Koushik Sinha

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Senior Member, IEEE
Assistant Professor, Southern Illinois University, IL, USA

Education

Year	Institution	Degree	Major
Aug. 2005 - Nov. 2007	Jadavpur University*, Kolkata, India	PhD	Computer Science
Aug. 2001 - Aug. 2003	Clemson University, South Carolina, USA	MS	Computer Science
May 1997 - June 2001	Kalyani Govt. Engg. College, West Bengal, India	B. Tech.	Computer Science

***One of the top 5 Universities in India**

Work Experience

Year	Employer	Position	Areas of Work
Aug. 2015 –	Southern Illinois University, Carbondale, Illinois, USA	**Assistant Professor**	Teaching and Research in Wireless Networks, Peer-to-Peer Networks, Human-augmented Computing
Nov. 2013 – Aug. 2015	Qatar Computing Research Institute, Doha, Qatar	**Senior Software Engineer**	Software Development, Research in Social Computing
Feb. 2011 – Nov. 2013	HP Labs, Bangalore, India	**Scientist**	Crowdsourcing, Human Augmented Analytics, Speech based Information Retrieval
Feb. 2013 – July 2013	Indian Statistical Institute[#], Bangalore Campus, India	**Visiting Professor**	Teaching M.S. students Data Structures and Computer Programming course
May 2008 – Feb. 2011	Honeywell Technology Solutions, Bangalore, India	**Lead Research Scientist**	Wireless Mesh Networks, Assistive Technologies, High Performance Computing
Aug. 2007 – April 2008	Honeywell Technology Solution, Bangalore, India	**Senior Research Scientist**	High Performance Computing, Energy Efficient Communications in Wireless Sensor Networks
April 2005 – July 2007	Honeywell Technology Solutions, Bangalore, India	**Principal Engineer**	Cluster Computing Solutions for Honeywell's Video Analytics System
Aug. 2004 – Mar. 2005	Honeywell Technology Solutions, Bangalore, India	**Senior Engineer**	Localization algorithms for first responder wireless ad hoc networks

[#]One of the top 5 Research and Educational Institutions in India

Awards and Achievements

[1] **Senior Member, IEEE**, 2015.

[2] **Grand Prize Winner** of **9th Open Source Software (OSS) World Challenge** for **AIDR** (link), 2015.

[3] **N. V. Gadadhar Memorial Award** from the **Institution of Electronics and Telecommunication Engineers**, 2011.

[4] **2 Hewlett-Packard eAwards** in Hewlett-Packard Labs, 2011 & 2012.

[5] **Bravo Spot Award, 4 Publication Awards, 2 IP & Innovation Awards** and **2 Spot Awards** in Honeywell, 2005-2010.

[6] **Best Business Track Award** at the *Honeywell Technology Solutions Symposium*, 2009.

[7] **Young Scientist Award** from the **Indian Science Congress Association**, 2009.

[8] **Best Paper Award** at the 20th *Parallel and Dist. Comp. and Systems* Conf. (PDCS), USA, Nov. 16-18, 2008.

Research Interests

- ✓ **Next Generation Mobile Networks, Dynamic Spectrum Management** and **Wireless Sensor Networks**.
- ✓ Combining **Cloud** and **Social Computing** with focus on **Crowdsourcing**, **Resource Allocation** and **Task Scheduling**.

Patents and Publications

- **70 Publications – 1 Book**, **22 International Journal** Publications and **47 Refereed Conference** Publications
- **7 Patents** with the United States and European Patent Offices
- **Google Citation Indices – Citations**: 531, **h-index**: 12, **i10-index**: 16 (see link)

Teaching Interests and Experience

- ✓ **Teaching Experience**
  - **[1]** **Aug. 2015 – till date**: Teaching at **Southern Illinois University**, Carbondale, IL USA
  - **[2]** **Feb. 2013 – July 2013**: **Visiting Professor** at the **Indian Statistical Institute**, Bangalore, India

- ✓ **Mentoring Experience**:
  - **[1]** **Oct. 2015 - present**: **8 Computer Science PhD & MS students**, **Southern Illinois University**, Carbondale, USA.
  - **[2]** **2012-2013**: **2 M. Tech. students**, each for **1 year** (as part of their M. Tech. degree requirement) in **Hewlett-Packard Labs**, India.
  - **[3]** **2011-2013**: **3 B. Tech. interns**, each for **6 months** (as part of their B. Tech. degree requirement) in **Hewlett-Packard Labs**, India.
  - **[4]** **2008-2010**: **2 software engineers** in **Honeywell Technology Solutions**, Bangalore, India.

