

Rajath Shashidhara

✉ rajaths@utexas.edu • 🌐 cs.utexas.edu/~rajaths • in [rajath-s](#)
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Education

University of Washington <i>Ph.D. Computer Science</i>	Seattle, WA <i>Starting Jan 2022</i>
The University of Texas at Austin <i>Ph.D. Computer Science</i> Advisor: Dr. Simon Peter Areas: Systems & Networking	Austin, TX <i>2021–2025</i>
The University of Texas at Austin <i>M.S. Computer Science, GPA: 4.0/4.0</i> Courses: Operating Systems, Datacenters, Virtualization, Distributed Systems Thesis: Flexible TCP offload to programmable SmartNICs with Fine-Grained Parallelism Teaching Experience: Cloud Computing (Spring 20)	Austin, TX <i>2019–2021</i>
Birla Institute of Technology and Science <i>M.Sc. Physics + B.E. Computer Science, GPA: 9.01/10 Distinction Class</i> Awarded Best Student of Batch 2017 Thesis: Driven Aubry-André-Harper systems Advisors: Dr. Tapomoy Guha Sarkar & Prof. Sundar Balasubramaniam	Pilani, India <i>2012–2017</i>

Research Experience

The University of Texas at Austin <i>Graduate Research Assistant</i> Advisor: Dr. Simon Peter	Austin, TX <i>2019–Present</i>
Flexible TCP offload to programmable SmartNICs with Fine-grained Parallelism (<i>*in review*</i>) <ul style="list-style-type: none">Full stateful offload of TCP packet processing to SmartNIC – frees CPU cores from TCP overhead.Data transfer directly from application memory to wire, eliminating OS and context switch overheads.POSIX-compliant: Unlike RDMA, no modifications required to application and network configuration.Memcached scales up to 38% better versus TAS, while saving 81% host CPU cycles versus Chelsio ToE.Provides competitive performance for RPCs, even with wimpy SmartNICs.Interoperates well with other TCP stacks and is easily extensible using XDP-eBPF.	
Distributed file systems with Client-Local NVMs <ul style="list-style-type: none">Scaling client-local NVM filesystems like Assise beyond rack-scale.In-network caching, coordination and coherence mechanisms.	
Distributed key-value store with co-located Serverless compute <ul style="list-style-type: none">Aggregate compute and storage to exploit data locality.Improves execution time of serverless compilation workloads by 1.6x and 5x reduction in data movement compared to conventional disaggregated deployments.	
SRoCE: Software RDMA over Commodity Ethernet <ul style="list-style-type: none">Software-based flexible RDMA verbs implementation using high performance user-space TCP stack.Achieved 3x single-connection throughput for one-sided 1000 bytes RDMA ops as compared to H/W RDMA NICs.	
Improving connection scalability of TAS: datacenter TCP stack <ul style="list-style-type: none">Increased throughput by 10% at 100k connections by improving TCP shaping and congestion control module.	

Samsung Research <i>Senior Software Engineer (Research)</i> Advisors: Anshuman Nigam & Dr. Dojun Byun 5G Radio Access Network data-plane R&D <ul style="list-style-type: none"> o Involved in the development of world's first pre-5G mobile user equipment. o Data-plane technical support for the 5G demo at <i>Winter Olympics (South Korea, 2018)</i>. o <i>Parallelization, memory management and flow control</i> research: improved throughput, ultra-low latency reliable transport, and reduced memory footprint on 5G Distributed Units. o <i>Samsung Technical Excellence</i> and <i>Outstanding Project</i> awards for quality and impact. Reinforcement Learning based radio-resource schedulers <ul style="list-style-type: none"> o Modeled scheduling as a Partially Observable Markov Decision Process to solve multi-objective optimization in stochastic input-driven environments. (GLOBECOM'20) 	Bangalore, India & Suwon, South Korea <i>2017–2019</i>
Birla Institute of Technology and Science <i>Research Student</i> Advisor: Dr. Tapomoy Guha Sarkar Studying Quantum Chaos in Aubry-André-Harper electron systems <ul style="list-style-type: none"> o Studied phase transitions in Hofstadter's butterfly under time-varying magnetic field and the relationship between topological invariants and Hall conductivity. (PhysRevA'16) o Simulated and computationally evaluated solutions to Schrodinger's equation for special quantum systems using perturbation methods and computational physics algorithms. 	Pilani, India <i>2015–2016</i>
National Central University <i>Undergraduate Research Assistant</i> Advisor: Dr. Ko Chung-Ming Gravitational lensing in elliptical galaxies <ul style="list-style-type: none"> o Analytically derived the gravitational lensing equation for elliptical galaxies. o Developed a <i>distributed recursive sub-gridding</i> algorithm to find the solution on a cluster and simulate the lensing. 	Zhongli, Taiwan <i>Summer 2015</i>
Bhaskaracharya Institute of Space Applications and Geoinformatics <i>Undergraduate Research Assistant</i> Satellite image geo-registration and stitching <ul style="list-style-type: none"> o Developed plugins to automatically orient & morph satellite images to match GPS co-ordinates for QGIS – open-source geo-information system. o Satellite image stitching using SIFT, SURF algorithms in OpenCV. 	Gujarat, India <i>Summer 2014</i>

