Sarath Babu

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Career Objective

Advance research in distributed systems, computer networks, cyber-physical systems, and next-generation wireless networking through the design of scalable and resilient cyberinfrastructures, integrating algorithmic innovation with large-scale experimental validation on real-world platforms and testbeds.

Research Interests

Distributed Systems, Testbeds, and Network Measurement: Design, development, and deployment of scalable, resilient, and secure distributed computing and communication systems across heterogeneous compute, storage, and wireless platforms. This includes building system prototypes and experimental testbeds, as well as conducting real-world network measurements to evaluate and optimize performance, reliability, fault tolerance, and security.

Next Generation Wireless Networks: Experimental design, evaluation, and deployment of real-world wireless and distributed system testbeds for 5G and beyond, including Open Radio Access Networks (Open RAN), wireless mesh networks, and satellite networks.

Software Defined Wireless Networks and Internet of Things (IoT): Modeling and implementation of Software Defined Networking (SDN)-based approaches in wireless systems-including wireless mesh networks, delay/disruption-tolerant networks, and sensor networks, and the development of lightweight system solutions (e.g., blockchain-based frameworks) to support emerging IoT applications.

Applied Algorithms, Graph Theory, and Complex Networks: Application of algorithmic, graph-theoretic, and complex network methods to the design and operation of large-scale networked and intelligent systems, including communication networks, cyber-physical infrastructures, and mobility systems. The focus is on modeling system structure and dynamics to develop efficient algorithms for resource allocation, routing, resilience, and security in dynamic environments.

Systems Security: Design, analysis, and experimental validation of secure and resilient distributed and software-defined systems, with an emphasis on cross-layer threat modeling, attack detection, and defense mechanisms for Software Defined Networking (SDN) and large-scale networked infrastructures deployed in real-world environments.

Education

Indian Institute of Space Science and Technology Feb 2014–May 2021
Doctor of Philosophy (Ph.D.) *Thiruvananthapuram, India*
Thesis: *Software defined disruption tolerant networks* CGPA: 9.25/10
Advisor: Prof. B. S. Manoj

National Institute of Technology, Calicut Aug 2009–May 2011
Master of Technology (M.Tech.) in Computer Science and Engineering (Information Security) *Calicut, India*
Thesis: *A usage control based model for multi-domain environments with distributed attributes* CGPA: 8.97/10
Advisor: Prof. Priya Chandran

Mahatma Gandhi University Aug 2005–Aug 2009
Bachelor of Technology (B.Tech.) in Information Technology *Kottayam, India*
Project: *Remote system access through universal serial bus* Percentage: 82.28%

Board of Higher Secondary Examination, Kerala Jul 2003–Mar 2005
Higher Secondary Examination (HSE) in Computer Science *Ernakulam, India*
Brahmanandodayam Higher Secondary School, Kalady Percentage: 91.83%

Board of Public Examinations, Kerala Jun 2000–Mar 2003
Technical High School Leaving Certificate (THSLC) in Electronics *Ernakulam, India*
Model Technical Higher Secondary School, Kaprassery Percentage: 81.5%

Experience

Iowa State University Feb 2025–Current
Research Assistant Professor, Department of Electrical and Computer Engineering *Ames, IA, USA*
Center for Wireless, Communities and Innovation (WiCI)

Iowa State University — Oct 2021–Feb 2025
Research Scientist II, Department of Electrical and Computer Engineering — *Ames, IA, USA*
Center for Wireless, Communities and Innovation (WiCI)

Indian Institute of Space Science and Technology — Feb 2014–May 2021
Graduate Teaching Assistant, Department of Avionics — *Thiruvananthapuram, India*

National Institute of Technology, Calicut — Jul 2009–May 2011
Graduate Teaching Assistant, Department of Computer Science and Engineering — *Calicut, India*