Project Grants

[1] Co-principal investigator for the **CrowdCloud: NextGen Analytics Platform with Human Intelligence** proposal that won **Hewlett-Packard Labs** funding of **$800K**, 2012.
- ✓ Delivered a platform to effectively combine cloud computing based services with crowdsourced services for enabling new, human-like analytics on unstructured data.

[2] Co-authored a proposal submitted for the **Geospatial Location and Navigation System for Emergency Responders** (GLANSER) program of the **US Department of Homeland Security** that won **Honeywell** a **$1.8M** project, 2007.

[3] Won a Honeywell funding of **$200K** for developing a **new cluster computing based architecture** for the **Honeywell Video Analytics Solution**, 2008.
- ✓ Delivered a cluster-based, parallel video analytics solution to replace the existing commercial video analytics software offered by Honeywell

[4] Won **$200K** funding in Honeywell for **A Sub-GHZ Broadband Wireless Development Platform** proposal, 2010.

[5] Won funding of **$60K** for **Assistive Technologies** project in Honeywell, 2009.
- ✓ Delivered an accelerometer based gesture recognition prototype system for Honeywell, suitable for integration with various Honeywell home and building control panels

Project Highlights

Qatar Computing Research Institute, Qatar

1. Nov. 2013 – Aug. 2015 **Project: AIDR - Artificial Intelligence for Disaster Response**

Role : Senior Software Engineer

The goal of the AIDR (Artificial Intelligence for Disaster Response: http://aidr.qcri.org) project was to develop an easy-to-use, free and open-source platform for **online filtering and classification** of **streaming twitter messages** and **SMSs** during humanitarian crises. AIDR uses **crowdsourcing** and **machine intelligence** for classification and was designed to automatically tag up to thousands of messages and SMSs per minute. AIDR provides a **tool for humanitarian or crisis response** that can be used to gather and classify tweets/SMS in real-time. My responsibilities involved **research** and **development** related to the

AIDR backend system using a combination of technologies that included Java, Hibernate, EJB, RESTful web services, REDIS, MySQL and WEKA.

- ✓ **Grand Prize Winner** of **9th Open Source Software (OSS) World Challenge (link)**, 2015.
- ✓ Partnered with the *United Nations Office for the Coordination of Humanitarian Affairs* (UNOCHA)
- ✓ Featured in the Qatar Foundation News, Wall Street Journal, Wired.co.uk and CBC News

2. Mar. 2015 – Aug. 2015 **Project: Social Media as a Sensor for Traffic Management**

Role : Co-Principal Investigator and Lead Engineer

The goal of the project was to develop a real-time traffic sensing and alerting system **based on streaming social media data**. We developed a **tool for obtaining a real-time view of city traffic condition**. My responsibilities involved **research** and **development** related to developing a new classifier of tweets, developing new algorithms for extraction of location entities and geo-locating the extracted locations. Technologies that I used included Python, Java, Hibernate, RESTful web services, REDIS, PostgreSQL, NLTK and GATE.

- ✓ Partnered with the **Qatar Mobility Innovations Center** (QMIC), Qatar for integration with their iTraffic App.

Hewlett Packard Labs, India

1. Jan. 2012 – Nov. 2013 **Project: CrowdCloud Platform - Human Augmented Cloud Computing**

Role : Co-Principal Investigator

The CrowdCloud project aimed to develop a platform for enabling analysis and collection of **unstructured data** to deliver sophisticated enterprise solutions by intelligently orchestrating automated processing/sensing with **on-demand crowdsourced human intelligence**; e.g., i) **understanding sentiment and opinion** from customer feedbacks and social networks, ii) **document digitization** of healthcare records and invoices to create next-gen distributed business process services (BPS) iii) distributed **mobile data collection**, iv) **event spotting in audiovisual streams** for new types of retail and insurance analytics, etc.

