Nikhil D. Hegde

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RESEARCH INTERESTS

I am interested in the areas of parallel and distributed computing, and programming languages. Specifically, I am interested in developing techniques to bridge the gap between performance and ease of programming of irregular applications on heterogeneous systems.

EDUCATION

Ph.D	Electrical and Computer Engineering, **Purdue University**, West Lafayette, USA *Thesis: Distributed Execution of Recursive Irregular Applications* Advisor: Prof. Milind Kulkarni	2019
M.Tech	Computer Science and Engineering, **Indian Institute of Technology**, Madras, India *Thesis: Mobility Management and the Role of Mobile Node in Meghadoot Architecture* Advisor: Prof. C. Siva Ram Murthy	2005
B.E	Computer Science and Engineering, **B.M.S.College of Engineering**, Bangalore, India	2002

POSITIONS SUMMARY

Assistant Professor	Indian Institute of Technology Dharwad, Karnataka, India	08/19 -present
Graduate Instructor	Purdue University, West Lafayette, USA	06/19 - 08/19
Teaching Assistant	**Purdue University**, West Lafayette, USA	01/19 - 05/19
Research Assistant	**Purdue University**, West Lafayette, USA	2017 – 2018
Summer Intern	Technology Manufacturing Group, AQS, **Intel Corp.**, Hillsboro, USA	2017
Research Assistant	**Purdue University**, West Lafayette, USA	2014 – 2017
Teaching Assistant	**Purdue University**, West Lafayette, USA	2013 – 2014
Senior Engineer	Mobile Communications Group, **Intel India Pvt. Ltd.**, Bangalore	2012 – 2013
Senior Engineer	Symbian Technology Group, **Nokia India Pvt. Ltd.**, Bangalore	2010 – 2012
Senior Engineer	**AdsFLO India Pvt. Ltd.**, Bangalore	2007 – 2010
Software Engineer – II	HPC Connectivity Group, **STMicroelectronics India Pvt. Ltd.**, Greater Noida	2005 – 2007
Software Engineer	**Infosys Technologies Ltd.**, Bangalore	2002 – 2003

PUBLICATIONS

CONFERENCES

- Abhishek Josyula, Pritesh Verma, Amar Gaonkar, Amlan Barua, **Nikhil Hegde**. 2024. Optimizing a Super-fast Eigensolver for Hierarchically Semiseparable Matrices, *International Conference on Parallel Processing (ICPP). https://doi.org/10.1145/3673038.3673119*
- Vivek Shahare, Milind Chabbi, and **Nikhil Hegde**, 2023. Protecting Locks against Unbalanced Unlock(), *Symposium on Parallelism in Applications and Algorithms (SPAA).* https://doi.org/10.1145/3558481.3591091.
- **Nikhil Hegde,** Qifan Chang, and Milind Kulkarni. 2019. D2P: From Recursive Formulations to Distributed-Memory Codes. In *Proceedings of the International Conference for High Performance Computing, Networking, Storage, and Analysis* (SC). https://doi.org/10.1145/3295500.3356205. Acceptance Rate: 23%

- **Nikhil Hegde**, Jianqiao Liu, and Milind Kulkarni. 2017. SPIRIT: A Framework for Creating Distributed Recursive Tree Applications. In *Proceedings of the International Conference on Supercomputing* (ICS). ACM, New York, NY, USA, Article 3, 11 pages. https://doi.org/10.1145/3079079.3079095 Acceptance rate: 16%.
- **Nikhil Hegde**, Jianqiao Liu, Kirshanthan Sundararajah, and Milind Kulkarni. 2017. Treelogy: A benchmark suite for tree traversals. In *2017 IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*. 227-238. https://doi.org/10.1109/ISPASS.2017.7975294 Acceptance rate: 30%.
- Jianqiao Liu, **Nikhil Hegde**, and Milind Kulkarni. 2016. Hybrid CPUGPU Scheduling and Execution of Tree Traversals. In *Proceedings of the 2016 International Conference on Supercomputing (ICS'16)*. ACM, New York, NY, USA, Article 2, 12 pages. https://doi.org/10.1145/2925426.2926261 Acceptance rate: 24%.
- K. Balaji, **N. Hegde**, B. V. Ramana, B. S. Manoj, and C. S. R. Murthy. 2005. Performance evaluation of a hybrid wireless network architecture for rural communication. In *2005 IEEE International Conference on Personal Wireless Communications, 2005. ICPWC 2005.* 212-216. https://doi.org/10.1109/ICPWC.2005.1431334
- **N. Hegde**, K. Balaji, B. V. Ramana, B. S. Manoj, and C. S. R. Murthy. 2005. Implementation and Performance Evaluation of a Hybrid Wireless Network Architecture for Rural Communication. In *Proceedings of the Eleventh National Conference on Communications: NCC-2005*. ISBN: 8177647350 9788177647358