Recognitions | Scholarships | Certifications

- **IEEE International Conference on Network Softwarization (IEEE NetSoft '25)** — Jun 2025
  Best Paper Award — *Budapest, Hungary*
- **Midscale Experimental Research Infrastructure Forum 2024 (MERIF '24)** — Sep 2024
  Best Demo Award — *Kansas City, MO, USA*
- **IEEE Future Networks World Forum (FNWF '23)** — Nov 2023
  Honorable Mention for the Paper — *Baltimore, MD, USA*
- **ACM Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (WiNTECH '23)** — Oct 2023
  Best Paper Award — *Madrid, Spain*
- **Indian Institute of Space Science and Technology** — Nov 2019
  Outstanding Teaching Assistant Award in the Department of Avionics — *Thiruvananthapuram, India*
- **ICTS-Northeastern Discussion Meeting on Games, Epidemics, and Behavior** — Jun 2016
  Selected Participant supported by Travel Grant — *Bangalore, India*
- **Department of Space, Government of India** — Feb 2014–Jan 2019
  Ph.D. Scholarship, Indian Institute of Space Science and Technology — *Thiruvananthapuram, India*
- **Ministry of Human Resource Development, Government of India** — Jul 2009–May 2011
  Master's Scholarship, National Institute of Technology, Calicut — *Calicut, India*
- **Ministry of Human Resource Development, Government of India** — Mar 2009
  Graduate Aptitude Test in Engineering (GATE), Percentile: 96.84
- **Infosys** — Sep 2009
  Campus Connect Program
- **Red Hat** — Apr 2007
  Linux 4.0 Essentials, Linux 4.0 System Administration, and Network and Security Administration

Projects Involved

Principle Investigator (PI) | Co-Principal Investigator (Co-PI)

1. Site Co-PI, "*ArMORED: Architecture for massive-MIMO Open RAN Energy-efficient Devices,*" **NTIA Innovation Fund,** (Total Funding: $10,118,112; ISU: $2,400,000), Skylark Wireless (PI), Eridan, and Iowa State University, Jan 2025–Dec 2027.

2. Site Co-PI, "*Acceleration of Compatibility and Commercialization for Open RAN Deployments (ACCoRD),*" **NTIA Innovation Fund,** (Total Funding: $42,299,693; ISU: $1,000,000), AT&T (PI), Verizon, University of Texas at Dallas, Northeastern University, Iowa State University, Rutgers University, Virginia Tech, NTT DOCOMO, and Reliance Jio, Jan 2024–Dec 2027.

3. Co-PI, "*ARA Launchpad: Open Wireless Platforms, Data and Co-Prototyping for Integrative Research and Community Building,*" **NSF NeTS**, (Total Funding: $784,000), Iowa State University (PI), Oct 2023–May 2026.

4. Co-PI, "*Open RAN Research, Testing, and Integration for Rural Industries and Communities,*" **NSF NeTS and TIP,** (Total Funding: $1,400,000), Iowa State University (PI), May 2023–Apr 2025.

Senior Personnel | Other Roles

1. Research Scientist/Research Assistant Professor, "*Ara4Rural: ARA Infrastructure and Community Building for Rural Wireless Applications,*" **NSF NeTS,** (Total Funding: $1,000,000), Iowa State University (PI), Dec 2024–Nov 2026.

2. Research Scientist/Research Assistant Professor, "*NSF AI Institute for Intelligent Cyber-Infrastructure with Computational Learning in the Environment (ICICLE),*" **NSF AI Research Institute,** (Total Funding: $20,000,000; ISU: $450,579), Ohio State University (PI) et al., Nov 2021–Oct 2026.

3. Research Scientist, "*POSE: Phase 1: OPERA: An Open-Source Ecosystem for Broadband Prairie,*" **NSF POSE**, (Total Funding: $299,999), Iowa State University (PI), Sep 2022–Aug 2024.

4. Research Scientist, "*Collaborative Research: CNS Core: Medium: Real-Time Liquid Wireless Networking for Data-Intensive Rural Applications,*" **NSF CNS Core,** (Total Funding: $600,000; ISU: $300,000), Iowa State University (PI), International Computer Science Institute, and Boston University, Oct 2022–Sep 2025.

5. Research Scientist/Research Assistant Professor, "*ARA: Wireless Living Lab for Smart and Connected Rural Communities,*" **NSF PAWR**, (Total Funding: $16,000,000), Iowa State University (PI), University of California Irvine, Ohio State University, and International Computer Science Institute, Jun 2021–May 2026.

6. Graduate Student, "*Research and Development of an Integrated Enterprise Network Security System,*" **IIST and ISRO,** May 2018–May 2020.

7. Graduate Student, "*Indo-US Collaborative Research on Pervasive Computing for Disaster Response,*" **NSF, DIT, and IIST**, (Total Funding: ₹32,00,000), Indian Institute of Space Science and Technology (IIST), University of California Irvine, and California Institute of Technology (Caltech), Jun 2013–Jun 2016.

8. Graduate Student, "*MICRONet—Mobile Infrastructure for Coastal Region Offshore Communication & Networks*", **IIST, ISRO-HQ, and ITRA/DIT**, Indian Institute of Space Science and Technology, Antrix Corporation (ISRO), Amrita University, and Indian Institute of Information Technology and Management-Kerala, Feb 2014–Jun 2016.

