Name: Nandivada Venkata Krishna
E-mail: nvk@iitm.ac.in **Phone:** +91-44-2257-4380

Educational Background

Degree	University	Graduation	Dept.
B.E.	R.E.C. Rourkela	May 1998	CSE
M.E.	Indian Institute of Science	Jan 2000	CSA
PhD	Purdue University	Aug 2003(transfer)	CS
PhD	UCLA	Dec 2005	CS
	Thesis: Combining Stack Location Allocation with Register Allocation. Advisor: Jens Palsberg		

Work Experience

- July 2015 - : Associate Professor, IIT Madras, Chennai.
- October 2011 - July 2015: Assistant Professor, IIT Madras, Chennai.
- October 2008 - September 2011: Research Staff Member, IBM Research, Bangalore.
- Feb 2006 - October 2008: Research Staff Member, IBM Research, New Delhi.
- May 2003-Aug 2003: Summer intern at Sun Labs, Burlington in the garbage collection group, under Dr. David Detlefs.
- Feb 2000-Jul 2001: Senior software engineer at Hewlett Packard, Bangalore, in the low level optimization and code generation group of the PA-RISC C and C++ compiler.

Teaching Experience

- IIT Madras: Software Engineering (undergraduate course, 2011, 2012), Principles of Programming languages (graduate course, 2012, 2013, 2014), Modern Compilers - Theory and Practice (graduate course, 2012, 2013, 2015), Compiler Design (undergraduate course, 2012, 2013, 2014), Compiler Design Lab (undergraduate course, 2012, 2013, 2014), Recent topics in Compilers (graduate course, 2015)
- IIT Delhi: Advanced Compiler Construction (graduate course, even semester 2007).
- University of California, Los Angeles: Compiler Construction (teaching assistant to Prof. Jens Palsberg, Fall 2005), Programming Languages (teaching assistant to Prof. Jens Palsberg, Fall 2004)

Areas of interest

- Program optimization: High level and low level (architecture specific) optimizations, interaction between optimizations, mathematical models for optimization, issues in static and dynamic code optimizations.
- Program verification: Static and Dynamic program verification for time, memory and threads related properties.

- Program analysis: Reasoning about programs by static analysis, type based analysis.
- Language extensions: For the ease of programming and program analysis.

Publications and Patents

Journal papers / Book Chapters

1. *Dynamic State Restoration Using Versioning Exceptions*, with Suresh Jagannathan. In the Journal of Higher Order Symbolic Computation, Vol 19(1), pp:101-124, March **2006**.
2. *Advances in Register Allocation.* Book chapter in 'The Compiler Design Handbook: Optimizations and Machine Code Generation'. Editors: Y. N. Srikant and Priti Shankar. CRC Press, **2007**
3. *A Transformation Framework for Optimizing Task-Parallel Programs*, with Jun Shirako, Jisheng Zhao and Vivek Sarkar. In the ACM Transactions on Programming Languages and Systems (TOPLAS), **2013**.
4. *Improved Bitwidth-Aware Variable Packing*, with Rajkishore Barik. In the ACM Transactions on Architecture and Code Optimization (TACO), **2013**.
5. *IMSuite: A Benchmark Suite for Simulating Distributed Algorithms*, with Suyash Gupta. In the Journal of Parallel and Distributed Computing (JPDC), **2015**.
6. *Lexical State Analyzer for JavaCC grammars*, with Kartik Gupta. In Software: Practice and Experience, **2015**.
7. *Energy Efficient Compilation of Irregular Task-Parallel Loops*, with Rahul Shrivastava In the ACM Transactions on Architecture and Code Optimization (TACO) (to appear).

Papers in Conferences

1. *Efficient Spill Code with SDRAM*, with Jens Palsberg. In Proceedings of 4^{th} International Conference on Compilers, Architecture and Synthesis for Embedded Systems, pp:24-31, October **2003**. (Acceptance rate 19%)
2. *Compile-Time Concurrent Marking Write Barrier Removal*, with David Detlefs. In the proceedings of the 3^{rd} annual IEEE/ACM international symposium on Code Generation and Optimization, pp: 37-48, March **2005**. (Acceptance rate = 35%)
3. *Timing analysis of TCP servers for surviving denial-of-service attacks*, with Jens Palsberg. In the proceedings of the 11^{th} IEEE Real-Time and Embedded Technology and Applications Symposium, pp: 541-549, March **2005**. (Acceptance rate 33%)
4. *SARA: Combining Stack Allocation and Register Allocation*, with Jens Palsberg. In the proceedings of the 15^{th} International Conference on Compiler Construction, pp: 232-246, April **2006**. (Acceptance rate 24%)