- ✓ **Principal Investigator** on the **task execution management** and **workflows** research thread
- ✓ Developed the platform's **task execution engine** that can **guarantee service level objectives** (SLOs) of tasks
- ✓ Collaborations with **HP Global Analytics** for **opinion mining** use-case and **HP BPO** for **invoice digitization** use-case
- ✓ **2 Accepted papers** in **HP TechCon 2013 conference**

2. Feb. 2011 – Jan. 2012 **Project: Simplifying Web Access for Fact Finding**

Role : Principal Investigator

The project goal was to develop a low overhead, flexible **speech interface for a Question Answering** (QA) system that is robust in the face of speech signal distortions resulting from variations in speaker accents of Indian-English.

- ✓ Managed a **team** of **4 members**
- ✓ Designed an **intelligent feedback based post-error correction module** to boost ASR accuracy for IR systems
- ✓ Developed **new error correction algorithm** based on i) **gene sequence alignment based phonemic similarity** and, ii) **domain-specific semantic feedback**
- ✓ **More than 10% improvement** observed on an average, **over Google Voice**, **Microsoft SAPI** and **CMU Sphinx 4**
- ✓ Integrated with the **Fact Finder app** on the Vayu Internet Device developed by HP Labs India
- ✓ **Accepted paper** in **HP TechCon 2012 conference** and **Poster** in **World Wide Web** (WWW) **conference 2012**

Honeywell Technology Solutions, India

1. Jan. 2008 – Feb. 2009 **Project: Large Scale Surveillance**

Role : Co-Principal Investigator

The project's goal was to i) **improve** the **performance of the Honeywell Video Analytics System** in order to meet customer QoS requirements and, ii) explore the possibility of providing **automated video surveillance as a cloud service**.

- ✓ Used various **code optimizations** to improve serial **C code** performance – achieved **speed-up** of **nearly 8.5**
  - ➢ **Dead code elimination**, **cache line conflicts** reduction, **loop unfurling** & **restructuring**, **compiler directives** and **basic algorithm modifications**, code **hot-spots identification** (using Intel's **VTune** profiling tool)

- ✓ Developed a distributed computing based, high performance **parallel Video Analytics System** using **OpenMPI**
- ✓ Developed **several solutions** for processing a class of computation intensive **soft real-time tasks** on a back-end cloud computing environment
  - ➢ **2 new resource allocation** and **scheduling algorithms**
  - ➢ **3 approximation algorithms** for **communication scheduling** over **interconnection switching fabrics**
- ✓ Designed a **new cluster computing based architecture** for the **Honeywell Video Analytics Solution**

2. Mar. 2009 – Dec. 2009 **Project**: **Assistive Technologies**

Role : Principal Investigator

The aim of the project was to **design assistive technology solutions** based on **gestures** to **aid** the **partially disabled** and **aged people in homes**.

- ✓ Managed a **team** of **3 members**
- ✓ Developed an **accelerometer based gesture recognition prototype system in C#** suitable for use with various **Honeywell home and building control panels** (e.g., thermostat, lighting, security, etc.)
- ✓ **3 US patents** filed

3. Mar. 2010 – Jan. 2011 **Project: Wireless Building Control Communications - Wi-Fi Mesh & Tools**

Role : Co-Principal Investigator

In this project, we **developed** an efficient **Wireless Mesh Network Setup and Diagnostic Tool** for commissioning, monitoring and diagnosing a wireless building control network in order to **convert the existing wired building management and control system** offered by Honeywell into a wireless mesh network based solution.

- ✓ Defined the **Tool architecture, schema** (using **Enterprise Architect** tool) and **use cases**
- ✓ Designed **algorithms** (using **C** and **MATLAB**) for **assessing and improving the reliability** and performance of deployed wireless mesh networks
- ✓ **1 US patent** granted

4. Mar. 2005 – Mar. 2007 **Project**: **SAFENet**

Role : Principal Investigator

The goal of this project was to: i) **improve battery life of wireless sensor devices** used in building smoke/fire detection network systems and, ii) design effective **localization algorithms** for wireless ad hoc networks in first responder scenarios.