9. Graduate Student, "*IIST MeshNet: A Programmable Hybrid Wireless Mesh Network Testbed,*" **IIST**, (Total Funding: ₹7,50,000), Indian Institute of Space Science and Technology (PI), Mar 2013–Mar 2016.

Publications

Journals

1. T. U. Islam, J. O. Boateng, M. Nadim, G. Zu, M. Shahid, X. Li, T. Zhang, S. Reddy, W. Xu, A. Atalar, V. Lee, Y. Chen, E. Gossling, E. Permatasari, C. Somiah, O. Perrin, Z. Meng, R. Afzal, **Sarath Babu**, M. Soliman, A. Hussain, D. Qiao, M. Zheng, O. Boyraz, Y. Guan, A. Arora, M. Y. Selim, A. Ahmad, M. B. Cohen, M. Luby, R. Chandra, J. Gross, K. Keahey, and H. Zhang, "*Design and Implementation of ARA Wireless Living Lab for Rural Broadband and Applications,*" **Elsevier Computer Networks**, vol. 263, p. 111188, May 2025. DOI: 10.1016/j.comnet.2025.111188

2. D. Dalai, **Sarath Babu**, B. S. Vineeth, and B. S. Manoj, "*A novel space based hosting approach for ultra low latency web services,*" **IEEE Access**, vol. 12, pp. 142838–142862, Sep. 2024. DOI: 10.1109/ACCESS.2024.3462252

3. **Sarath Babu**, A. Rajeev, and B. S. Manoj, "*A medium-term disruption tolerant SDN for wireless TCP/IP networks,*" **IEEE Transactions on Network and Service Management (IEEE TNSM)**, pp. 2318–2334, Dec. 2020. DOI: 10.1109/TNSM.2020.3023889

4. A. Chakraborty, **Sarath Babu**, and B. S. Manoj, "*On achieving capacity-enhanced small-world networks,*" **Physica A: Statistical Mechanics and its Applications**, vol. 556, p. 124729, Oct. 2020. DOI: 10.1016/j.physa.2020.124729

5. **Sarath Babu** and B. S. Manoj, "*Toward a type-based analysis of road networks,*" **ACM Transactions on Spatial Algorithms and Systems (ACM TSAS)**, vol. 6, no. 4, pp. 28:1–28:45, Aug. 2020. DOI: 10.1145/3397579

6. P. Koshy, **Sarath Babu**, and B. S. Manoj, "*Sliding window blockchain architecture for Internet of Things,*" **IEEE Internet of Things Journal**, vol. 7, no. 4, pp. 3338–3348, Apr. 2020. DOI: 10.1109/JIOT.2020.2967119

7. **Sarath Babu**, P. V. Mithun, and B. S. Manoj, "*A novel framework for resource discovery and self-configuration in software defined wireless mesh networks,*" **IEEE Transactions on Network and Service Management (IEEE TNSM)**, vol. 17, no. 1, pp. 132–146, Mar. 2020. DOI: 10.1109/TNSM.2019.2922107

8. N. Anand, **Sarath Babu**, and B. S. Manoj, "*On detecting compromised controller in software defined networks,*" **Elsevier Computer Networks**, vol. 137, pp. 107–118, Jun. 2018. DOI: 10.1016/j.comnet.2018.03.021

9. D. S. Yadav, **Sarath Babu**, and B. S. Manoj, "*Quasi path restoration: A post-failure recovery scheme over pre-allocated backup resource for elastic optical networks,*" **Elsevier Optical Fiber Technology**, vol. 41, pp. 139–154, Mar. 2018. DOI: 10.1016/j.yofte.2018.01.011

Conferences

1. M. Nadim, X. Li, S. Reddy, **Sarath Babu**, A. Ahmad, O. Boyraz, D. Qiao, A. Arora, and H. Zhang, "*AraOptical system and testbed for long-range, high-capacity FSOC in rural wireless x-haul networks,*" in Proceedings of **ACM Networking**, 21st **ACM International Conference on emerging Networking EXperiments and Technologies (ACM CoNEXT 2025)**, vol. 3, no. CoNEXT4, HKUST, Hong Kong, Dec. 2025, pp. 39:1–39:21. DOI: 10.1145/3768986