5. *A framework for end-to-end evaluation of register allocators* with Fernando Pereira and Jens Palsberg. In the proceedings of the 14^{th} International Static Analysis Symposium, pp: 153-169, August **2007**. (Acceptance rate 30%)

6. *Static Detection of Place Locality and Elimination of Runtime Checks*, with Shivali Agarwal, Rajkishore Barik, Rudrapatna K. Shyamasundar, and Pradeep Varma. In the proceedings of the 6^{th} ASIAN Symposium on Programming Languages and Systems, pp: 53-73, December **2008**. (Acceptance rate = 50%)

7. *Efficient, portable implementation of asynchronous multi-place programs*, with Ganesh Bikshandi, Jose G. Castanos, Sreedhar B. Kodali, Igor Peshansky, Vijay Saraswat, Sayantan Sur, and Pradeep Varma. In the proceedings of the 14^{th} ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming, pp: 271-282, February **2009**. (Acceptance rate = 24%)

8. *Chunking Parallel Loops in the Presence of Synchronization*, with Jun Shirako, Jisheng Zhao, and Vivek Sarkar. In the proceedings of the 23^{rd} ACM International Conference on Supercomputing, pp: 181-192, June **2009**. (Acceptance rate = 25%)

9. *Reducing Task Creation and Termination Operations in Explicitly Parallel Programs*, with Jisheng Zhao, Jun Shirako, and Vivek Sarkar. In the proceedings of the 19^{th} International Conference on Parallel Architectures and Compilation Techniques, pp:169-180, September **2010**. (Acceptance rate = 17%)

10. *Inferring Arbitrary Distributions for Data and Computation*, with Soham S Chakraborty. In the proceedings of the 5^{th} ACM SIGPLAN SPLASH (previously OOPSLA) Onward!, pp:51-60, October **2010**. (Acceptance rate = 25%)

11. *Fault Localization for Data-Centric Programs*, with Diptikalyan Saha, Pankaj Dhoolia, Mangala Gowri Nanda, Vibha Sinha and Satish Chandra. in the Proceedings of the 19th ACM SIGSOFT Symposium on the Foundations of Software Engineering, pp:157-167, September **2011**. (Acceptance rate = 17%)

12. *A framework for analyzing programs written in proprietary languages*, with Mangala Gowri Nanda, Pankaj Dhoolia, Diptikalyan Saha, Anjan Nandy, Arup K Ghosh, in the Proceedings of SPLASH Wavefront, ACM, pp:289-300, October **2011**. (Acceptance rate = 50%)

13. *Identifying Services from Business Applications*, with Raghavan Komondoor, Saurabh Sinha and John Field, in the Proceedings of the 5th India Software Engineering Conference (ISEC), ACM, pp:13-22, February **2012**. (Acceptance rate = 8%)

14. *Improved Bitwidth-Aware Variable Packing*, with Rajkishore Barik. Presented in High Performance and Embedded Architecture and Compilation conference (HiPEAC), **2014**.

15. *Unique Worker model for OpenMP*, with Raghesh Aloor, in the Proceedings of the 29th International Conference on Supercomputing (ICS), pp:47-56, June **2015**. (Acceptance rate = 25%)

16. *Loop tiling in the presence of exceptions*, with Abhilash Bhandari, in the Proceedings of the 29th European Conference on Object-Oriented Programming (ECOOP), pp:124-148, July **2015**. (Acceptance rate = 23%)

17. *Improved MHP Analyses*, with Aravind Sankar and Soham Chakraborty, in the Proceedings of the 25th International Conference on Compiler Construction (CC), pp: 207-217, Mar **2016**. (Acceptance rate = 31%)

18. *Refactoring Opportunities for Replacing Type Code with State and Subclass*, with Jyothi Vedurada, (to appear) in the (companion) Proceedings of the 25th International Conference on Software Engineering (ICSE), May **2017**.

19. *Optimizing Recursive Task Parallel Programs*, with Suyash Gupta and Rahul Shirvastava, (to appear) in the Proceedings of the 25th International Conference on Supercomputing (ICS), Jun **2017**.

Unrefereed papers/manuscripts under evaluation

1. *Parallelizing Loops in Asynchronous Programs*, with Soham Chakraborty, IBM Research Technical Report RI10007, 2010.