- ✓ Proposed a **new communication strategy** for low data rate wireless sensor networks: **communication through silent-symbols**
  - ➢ Demonstrated **33% to 62% improvement** in **transmitter-side energy savings** for wireless sensor devices
  - ➢ Demonstrated **37% to 50% improvement** in **receiver-side energy savings** for wireless sensor devices
  - ➢ Developed a **new hybrid modulation scheme** utilizing FSK and ASK
- ✓ Developed a new **location identification algorithm** that formed part of **$1.8M proposal** submitted by Honeywell for the **Geospatial Location and Navigation System for Emergency Responders** (GLANSER) program of the US Dept. of Homeland Security
  - ➢ **2 US Patents** granted

Professional Activities

I. Advisory Committee

[1] Member of International Advisory/Technical Committee, *IEEE International Conference on Innovations in Electronics, Signal Processing and Communication*, Shillong, India, April 6-7, 2017.

[2] Member of International/National Advisory Board, *2nd International conference on Data Engineering & Communication Technology* (ICDECT-17), Andhra Pradesh, India, January 20-22, 2017.

II. Conference Chair

[1] **General Co-Chair** for the *IEEE International Conference on Advanced Networks and Telecommunication Systems* (IEEE ANTS), Indore, India, 2018.

[2] **TPC Co-Chair** for the *IEEE International Conference on Advanced Networks and Telecommunication Systems* (IEEE ANTS), Bangalore, India, 2016 and 2017.

[3] **Chair of Social Computing Track**, 12th *ACS/IEEE International Conference on Computer Systems and Applications* (IEEE AICCSA), Marrakech, Morocco, 2015.

[4] **Chair of Social Computing Track**, 11th *ACS/IEEE International Conference on Computer Systems and Applications* (IEEE AICCSA), Doha, Qatar, 2014.

[5] **Registration Chair**, 3rd *International Conference on Internet Multimedia Services Architecture and Application* (IMSAA), Bangalore, India, 2009

[6] **Chair**, *Workshop on Collaborative Security Technologies* (CoSec), Bangalore, India, 2009

[7] **Chair**, *Workshop on Emerging Internet Applications* (WEIA), Bangalore, India, 2009

III. Technical Program Committee

[1] 28th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Italy, 2019

[2] 14th IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (IEEE WiMob), Cyprus, 2018.

[3] 28th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Italy, 2018

[4] 38th IEEE Sarnoff Symposium, Newark, NJ, USA, 2017

[5] 13th IEEE International Conference on Wireless and Mobile Computing, Networking and Communications (IEEE WiMob), Rome, Italy, 2017

[6] 27th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Valencia, Spain, 2017

[7] International Conference on Future Network Systems and Security (FNSS), Florida, USA, 2017

[8] 32nd International Conference on Computers and Their Applications (CATA), Hawaii, USA, 2017

[9] International Conference on Computer Intelligent Systems & Networking (ICCISN), Dubai, UAE, 2017

[10] 2nd International Conference on Telecommunication and Networks (TEL-NET), Noida, India, 2017

[11] 8th International Conference on Information and Communication Systems (ICICS), Irbid, Jordan, 2017

[12] 2nd International Conference on Internet of Things and Cloud Computing (ICC), Cambridge, UK, 2017

[13] 27th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Valencia, Spain, 2016

[14] 7th International Conference on Information and Communication Systems (ICICS), Irbid, Jordan, 2016

[15] 5th International Conference on Advances in Computing, Communications & Informatics (ICACCI), Jaipur, India, 2016

[16] International Conference on Internet of Things and Cloud Computing (ICC), Singapore, 2016

[17] International Symposium on Advances in Applied Informatics (SAI), Jaipur, India, 2016

[18] Global Summit on Computer & Information Technology (GSCIT), Sousse, Tunisia, 2016

[19] 26th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Hong Kong, 2015

[20] 15th IEEE International Symposium on Signal Processing and Information Technology (ISSPIT), Abu Dhabi, UAE, 2015

[21] 4th International Conference on Advances in Computing, Communications & Informatics (ICACCI), Kochi, India, 2015

[22] 2nd International Conference on Information and Communication Technologies for Disaster Management (ICT-DM), Rennes, France, 2015