2. G. Zu, J. O. Boateng, V. S. Advani, T. U. Islam, V. Lee, **Sarath Babu**, M. Nadim, D. Qiao, M. Y. Selim, and H. Zhang, "*Real-world integration and evaluation of open-source 5G core with commercial RAN,*" in Proceedings of the **IEEE Military Communications Conference (IEEE MILCOM 2025)**, Los Angeles, CA, USA, Oct. 2025, pp. 1296–1301. DOI: 10.1109/MILCOM64451.2025.11309851
3. J. O. Boateng, T. Zhang, G. Zu, T. U. Islam, **Sarath Babu**, F. Kaltenberger, R. Schmidt, H. Zhang, D. Qiao, "*AraRACH: Enhancing NextG random access reliability in programmable wireless living labs,*" in Proceedings of the 11th **IEEE International Conference on Network Softwarization (IEEE NetSoft)**, Jun. 2025, pp. 362–370, DOI: 10.1109/NetSoft64993.2025.11080601 [**Best Paper Award**]
4. M. Shahid, K. Das, H. Ushaq, H. Zhang, J. Song, D. Qiao, **Sarath Babu**, Y. Guan, Z. Zhu, A. Ahmad, "*ReVeal: A physics-informed neural network for high-fidelity radio environment mapping,*" in Proceedings of the 2025 **IEEE International Symposium on Dynamic Spectrum Access Networks (IEEE DySPAN '25)**, May 2025, pp. 1–10. DOI: 10.1109/DySPAN64764.2025.11115911
5. M. Nadim, T. Islam, S. Reddy, T. Zhang, Z. Meng, R. Afzal, **Sarath Babu**, A. Ahmed, D. Qiao, A. Arora, H. Zhang, "*AraSync: Precision time synchronization in rural wireless living lab,*" in Proceedings of the 30th Annual **International Conference on Mobile Computing and Networking (ACM MobiCom '24)**, Nov. 2024, pp. 1758–1763. DOI: 10.1145/3636534.3697318
6. J. O. Boateng, T. Zhang, G. Zu, T. U. Islam, **Sarath Babu**, H. Zhang, and D. Qiao, "*AraSDR: End-to-end, fully-programmable living lab for 5G and beyond,*" in the Proceedings of the **IEEE International Conference on Communications (IEEE ICC)**, Jun. 2024, pp. 1758–1763. DOI: 10.1109/ICC51166.2024.10623061
7. E. K. A. Permatasari, E. Gosling, M. Nadim, **Sarath Babu**, D. Qiao, H. Zhang, M. Luby, J. W. Byers, L. Minder, and P. Aggrawal, "*Real-time liquid wireless transport for video streaming in rural and agricultural applications,*" in Proceedings of the 3rd **ACM Mile High Video (ACM MHV)**, Feb. 2024, pp. 54–60. DOI: 10.1145/3638036.3640806
8. G. Zu, M. Nadim, S. Reddy, T. U. Islam, **Sarath Babu**, T. Zhang, D. Qiao, H. Zhang, and A. Arora, "*AraHaul: Multi-modal wireless x-haul living lab for long-distance, high-capacity communications,*" in Proceedings of the 2023 **IEEE Future Networks World Forum (IEEE FNWF)**, Nov. 2023, pp. 1–6. DOI: 10.1109/FNWF58287.2023.10520543
9. T. Zhang, G. Zu, T. U. Islam, E. Gossling, **Sarath Babu**, D. Qiao, and H. Zhang, "*Exploring wireless channels in rural areas: A comprehensive measurement study,*" in the Proceedings of the 2023 **IEEE Future Networks World Forum (IEEE FNWF)**, Baltimore, MD, USA, Nov. 2023, pp. 1–6. DOI: 10.1109/FNWF58287.2023.10520408 [**Honorable Mention**]
10. T. U. Islam, T. Zhang, J. O. Boateng, E. Gossling, G. Zu, **Sarath Babu**, H. Zhang, and D. Qiao, "*AraMIMO: Programmable TVWS mMIMO living lab for rural wireless,*" in Proceedings of the 17th **ACM Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (ACM WiNTECH '23)**, Oct. 2023, pp. 9–16. DOI: 10.1145/3615453.3616512 [**Best Paper Award**]
11. M. Shahid, **Sarath Babu**, H. Zhang, D. Qiao, Y. Guan, J. O. Boateng, T. U. Islam, G. Zu, A. Kamal, and M. Zheng, "*Wireless guard for trustworthy spectrum management,*" in Proceedings of the 16th **ACM Workshop on Wireless Network Testbeds, Experimental evaluation & Characterization (ACM WiNTECH '22)**, Oct. 2022, pp. 32–39. DOI: 10.1145/3556564.3558241
12. K. Keahey, J. Anderson, M. Sherman, C. Hammock, Z. Zhen, J. Tillotson, T. Bargo, L. Long, T. U. Islam, **Sarath Babu**, H. Zhang, and F. Halbach, "*CHI-in-a-Box: Reducing operational costs of research testbeds,*" in Proceedings of the **ACM Practice and Experience in Advanced Research Computing (ACM PEARC)** Conference Series, Jul. 2022, pp. 1–8. DOI: 10.1145/3491418.3530768
13. T. Abhiroop, **Sarath Babu**, and B. S. Manoj, "*A machine learning consensus based light-weight blockchain architecture for Internet of Things,*" in Proceedings of the 14th **International Conference on Communication Systems & Networks (COMSNETS)**, Jan. 2022, pp. 1–6. DOI: 10.1109/COMSNETS53615.2022.9668487
14. A. Salas, **Sarath Babu**, and B. S. Manoj, "*A light-weight delay tolerant networking framework for resource-constrained environments,*" in Proceedings of the 27th **National Conference on Communications (NCC)**, Jul. 2021, pp. 1–6. DOI: 10.1109/NCC52529.2021.9530075
15. **Sarath Babu**, I. Ghosh, and B. S. Manoj, "*Effort: A new metric for roadside unit placement in 5G enabled vehicular networks,*" in Proceedings of the 3rd **IEEE 5G World Forum (IEEE 5GWF)**, Sep. 2020, pp. 263–268. DOI: 10.1109/5GWF49715.2020.9221228
16. D. Dalai, **Sarath Babu**, and B. S. Manoj, "*On using edge servers in 5G satellite networks,*" in Proceedings of the 3rd **IEEE 5G World Forum (IEEE 5GWF)**, Sep. 2020, pp. 553–558. DOI: 10.1109/5GWF49715.2020.9221366
17. R. Suraj, **Sarath Babu**, D. Dalai, and B. S. Manoj, "*DebriNet: An opportunistic software defined networking framework over PSLV debris,*" in Proceedings of the **IEEE International Conference on Advanced Networks and Telecommunications Systems (IEEE ANTS)**, Dec. 2019, pp. 1–6. DOI: 10.1109/ANTS47819.2019.9118082
18. **Sarath Babu**, P. Rathod, and B. S. Manoj, "*On optimizing information gathering in shanty town emergency response,*" in Proceedings of the **IEEE Region 10 Conference (IEEE TENCON)**, Oct. 2019, pp. 129–134. DOI: 10.1109/TENCON.2019.8929340