2. *IMSuite: A Benchmark Suite for Simulating Distributed Algorithms*, with Suyash Gupta, CoRR arXiv cs.FL/1310.2814, 2013.

3. *Lexical State Analyzer*, with Kartik Gupta CoRR arXiv cs.FL/1308.3156, 2013.

4. *DCAFE: Dynamic load-balanced loop Chunking & Aggressive Finish Elimination for Recursive Task Parallel Programs*, with Suyash Gupta and Rahul Shrivastava, CoRR arXiv cs.DC/1502.06086, 2015.

Patents - Granted

1. Selectively eliminating write barriers in snapshot-at-the beginning concurrent-marking garbage collectors, with David Detlefs (US Patent no: 7685580).

2. Method, System and Program Storage Device that Provide for Automatic Programming Language Grammar Partitioning, with Pankaj Dhoolia, Mangala Gowri, and Diptikalyan Saha (US Patent no: 8516457).

3. System and Method for Dynamic Code Analysis in presence of the "table processing" idiom, with Pankaj Dhoolia, Mangala Gowri, and Diptikalyan Saha (US Patent no: 8583965).

4. Model, System and Program Storage Device for automatic incremental learning of Programming language grammar, with Pankaj Dhoolia, Mangala Gowri, and Diptikalyan Saha (US Patent no: 8676826).

5. An intermediate form for bitwidth sensitive applications and uses thereof, with Rajkishore Barik, Filed for US patent, published (US Patent no: 8732680).

6. Transformation of computer programs and eliminating errors, with Pankaj Dhoolia, Anup Kumar Ghosh, Sugata Ghosal, Asidhara Lahiri, Mangala Gowri Nanda, Anjan Nandy, Diptikalyan Saha. (US Patent no: 8806452).

7. Fault localization for data-centric programs, with Satish Chandra, Pankaj Dhoolia, Mangala Gowri Nanda, Diptikalyan Saha, Vibha Singhal Sinha. (US Patent no: 8892951).

8. Systems and methods for automatically optimizing high performance computing programming languages, with Ganesh Bikshandi, Igor Peshanski and Vijay Saraswat. (US patent no: 8924946).

Patents - Filed

9. System and method for determining the behavioral integrity of an application, with Thangaraj Raja Subramaniam. Filed for Indian patent (application no: 3161/CHE/2014).

Softwares

1. ATASYN: A static TCP server validator against SYN flooding.

2. RALF: A register allocation framework, that allows plug and play of register allocators inside the gcc compiler.

3. X10 Compiler: An optimizing compiler that translates X10 code to C++ code (part of X10 Team).

4. XINC: A framework for the creation and sustenance of dynamic communities over mobile phones.

5. IMSuite: IIT Madras Benchmark Suite for Simulating Distributed Algorithms.

6. LSA: Lexical State Analyzer – a tool to identify errors in JavaCC grammar files with lexical states.

Funding - Research/Consultancy Projects, Awards

- PI: 2012 Microsoft Research India Outstanding Young Faculty Award - Rs 1.2L
- PI: New Faculty Seed Grant (IIT Madras) - Rs 18L.
- PI: Fast Track Scheme for Young Scientists (Science and Engineering Research Board, DST) - Rs 13L.
- PI: Research Grant from BRNS, DAE - Rs 23L.
- PI: Shared University Research Grant, IBM - Rs 6.91L.
- PI: Consultancy project with Metacube, 2012 - 2012.
- Architecture Readiness Program (jointly with Krishna Sivalingam, Lata Dayaram, RP Sundaram, T J Kamalanabhan) for Verizon India - 2013-2014.
- PI: Consultancy project with Altair Inc, 2013 - 2014.

Research Guidance

- **PhD**
  1. Raghesh Aloor (joined – August 2012; cleared comprehensive exam – 2013; first seminar – April 2015),
  2. Manas Thakur (joined August 2013; cleared Comprehensive exam in 2014),
  3. Aman Nougrahiya (converted from MS - Jan 2014; cleared comprehensive exam in 2015),
  4. Jyothi Vedurada (converted from MTech - June 2014; cleared comprehensive exam in 2015).
- **MS**
  1. Suyash Gupta (2015, Purdue),
  2. Abhilash Bhandari (2015, AMD),
  3. Rahul Shrivastava (2017, Samsung),
  4. Indu K Prabhu (joined 2014),
  5. Anchu Rajendran (joined 2016).
  6. T Arun (joined 2016).
- **MTech/DD**: Raja Thangaraj (2014, Adobe), Nitin Patil (2014, LinkedIn), Vamshi Surabhi (2014, Startup), Niranjan Shinde (2015, Microsoft), Saurabh Singh Maurya (2016), Yogendra Kushwah (2016, Infosys).