TECHNICAL REPORTS

- Bonthu Vyuhita, **Nikhil Hegde**. 2023. *Accelerated Development of Efficient Matrix Multiplication for Heterogeneous Systems.* Short Paper, HiPC Student Research Symposium, Goa, India.
- Deepan Raj, Bonthu Vyuhita, **Nikhil Hegde**. 2022. *Generating Efficient Parallel codes for Recursive Linear-Algebra Algorithms.* Extended Abstract, HiPC Student Research Symposium, Bengaluru, India.
- **Nikhil Hegde,** Qifan Chang, and Milind Kulkarni. 2018. *D2P: Automatically generating distributed dynamic programming codes.* School of Electrical and Computer Engineering Technical Report TR-ECE-18-09. Purdue University, West Lafayette, IN, USA. https://docs.lib.purdue.edu/ecetr/492

AWARDS, GRANTS, and SERVICE

- (Grant) Development of DSL for Radio Access Network Functions and related hardware accelerators – Phase 2, Tejas Networks 2025
- (Grant) Compiler Optimizations in LLVM, QUALCOMM Inc. 2025
- (Grant) Development of DSL for Radio Access Network Functions and related hardware accelerators, Saankhya Labs 2024
- (Grant) Toward an Auto-Programming Framework for Recursive Irregular Applications, SERB-SRG, Principal Investigator 2022-2024
- (Grant) Fast Eigensolvers for Large-Scale Hierarchical Matrices -From Design to Deployment, DST-NSM, Principal Investigator 2021-2023
- (Grant) "D2P: A framework for code generation and distributed-memory parallelization of dynamic programming algorithms". Allocation Manager: (PI: Milind Kulkarni), 11/18 - 11/19, XSEDE Startup Grant TG-ASC170007 2018
- (Grant) NSF travel grant to attend ISPASS, Santa Rosa, CA. 2017
- (Grant) NSF travel grant to attend IISWC, Providence, RI. 2016
- (Award) Outstanding Service Award – CCGRID'23 2023
- PPoPP'24 – ERC member, PPoPP'23 (Artifact Evaluation Chair), CCGRID'23 (Early Career and Students' Showcase Co-chair) 2023
- Supercomputing (SC), mentor: 2020, 2021; Tutorial Committee Member: 2022-2025

- HiPC, Technical Program Committee Member, 2022, 2023
- ACM TACO, Reviewer 2022, 2025
- IEEE TPDS, Reviewer 2025
- International Conference on Parallel Processing (ICPP), Technical Program Committee member 2020, 2022
- TPC: Indosys'25, ICDCIT'25

TALKS, WORKSHOPS, and PRESENTATIONS

- Compiler Optimizations in LLVM, Qualcomm Inc. Hyderabad, 2025
- Optimizing a Super-fast Eigensolver for Hierarchically Semiseparable Matrices, Sweden 2024
- Revisiting model checking of parameterized systems with counter abstraction and environment abstraction, Formal Methods Update Meeting, IIT Dharwad 2024
- Protecting Locks Against Unbalanced Unlock() (SPAA), Orlando, Florida 2023
- Concurrency and Java, Invited Talk, Mentor Graphics (Siemens EDA) 2021
- Parallel Programming Models, Invited Talk, NIT Andhra Pradesh 2021
- HPC101, Workshop, under the ambit of National Supercomputing Mission (NSM) 2021
- Parallel Programming Models, 2-day workshop, Broadridge Financial Solutions 2020
- SPIRIT: A runtime system for distributed irregular tree applications
  International Conference on Supercomputing (ICS), Chicago 2017
- Treelogy: a benchmark suite for tree traversal applications
  IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS), Santa Rosa 2017
- Implementation and Performance Evaluation of a Hybrid Wireless Network Architecture for Rural Communication
  National Conference on Communications (NCC), IIT Kharagpur, India 2005

POSTERS

- Accelerated Development of Efficient Matrix Multiplication for Heterogeneous Systems, HiPC, SRS, Goa 2023
- Generating Efficient Parallel codes for Recursive Linear Algebra Algorithms, HiPC, SRS, Bengaluru 2022
- SPIRIT: A runtime system for distributed irregular tree applications
  Principles and Practice of Parallel Programming (PPoPP), Barcelona 2016
- Treelogy: a benchmark suite for tree traversal applications
  IEEE International Symposium on Workload Characterization (IISWC), Providence 2016

SOFTWARE CREATED

- **SPIRIT and Treelogy - https://bitbucket.org/plcl/treelogy**
- **D2P - https://bitbucket.org/plcl/d2p**

OTHER PROJECTS

- WaSP: Ensemble-based Warm-Starting Parameter Initialization for Training of Neural Network Models (Purdue University, Research project, 2/2016).
- A compiler for the LITTLE programming language (Purdue University, ECE573 project, 12/2013).