19. T. Abhiroop, **Sarath Babu**, and B. S. Manoj, "*A machine learning approach for detecting DoS attacks in SDN switches,*" in Proceedings of the 24th **National Conference on Communications (NCC)**, Feb. 2018, pp. 1–6. DOI: 10.1109/NCC.2018.8600196
20. P. V. Mithun, **Sarath Babu**, and B. S. Manoj, "*On resolving network view inconsistencies in SDN control plane,*" in Proceedings of the **IEEE International Conference on Advanced Networks and Telecommunications Systems (IEEE ANTS)**, Dec. 2017, pp. 1–6. DOI: 10.1109/ANTS.2017.8384108
21. G. Gupta, **Sarath Babu**, and B. S. Manoj, "*Dual-mode TCP: An alternative approach for delay tolerant networks,*" in Proceedings of the 23rd **National Conference on Communications (NCC)**, Mar. 2017, pp. 1–6. DOI: 10.1109/NCC.2017.8077040
22. **Sarath Babu** and B. S. Manoj, "*On the topology of Indian and Western road networks,*" in Proceedings of the 8th **International Conference on Communication Systems and Networks (COMSNETS)**, Jan. 2016, pp. 1–6. DOI: 10.1109/COMSNETS.2016.7440027
23. R. Raj, **Sarath Babu**, K. Benson, G. Jain, B. S. Manoj, and N. Venkatasubramanian, "*Efficient path rescheduling of heterogeneous mobile data collectors for dynamic events in shanty town emergency response,*" in Proceedings of the **IEEE Global Communications Conference (IEEE GLOBECOM)**, Dec. 2015, pp. 1–7. DOI: 10.1109/GLOCOM.2015.7417610
24. A. V. Mamidi, **Sarath Babu**, and B. S. Manoj, "*Dynamic multi-hop switch handoffs in software defined wireless mesh networks,*" in Proceedings of the **IEEE International Conference on Advanced Networks and Telecommunications Systems (IEEE ANTS)**, Dec. 2015, pp. 1–6. DOI: 10.1109/ANTS.2015.7413638
25. G. Jain, **Sarath Babu**, R. Raj, K. Benson, B. S. Manoj, and N. Venkatasubramanian, "*On disaster information gathering in a complex shanty town terrain,*" in Proceedings of the **IEEE Global Humanitarian Technology Conference - South Asia Satellite (IEEE GHTC-SAS)**, Sep. 2014, pp. 147–153. DOI: 10.1109/GHTC-SAS.2014.6967574

