasping the Complexity Gap between Blocking and Non-blocking Transactional Memories”

International Symposium of Distributed Computing (DISC) 2015, Tokyo, Japan

“Inherent Limitations of Hybrid Transactional Memory”

International Symposium of Distributed Computing (DISC), 2015, Tokyo, Japan
Hewlett Packard Labs, Palo Alto (July 2016)

“Synchronization using Transactional Memory”

Instituto Superior Technico (IST) Lisbon (July 2015)
NEC Research Lab Heidelberg (June 2015)

“Progressive Transactional memory in Time and Space”

International Conference on Parallel Computing Technologies (PaCT) 2015, Petrozavodsk, Russia

“On Partial Wait-freedom in Transactional memory”

International Conference on Distributed Computing and Networking (ICDCN) 2015, Goa, India

“Safety in Distributed Computing”

Mathematical methods in Distributed computing, Volkswagen Stiftung International Workshop, University of Bremen, Germany, August 2013

“Safety of Deferred-update semantics in Transactional Memory”

International Conference on Distributed Computing Systems (ICDCS) 2013, Philadelphia, U.S.A

“Optimistic Transactions vs. Pessimistic Locks”

Scalable Synchronization group, Oracle Labs, Burlington (July 2013).

"From Sequential to Concurrent: Correctness and Relative Efficiency"
Principles of Distributed Computing (PODC), 2012, Madeira, Portugal
Technion Systems Lunch (Spring 2012), The Technion, Haifa.

"On the Cost of Concurrency in Transactional Memory"
International Conference on Principles of Distributed Systems (OPODIS), 2011, Toulouse, France
TRANSFORM Winter School, March 2011, INRIA Rennes, France.

"Network Topology, Routing and Security Model of Freenet"
Free and Open Source Software (FOSS.IN) Conference 2008, Indian Institute of Science.

Students

Ph.D students

Weizhao Jin: Fall 2020 -> ?

Sulyab Thottungal: Spring 2021 -> ?

Charles Bickham: Fall 2021 -> ?

Yixiang Yao: Fall 2021 -> ?

Graduate students, Interns and Directed Research

Chen Pohan (Masters student USC): Spring 2021 -> ?

Tanmay Ghai (Masters student USC): Fall 2020 -> ?

Ryan Thomas (Masters student USC): Fall 2019

Shreyas Mishra (Masters student; University of Massachusetts Amherst): USC Intern, Summer 2018

Marton Demeter (Masters student; USC): Summer 2018 (joint with Christophe Hauser)

Ph.D Committee

James Lembke (Ph.D., Purdue University)

Nicolaas Weideman (Ph.D Qualifying Committee, USC)

Undergraduate

Jonathan Wang (San Jose State University): Summer student at USC as part of Viterbi SURE 2021

Karthik Sivanadiyan (USC): Fall 2019 as part of USC Undergraduate Research Associates Program

YingChen Wang (USC): Fall 2018

Visiting Ph.D students

Muhammad Saad (University of Central Florida): Summer 2019

Kasra Koorehdavoudi (Washington State University): Summer 2018

Achievements and Distinctions

University of Southern California, Information Sciences Institute Publication Award 2017

Marie Curie Actions Ph.D Fellowship 2010-2013

Programming competitions

Top-20 in *IBM-Inter Collegiate Programming Contest (ICPC)*, 2006 for the ACM India Regionals and Online Qualifiers

Winner-Debugging Contest, *Kurukshetra* 2007, Anna university

Second place-Programming Contest, *Abacus* 2007 and *Kurukshetra* 2007, Anna University

University services

USC Viterbi School of Engineering Faculty Council, Elected voting member, 2021-2022
 USC Computer Science Ph.D Fellowship Admissions Committee, 2018-19
 Faculty advisor: USC Information Sciences Institute Graduate Student Symposium 2019

Professional services

Journal reviews

Concurrency and Computation: Practice and Experience 2021
 IEEE/ACM Transactions on Networking 2021
 ACM Transactions on Parallel Computing 2020
 Symposium on Stabilization, Safety, and Security of Distributed Systems 2018 Special Issue for Information and Computation (I&C) 2020
 IEEE Journal on Special Areas in Communications (JSAC): Special Issue on Scalability Issues and Solutions in Software-Defined Networks
 IEEE Transactions on Network and Service Management (TNSM)
 Elsevier Computer Networks Journal (COMNET)
 Distributed Computing (DC), Springer
 Euro-TM Lecture notes in Computer science, Springer 2015

Conference reviews

Program Committee member: International Conference on Distributed Computing Systems (ICDCS) 2021, ACM SIGPLAN conference on Systems, Programming, Languages, and Applications (SPLASH) SRC 2021
 External reviewer: ACM SIGCOMM 2019
 Subreviewer: ACM Symposium on Parallelism in Algorithms and Architectures (SPAA) 2019
 Subreviewer: International Colloquium on Structural Information and Communication Complexity (SIROCCO) 2016
 Subreviewer: International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS) 2017

One of the organizers of the Workshop on the Theory of Transactional Memory (WTTM'11) held in conjunction with DISC'11 in Rome.

One of the student editors of the report on the Dagstuhl Seminar on *Applications of Combinatorial Topology to Computer Science*, March 2012.

Research Schools and Seminar participation

UC Berkeley Simons Workshop on Large-Scale Consensus and Blockchains, Oct 2019
 Northrop Grumman University Research Symposium, Baltimore, April 2018
Mathematical methods in Distributed Computing, Volkswagen Stiftung International Workshop, University of Bremen, August 2013
Hot topics in Distributed Computing (HPDC), La Plagne, March 2012
 Ph.D Summer School, Microsoft Research (MSR) Cambridge, July 2012
 Dagstuhl Seminar on *Abstractions for scalable multi-core computing*, April 2012
 Dagstuhl Seminar on *Applications of Combinatorial Topology to Computer Science*, March 2012