[23] Global Summit on Computer & Information Technology (GSCIT), Sousse, Tunisia, 2015

[24] International Biometrics & Smart Government Summit (IBMSGS), Sousse, Tunisia, 2015

[25] International Conference on Signal Processing and Data Mining (ICSPDM), Istanbul, Turkey, 2015

[26] International Conference on Computer Applications and Aided Diagnosis (ICCAAD), Sousse, Tunisia, 2015

[27] 25th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Washington DC, USA, 2014

[28] 3rd International Conference on Advances in Computing, Communications & Informatics (ICACCI), Delhi, India, 2014

[29] 24th IEEE Personal Indoor Mobile Radio Communications (PIMRC), London, UK, 2013

[30] 23rd IEEE Personal Indoor Mobile Radio Communications (PIMRC), Sydney, Australia, 2012

[31] 22nd IEEE Personal Indoor Mobile Radio Communications (PIMRC), Toronto, Canada, 2011

[32] 21st IEEE Personal Indoor Mobile Radio Communications (PIMRC), Istanbul, Turkey, 2010

[33] 20th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Tokyo, Japan, 2009

[34] 3rd International Conference on Internet Multimedia Services Architecture and Application (IMSAA), Bangalore, India, 2009

[35] 19th IEEE Personal Indoor Mobile Radio Communications (PIMRC), Cannes, France, 2008

[36] 2nd International Conference on Internet Multimedia Services Architecture and Application (IMSAA), Bangalore, India, 2008

IV. Journal Reviewer

[1] *IEEE/ACM Trans. on Networking*, IEEE

[2] *IEEE Trans. on Vehicular Technology*, IEEE

[3] *IEEE Trans. on Very Large Scale Integration Systems*, IEEE

[4] *IEEE Wireless Communications Letters*, IEEE

[5] *IEEE Communications Letters*, IEEE

[6] *Journal of Parallel and Distributed Computing* (JPDC), Elsevier

[7] *Computers and Mathematics with Applications* (CAMWA), Elsevier

[8] *Information Sciences* (INS), Elsevier

[9] *Algorithmica*, Springer

[10] *Statistics*, Taylor & Francis

[11] EURASIP Journal on Wireless Communications and Networking, Springer

[12] International Journal of Communication Networks and Distributed Systems (IJCNDS), Inderscience.

V. Conference Reviewer

[1] *IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems* (SPICES), Kerala, India, 2015.

[2] *International Conference on Networks and Soft Computing* (ICNSC), India, 2014

[3] *35th IEEE Sarnoff Symposium*, Newark, New Jersey, 2012

[4] *34th IEEE Sarnoff Symposium*, Princeton, NJ, USA, 2011

[5] *33rd IEEE Sarnoff Symposium*, Princeton, NJ, USA, 2010

[6] *32nd IEEE Sarnoff Symposium*, Princeton, NJ, USA, 2009

[7] *31st IEEE Sarnoff Symposium*, Princeton, NJ, USA, 2008

VI. Professional Memberships

[1] Member, **IEEE**, since 1998.

[2] Member, Association of Computing Machinery (ACM), since 2014.

[3] Member, **IEEE GOLD Executive Committee**, Bangalore Chapter, 2008 - 2011.

Invited Talks

- **Indian Institute of Engineering Science and Technology** (IIEST), Kolkata, India, 2018
- **University of Minnesota**, Minneapolis, 2017
- **International Conference on Computing, Communication and Sensor Networks** (CCSN 2017), Kolkata, India, 2017
- **Indian Institute of Engineering Science and Technology** (IIEST), Kolkata, India, 2017
- **Indian Statistical Institute**, Kolkata, India, 2015
- **Kalyani Government Engineering College**, West Bengal, India, 2015
- **Indian Statistical Institute**, Kolkata, India, 2014
- **National Institute of Technology Durgapur**, West Bengal, India, 2010

- **Indian Statistical Institute**, Kolkata, India, 2009
- **PES Institute of Technology**, Bangalore, Karnataka, India, 2012
- **North-Eastern Hill University**, Shillong, India, 2009
- **Andhra University**, Visakhapatnam, India, 2008
- **Indian Science Congress**, 2008 & 2009