Demos | Posters

1. X. Li, A. Atalar, M. Nadim, **Sarath Babu**, O. B. Boyraz, C. J. Margison, R. Chen, M. M. Bayer, A. Ahmad, D. Qiao, H. Zhang, and O. Boyraz, "*Demonstration of a 4.2 km MISO free-space optical communication link using COTS SFP+ transceivers*"," accepted in **SPIE Photonics West**, San Francisco, CA, 17–22 Jan. 2026.
2. G. Zu, J. O. Boateng, V. S. Advani, T. U. Islam, V. Lee, **Sarath Babu**, M. Nadim, D. Qiao, M. Y. Selim, and H. Zhang, "*Demo: Real-world integration and evaluation of open-source 5G core with commercial RAN,*" in Proceedings of the **IEEE Military Communications Conference (IEEE MILCOM 2025)**, Los Angeles, CA, USA, Oct. 2025, pp. 881–882. DOI: 10.1109/MILCOM64451.2025.11310344
3. X. Li, A. Atalar, M. Nadim, **Sarath Babu**, C. J. Margison, M. M. Bayer, A. Ahmad, D. Qiao, H. Zhang, and O. Boyraz, "*Long-range, high-capacity FSOC system for rural wireless x-haul using COTS transceivers,*" in Proceedings of the 51th **European Conference on Optical Communication (ECOC)**, Copenhagen, Denmark, Sep–Oct. 2025, pp. 1–4. DOI: 10.1109/ECOC66593.2025.11263248
4. M. Kandes, **Sarath Babu**, Z. Meng, and H. Zhang, "*ARA distributed inference experiments: Flying HTCondor over a field of wireless dreams,*" **Throughput Computing 2025, HTC25**, Madison, WI, USA, Jun. 2025
5. M. Nadim, T. Islam, S. Reddy, T. Zhang, Z. Meng, R. Afzal, **Sarath Babu**, A. Ahmed, D. Qiao, A. Arora, and H. Zhang, "*Demo: AraSync: Precision time synchronization in rural wireless living lab,*" in 30th Annual **International Conference on Mobile Computing and Networking (ACM MobiCom '24)**, Washington, D.C., USA, Nov. 2024.
6. T. U. Islam, J. O. Boateng, M. Nadim, G. Zu, M. Shahid, X. Li, T. Zhang, S. Reddy, W. Xu, A. Atalar, V. Lee, Y. F. Chen, E. Gosling, E. Permatasari, Z. Meng, **Sarath Babu**, M. Soliman, A. Hussain, D. Qiao, M. Zheng, O. Boyraz, Y. Guan, A. Arora, M. Selim, A. Ahmad, M. B. Cohen, and H. Zhang, "*Demo: ARA PAWR wireless living lab for smart and connected rural communities,*" in 32nd **IEEE International Conference on Network Protocols (IEEE ICNP 2024)**, Charleroi, Belgium, Oct. 2024, pp. 1–3. DOI: 10.1109/ICNP61940.2024.10858584
7. J. O. Boateng, T. Zhang, **Sarath Babu**, and H. Zhang, "*ARA-enabled end-to-end 5G and Open RAN prototyping using srsRAN and FlexRIC*", in **srsRAN Project Fall Workshop**, Arlington, VA, USA, Oct. 2024.
8. T. U. Islam, M. Nadim, G. Zu, V. Lee, O. J. Perrin, J. O. Boateng, M. Shahid, T. Zhang, E. K. A. Permatasari, Z. Meng, **Sarath Babu**, D. Qiao, and H. Zhang, "*ARA PAWR: Enabling wireless experiments with programmable COTS RAN and x-Haul platforms,*" in **Midscale Experimental Research Infrastructure Forum (MERIF '24)**, Kansas City, MO, USA, Sep. 2024. [**Best Demo Award**]
9. **Sarath Babu**, T. U. Islam, J. O. Boateng, M. Nadim, T. Zhang, and H. Zhang, "*ARA PAWR: Wireless living lab for smart and connected rural communities,*" in **IEEE International Conference on Communications (IEEE ICC)**, Denver, CO, USA, Jun. 2024.
10. T. U. Islam, J. O. Boateng, G. Zu, M. Shahid, M. Nadim, W. Xu, T. Zhang, S. Reddy, X. Li, A. Atalar, Y. Chen, **Sarath Babu**, H. Zhang, D. Qiao, M. Zheng, Y. Guan, O. Boyraz, A. Arora, M. Selim, and M. B. Cohen, "*ARA PAWR: Wireless living lab for smart and connected rural communities,*" in Proceedings of the 29th Annual **International Conference on Mobile Computing and Networking (ACM MobiCom '23)**. ACM, Article 98, Madrid, Spain, Oct. 2023, pp. 1–3. DOI: 10.1145/3570361.3614068

