Dr. Sandeep **Kumar**

RESEARCH SCIENTIST @ INTEL LABS, BENGALURU, INDIA

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Research Interest

Operating Systems, Architecture, Security, Distributed and Parallel Systems.

Selected Publications

1. *A Tug-of-War between Static and Dynamic Memory in Intel SGX*
   Sandeep Kumar, Abhisek Panda, Advait Nerlikar and Smruti R. Sarangi. In **VLSID, Bangalore, India** , 2024.

2. *Telescope: Telemetry for Gargantuan Memory Footprint Applications*
   Alan Nair, **Sandeep Kumar**, Aravinda Prasad, Ying Huang, Andy Rudoff, Sreenivas Subramoney. In **USENIX, ATC, USA**, 2024.

3. *Taming Server Memory TCO with Multiple Software-Defined Compressed Tiers*
   Sandeep Kumar, Aravinda Prasad, and Sreenivas Subramoney. In **arXiv** , 2024.

4. *Managing Large Enclaves in a Data Center*
   Sandeep Kumar, Abhisek Panda, Smruti R. Sarangi. In **arXiv** , 2024.

5. *Perspector: Benchmarking Benchmark Suites*
   Sandeep Kumar, Abhisek Panda, Smruti R. Sarangi. In **DATE**, Antwerp, Belgium, 2023.

6. *Hardware-Assisted Mechanisms to Enforce Control Flow Integrity: A Comprehensive Survey*
   Sandeep Kumar, Diksha Moolchandani, Smruti R. Sarangi. In Journal of Systems Architecture (JSA)

7. *SecureLease: Maintaining Execution Control in The Wild using Intel SGX*
   Sandeep Kumar, Abhisek Panda, and Smruti R. Sarangi. In **Middleware**, Quebec City, Canada, 2022.

8. *SGXGauge: A Comprehensive Benchmark Suite for Intel SGX*
   Sandeep Kumar, Abhisek Panda, and Smruti R. Sarangi. In **ISPASS**, Singapore, 2022.

9. *SecureFS: A Secure File System for Intel SGX*
   Sandeep Kumar and Smruti R. Sarangi. In **RAID**, Spain, 2021.

10. *Page Table Management for Heterogeneous Memory Systems*
    Sandeep Kumar, Aravinda Prasad, Smruti R. Sarangi, and Sreenivas Subramoney. In **ISMM**, Canada, 2021.

11. *F-LaaS: A Control-Flow-Attack Immune License-as-a-Service Model*
    Sandeep Kumar, Diksha Moolchandani, Takatsugu Ono, and Smruti Sarangi. In **IEEE SCC**, Milan, Italy, 2019.

12. *Towards a Portable Human Gait Analysis & Monitoring System*
    Sandeep Kumar, Poorna Talkad Sukumar, K. Gopinath, Dr. Jayanth Sampath, Laura Rocchi, and Suyameendra Kulkarni..In **IEEE ICSigSys**, Bali, Indonesia, 2018.

13. *Scalable Performance Tuning of Hadoop MapReduce: A Noisy Gradient Approach*
    Sandeep Kumar, Sindhu Padakandla, Chandrashekar L, Priyank Parihar, Gopinath K, and Shalabh Bhatnagar. In **IEEE Cloud**, Hawaii, USA, 2017.

Patent

1. Methods and apparatus to profile page tables for memory management. (Patent Pending)
   Aravinda Prasad, **Sandeep Kumar**, Sreenivas Subramoney, and Andy Rudoff

Education

Indian Institute of Technology Delhi   *New Delhi, India*

DOCTOR OF PHILOSOPHY   *Jul. 2017 - Jun 2024*

- Advised by Prof. S. R. Sarangi

Indian Institute of Science   *Bangalore, India*

MASTER OF ENGINEERING IN COMPUTER SCIENCE   *Jul. 2011 - Aug. 2013*

- Advised by Prof. K. Gopinath

Guru Gobind Singh Indraprastha Univeristy   *New Delhi, India*

BACHELOR OF TECHNOLOGY IN COMPUTER SCIENCE   *Jul. 2007 - Aug. 2011*

Work Experience

Intel Labs   *Bangalore, Karnataka*

RESEARCH SCIENTIST   *March 2022 – Current*

- Working on developing methods and tools for a better synergy between the hardware and the software.

Intel Labs   *Bangalore, Karnataka*

GRADUATE RESEARCH INTERN   *July 2020- Jan 2021*

- Developed and optimized memory tiering strategies for page table pages, enhancing efficiency and performance in a heterogeneous memory system.

Indian Institute of Science   *Bangalore, Karnataka*

RESEARCH ASSOCIATE   *Sept 2014- July 2017*

- Implemented and refined auto-tuning of Hadoop MapReduce workflows using advanced stochastic algorithms, driving performance optimization and efficiency.
- Designed and developed advanced models for human gait analysis leveraging Inertial Measurement Unit (IMU) sensors, enabling precise motion tracking and insights.

Dell R&D   *Bangalore, India*

SOFTWARE DEVELOPMENT ENGINEER   *Jul 2013-Jun 2014*

- Responsible for BIOS configuration and system management tools, DCC (Dell Command Configure) and OMCI (Open Manage Client Instrumentation) respectively

Selected Projects

Toy C Compiler

COURSE PROJECT FOR COMPILER DESIGN   *8*

- Implemented a Toy C Compiler using Flex Bison and LLVM as part of the Compiler Course Work. It contains LLVM IR code generation and implementation of some basic optimizations.

Distributed Computing

COURSE PROJECT

- Wrote Distributed Programs to solve TSP (Travelling sales man problem), ABP (Alpha Beta pruning search) and MST (Minimum spanning tree) using rpcgen in C++ and showed a speed up of factor 9, 6 and 2.5 respectively when the number of servers went up from 1 to 6.

Interests & Activities

Reading

Goodreads profile:

`https://goodreads.com/sandeep007734`

Running, Cycling, and Hiking

Strava profile:

`https://www.strava.com/athletes/sandeep007734`

References

Prof. Smruti R. Sarangi

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Indian Institute of Technology Delhi, New Delhi, India

Prof. K. Gopinath

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Computer Science and Automation

Indian Institute of Science, Bangalore, India