TEACHING EXPERIENCE

Assistant Professor — Computer Science and Engineering, **IIT Dharwad** 8/2019-present

CS406 (Compilers), CS316 (Compilers Lab), CS305 (Software Engineering)
CS601 (Software Development for Scientific Computing),
CS410 (Parallel Computing)
CS101 (Programming in C), ME113 (Hands-on Engineering Lab)

- Fully responsible for teaching CS406, CS316, CS305, CS601: creating syllabus (CS601 only),

updating the course content, delivering lectures to a large class, holding office hours, preparing exams, managing tools (GitHub Classroom, GitHub teams, Actions, Autograding), designing and updating the course webpage for efficient realization of course objectives;
https://hegden.github.io/teaching

Graduate Instructor — Electrical and Computer Engineering, **Purdue University** — 6/2019 – 8/2019
Advanced C Programming (ECE264)

- Fully responsible for teaching the course: updating the course content, delivering lectures to a large class, holding office hours, preparing exams, managing tools (GitHub Classroom, Piazza), designing and updating the course webpage for efficient realization of course objectives;
https://hegden.github.io/ece264

Teaching Assistant — Electrical and Computer Engineering, **Purdue University**
Introduction to Data Science (ECE29595) — 1/2019 – 5/2019
Introduction to ASIC Design (ECE337) — 8/2013 – 5/2014

- Delivered short lectures at the beginning of the lab session, assisted students on their programming tasks, graded assignments and exams, advised on project execution and presentation.

Lab Assistant — Computer Science and Engineering, **Indian Institute of Technology, Madras** — 8/2004 – 4/2005
Paradigms of Programming (CS3100)
Introduction to Computer Science and Engineering (CS1300)

- Assisted students on their programming tasks.

PROFESSIONAL EXPERIENCE

Intern — **Advanced Quality Systems, MTD, Intel Corp.,** Hillsboro, USA — 5/2017 – 8/2017

- Built predictive models using machine learning techniques to accurately predict yield and quality in Intel's chip manufacturing lines

Senior Engineer — **Mobile Communications Group, Intel India Pvt. Ltd.**, Bangalore — 7/2012 – 8/2013

- *Development, and integration of GPS receiver software modules on cellular platform.*
Designed and developed modules to support different positioning protocols: OTDOA, Assisted-GPS (AGPS), Network-based, and LTE Positioning Protocol.

Senior Engineer — **Nokia India Pvt. Ltd.**, Bangalore — 6/2010 – 6/2012

- *Creation of hardware adaptation and OS layer for GPS receiver chips used in Nokia smartphones.*
Ported I2C driver for SMP compliance, improved Symbian OS scheduler, developed location services protocols (RRLP, RRC, SUPLV1.0) and tested for GCF and PTCRB compliance, developed modules to support Assisted-GPS and network-based positioning technologies**.**
- *Creation of robust authentication methods for Mobile Device Management (DM)*
Developed modules to support mutual-authentication of mobile device and DM server.

Senior Engineer — **AdsFLO India Pvt. Ltd.**, Bangalore — 10/2007 – 5/2010

- *Creation of targeted mobile advertising solutions for iOS, WinCE, Symbian based smartphones, and DVB-H based devices.*
Supported demonstration of the product at MWC (2007 – 2009), and CES (2008 – 2009), developed Ad-scheduling algorithms to ensure fairness, optimize fill rate, and minimize Ad fatigue, developed Electronic Service Guide (ESG), and applied basic image-processing and error-correction algorithms.
- *Recruitment for the mobile devices team*
Conducted technical interviews and mentored new employees

Software Engineer – II — **STMicroelectronics India Pvt. Ltd.**, Greater Noida — 7/2005 – 10/2007

- *Design and development of link-layer software for the DVB-H receiver chip.*
  Modeled memory controller, Reed-Solomon encoder, and DVB-H traffic decoder in software. Performed link layer validation of DVB-H IP on FPGA, Implemented drivers for taped-out chip.

Software Engineer **Infosys Technologies Ltd.**, Bangalore 12/2002 – 7/2003

- Tested MPLS enabled network switches.

SKILLS

Programming: C, C++, Symbian C++, Objective C, Perl, Python, Shell, OpenGL-ES, Linux Kernel, MPI, OpenMP, Pthreads, Boost Graph Libraries, LLVM, MLIR, CUDA-C
Debuggers: Lauterbach, Trace-32, Fastrace, ARM extended debugger (AXD), Multi-ICE, gdb.
Others: Spirent ULTS, Cadence SimVision, WireShark Network Traffic Analyzer, OpenSSL, JBoss, and Tomcat, LaTeX.
Versioning and Quality: Rational tool chain, SVN, CVS, Git, Bugzilla.