11. J. O. Boateng, T. Zhang, **Sarath Babu**, T. U. Islam, M. Shahid, and H. Zhang, "*ARA rural wireless living lab and end-to-end OTA containerized OAI 5G-NR support,*" in Fall 2022 **OpenAirInterface North American Workshop**, San Diego, CA, USA, Nov. 2022.

Book Chapters

1. A. D. Dhruva, **Sarath Babu**, A. Chakraborty, and B. S. Manoj, "*Computing platforms for the Internet of Things,*" In: Abraham, Martin A. (eds.) **Encyclopedia of Sustainable Technologies**, 2nd Edition, 2024, vol. 3, pp. 780–799. Oxford: Elsevier. DOI: 10.1016/B978-0-323-90386-8.00068-1

arXiv Preprints

1. M. Shahid, K. Das, H. Ushaq, H. Zhang, J. Song, D. Qiao, **Sarath Babu**, Y. Guan, Z. Zhu, and A. Ahmad, "*ReVeal-MT: A physics-informed neural network for multi-transmitter radio environment mapping,*" **arXiv** preprint arXiv:2512.04100v1, Nov. 2025. DOI: 10.48550/arXiv.2512.04100
2. T. U. Islam, J. O. Boateng, M. Nadim, G. Zu, M. Shahid, X. Li, T. Zhang, S. Reddy, W. Xu, A. Atalar, V. Lee, Y. F. Chen, E. Gossling, E. Permatasari, C. Somiah, O. Perrin, Z. Meng, R. Afzal, **Sarath Babu**, M. Soliman, A. Hussain, D. Qiao, M. Zheng, O. Boyraz, Y. Guan, A. Arora, M. Y. Selim, M. B. Cohen, M. Luby, R. Chandra, J. Gross, K. Keahey, and H. Zhang, "*Design and implementation of ARA wireless living lab for rural broadband and applications,*" **arXiv** preprint arXiv:2408.00913v1, Aug. 2024. DOI: 10.48550/arXiv.2408.00913
3. M. Shahid, K. Das, T. U. Islam, C. Somiah, D. Qiao, A. Ahmad, J. Song, Z. Zhu, **Sarath Babu**, Y. Guan, T. Chakraborty, S. Jog, R. Chandra, and H. Zhang,"*Wireless spectrum in rural farmlands: Status, challenges and opportunities,*" **arXiv** preprint arXiv:2407.04561v1, Jul. 2024. DOI: 10.48550/arXiv.2407.04561
4. D. Dalai, **Sarath Babu**, and B. S. Manoj, "*Satellite-6G network integration roadmap on reference architectures,*" **TechRxiv**. Preprint. Aug. 2022. DOI: 10.36227/techrxiv.20624685.v1
5. **Sarath Babu**, G. Jain, and B. S. Manoj, "*Urban Delay Tolerant Network Simulator (UDTNSim v0.1),*" **CoRR**, vol. abs/1709.05645, Sep. 2017. DOI: 10.48550/arXiv.1709.05645

Technical Reports

1. S. Kota, G. Giambene, et al., "*Satellite, IEEE INGR International Network Generations Roadmap, 2023 Edition,*" 2023 **IEEE Future Networks World Forum (IEEE FNWF)**, Baltimore, MD, USA, 2023, pp. 1–195. DOI: 10.1109/FNWF58287.2023.10520529
2. S. Kota, G. Giambene, et al., "*Satellite, IEEE INGR International Network Generations Roadmap, 2022 Edition,*" 2022 **IEEE Future Networks World Forum (IEEE FNWF)**, Montreal, QC, Canada, 2022, pp. 1–182. DOI: 10.1109/FNWF55208.2022.00141

Patents

1. P. Koshy, A. S. Ananthakrishnan, **Sarath Babu**, and B. S. Manoj, "*IoT enabled biomedical wearable clothing system for healthcare assistance,*" **IN 449773**, 2023.