Industry Experience

Confluent <i>Software Engineering Intern</i> Kubernetes control plane for deployment life-cycle management of Kafka clusters. Designed <i>safe and seamless live migration</i> of Kafka deployments with no service disruption.	Mountain View, CA <i>Summer 2020</i>
Symantec <i>Software Engineering Intern</i> Designed a proof-of-concept cloud-ready web application to automate purchase, delivery & installation of SSL certificates for services hosted on Amazon AWS.	Bangalore, India <i>Spring 2017</i>
Microsoft R&D <i>Software Engineering Intern</i> Integrated Azure AD cloud authentication/authorization service into ASP.NET Core.	Hyderabad, India <i>Summer 2016</i>
Google Summer of Code <i>Open-source Intern</i> Document version-control toolbar integrated with cloud repositories in Apache OpenOffice.	Apache Software Foundation <i>Summer 2013</i>

Projects

IoT enabled Laboratory Environment: Project SmartLAB

BITS, Pilani

Undergraduate Researcher

2012-2013

Proactive lab monitoring and activity tracking using sensor networks, speech and gesture recognition

- o Awarded *Prof. I J Nagrath Student Project Fund* by Dept. of Electrical Engineering, BITS Pilani.
- o Won 2nd place in *Siemens Home Automation challenge*.
- o Blog: <https://smartlabbits.wordpress.com>

Awards

Best Student of Batch 2017: adjudged by Dept. of Physics, BITS Pilani

BITS Pilani MCN Scholarship: 80% tuition fee waiver for all semesters (top 5% in a batch of 800 students)

Prof. I J Nagrath Student Project Fund: awarded by BITSAA & Dept. of EE, BITS Pilani

Samsung Annual Excellence Awards: organization-wide award for technical excellence

Samsung Professional Software Competency: held by < 10% employees globally when obtained

Publications

- [1] Rajath Shashidhara. *TASNIC: a flexible TCP offload with programmable SmartNICs*. Master's thesis, The University of Texas at Austin, 2021. DOI: 10.26153/tsw/14442.
- [2] Jitender Singh Shekhawat, Rishabh Agrawal, K Gautam Shenoy, and Rajath Shashidhara. A reinforcement learning framework for qos-driven radio resource scheduler. In *GLOBECOM 2020 - 2020 IEEE Global Communications Conference*, pages 1–7, 2020. DOI: 10.1109/GLOBECOM42002.2020.9322182.
- [3] Rajath Shashidhara. *Driven Aubry-André-Harper systems*. Master's thesis, Birla Institute of Technology and Science, Pilani, 2017. URL: https://cs.utexas.edu/~rajaths/thesis_phy.pdf.
- [4] Tridev Mishra, Rajath Shashidhara, Tapomoy Guha Sarkar, and Jayendra N. Bandyopadhyay. Phase transition in an aubry-andré system with a rapidly oscillating magnetic field. *Phys. Rev. A*, 94:053612, 5, November 2016. DOI: 10.1103/PhysRevA.94.053612.

Skills

Languages: C, C++, Java, Python (+numpy/scipy/matplotlib/PyTorch), Go, Julia, \LaTeX , P4, JavaScript

Frameworks: MPI, OpenMP, Pthreads, DPDK, NodeJS, Kubernetes

Tools: git, gdb, make, valgrind, strace, perf, qemu-kvm