Honours, Awards and Invited talks

- Cray's Dr. A.P.J Abdul Kalam HPC Award (2017) – in the young researcher category.
- Senior Member IEEE (Feb 2016), Senior Member ACM (May 2016).
- HCP Challenge (Class II) Winner, at Supercomputing Conference year 2008: a joint submission of X10 and UPC teams.
- HCP Challenge (Class II) Winner, at Supercomputing Conference year 2007 (X10 Team submission).
- UCLA fellowship support 2005.
- Member Purdue University Beta Chapter of Upsilon Pi Epsilon, International Honor Society for Computing Sciences.
- GATE Score 99.31 *percentile* `All India Rank = 20`.
- Among the top 1% of the total applicants in IIT-JEE and Orissa JEE 1994.
- Invited talk at NIT Calicut FDP program Mar 2017. Title: "Writing Efficient Programs for Multicore systems".

- Invited talk at WEPL, held along with POPL 2015. Title: "Writing Efficient Programs for Multicore systems".
- Invited talk at TRDDC Pune, Dec 2014. Title: "Analysing Recursive Task Parallel Programs".
- Invited talk at NIT Calicut, Dec 2012. Title: "Role of parallel computing in near future".
- Invited talk at ICCCS conference Oct 2012. Title: "Role of Parallel Computing in near future".
- Talk at IMPECS workshop, 2012. Title: "A Transformation Framework for Optimizing Task-Parallel Programs".
- Invited talk at ACM Chennai chapter meeting, held at IMSc, in Feb 2012: Title: "Multicore enablement of legacy code".
- Invited talk at Ericsson Research Lab Chennai, on the Ericsson research day, in Jan 2012: Title: "Multicore enablement of legacy code".
- Invited talk at ASPIRE workshop, held at IIT Madras, in Dec 2011. Title: "Role of parallel computing in near future".
- Invited talk at JNTU Kakinada in Feb 2011. Title: "Optimizing for Multicore systems".
- Invited talk at IWDS 2009, held at IIT Madras. Title: "Compiling for multi core systems".
- Invited talk at JNTU Kakinada in Feb 2009. Title: "What, Why and How of Research".
- Invited speaker at the satellite workshop on compiler techniques and applications (part of FSTTCS 2007): Talk title - "Compiling for Multicore systems".

Service Activities

1. Editorial board member: Associate editor, Sadhana 2013 - on going.
2. Program Committee: Member APSEC 2006, Member ICIT 2007, Member IEEE RE 2007, Member QSIC 2010, Member ISED 2010, WHMC 2010, India Publicity Chair PACT 2011, Member I-CARE 2011, Program Committee co-chair ICCCS 2012, Member I-CARE 2012, Member ADCOM 2012, Tutorial co-chair ICDCN 2013, Tutorial co-chair ICDCN 2014, PC Member and Tutorial co-chair ISEC 2014, PC Member SRS HiPC 2014, PC Member (software track) and Student Participation co-chair IPDPS 2015, Organising committee member INDOSYS 2015, PC Member FSTTCS 2015, PC Member APSEC 2015, PC Member ACM Compute 2015, PC Member ISEC 2016, PC Member ACM Compute 2016, ERC Member and Publicity Chair (India) PPoPP 2017, ERC Member and Publicity Chair (India) PPoPP 2018.
3. Board of Studies member JNTU Kakinada (from Mar 2008 - 2014).

4. Member of Central Purchase Committee (CPC) IITM (from 2012).
5. Department Email service incharge (from 2014).
6. Set up PACE lab (with Madhu Mutyam) for MS PhD students.
7. Faculty in charge HPCE, Computer Center (from 2016).
8. Part of the technical committee of the free laptop scheme of Tamil Nadu government (from 2013).
9. Given lectures in the "Introduction to Research" course on "How to get your paper rejected" and "How to give bad a presentation?"
10. Faculty advisor to two MTech batches (2012-2014, 2014-2016) and a BTech batch (2014-2018).
11. Member of Graduate Technical Committees (Arun Raj, Neel Gala, KVS Santosh Kumar, Shashank Shekhar, Pavan Thorvi) and Doctoral Committees (Moumita Patra, Arun Raj, Neel Gala, Somesh Singh, V Vinod Kumar, J Ganeswara Rao, Samik Banerjee).