Software Developed

1. **AraSoft: Software Control Framework for ARA Wireless Living Lab**
   Objective: Design and develop a scalable and robust software control framework for the ARA Wireless Living Lab that enables advanced, reproducible wireless experimentation across heterogeneous compute, storage, wireless, and sensing platforms.
2. **OpenFlow Software Switch with Controlled Buffering**
   Objective: Enable an SDN switch capable of controlled buffering of packets in order handle link disruptions in software defined wireless environments.
3. **Software Defined Optimized Link State Routing (SD-OLSR) Protocol**
   Objective: Provide an automated SDN resource discovery and self-configuration scheme for software defined wireless environments involving mobile switches and controllers.
4. **Urban Delay Tolerant Network Simulator (UDTNSim)**
   URL: https://github.com/4sarathbabu/UDTNSim
   Objective: Design and develop mobility models and routing protocols for ad hoc vehicular networks in real-world road network environments and analyze the performance.

Professional Affiliations

Institute of Electrical and Electronics Engineers (IEEE)

- **Working Groups**
  - IEEE Future Networks, **International Network Generations Roadmap (INGR), Satellite** — Apr 2020–Current
- **Member** — Dec 2021–Current
  - Societies
    - IEEE Communications Society (ComSoc) — Dec 2021–Current
    - IEEE Computer Society — Dec 2021–Current
  - Communities
    - IEEE Smart Cities — Jan 2022–Current
    - IEEE Future Networks — Jan 2021–Current
    - IEEE Internet of Things — Jan 2021–Current
    - IEEE Sensors Council — Jan 2015–Current
    - IEEE Systems Council — Jan 2015–Current
- **Graduate Student Member** — Jan 2014–Nov 2021
  - Societies
    - IEEE Communications Society (ComSoc) — Mar 2014–Dec 2014, Jan 2016–Nov 2021
    - IEEE Computer Society — Mar 2016–Nov 2021
- **IEEE Student Branch, Indian Institute of Space Science and Technology**
  - Executive Committee Member — Feb 2018–Feb 2020
  - Secretary — Dec 2014–Jan 2018

Association of Computing Machinery (ACM)

- **Professional Member** — Dec 2020–Current
- **Graduate Student Member** — Jan 2014–Nov 2020

Professional Services

Journal Reviews

- IEEE Transactions on Network and Service Management (IEEE TNSM)
- IEEE Transactions on Wireless Communications (IEEE TWC)
- IEEE Transactions on Communications (IEEE TCOM)
- IEEE Transactions on Mobile Computing (IEEE TMC)
- IEEE Transactions on Network Science and Engineering (IEEE TNSE)
- IEEE Transactions on Aerospace and Electronic Systems (IEEE TAES)
- IEEE Transactions on Vehicular Technology (IEEE TVT)
- IEEE Transactions on Industrial Informatics (IEEE TII)
- IEEE Transactions on Intelligent Transportation Systems (IEEE T-ITS)
- IEEE Transactions on Big Data (IEEE TBD)
- IEEE Journal of Selected Areas in Communications (IEEE JSAC)—Series on Network Softwarization & Enablers
- IEEE Internet of Things Journal
- IEEE Sensors Journal
- IEEE Communications Letters (IEEE COMML)
- IEEE Networking Letters (IEEE LNET)
- IEEE Systems Journal
- IEEE Open Journal of Vehicular Technology (IEEE OJVT)
- IEEE Open Journal of the Communications Society (IEEE OJCOMS)
- IEEE Wireless Communications Magazine
- IEEE Communications Magazine
- IEEE Computer Magazine
- IEEE Communications Standards Magazine
- IEEE Network Magazine
- IEEE Access
- ACM Transactions on Asian and Low-Resource Language Information Processing
- Elsevier Computer Networks
- Springer Nature Computer Science

Technical Program Committees (TPCs)

- IFIP Networking — 2024, 2025, 2026
- COMSNETS — 2023, 2024, 2025, 2026
- IEEE NFV-SDN — 2025
- ACM WiNTECH — 2022, 2023, 2024, 2025
- IEEE Future Networks World Forum (IEEE FNWF) — 2023, 2024, 2025
- IEEE RAICS — 2015

Conference Reviews (In addition to TPCs)

- IEEE INFOCOM — 2023, 2024, 2025, 2026
- IEEE GLOBECOM — 2023
- IEEE ICCC — 2023
- IEEE INDICON — 2022
- IEEE WF-IoT — 2021, 2022

Volunteering

- State Science and Technology Fair of Iowa (SSTFI) 2025 [Served in the Judging Panel], Ames, Iowa, USA — Mar 2025
- IEEE Shannon Centennial Workshop on Communications and Information Theory (SCWIT) — Dec 2016
- IEEE Recent Advances in Intelligent Computational Systems (RAICS) — Dec 2015
- 7th International Conference on COMmunication Systems & NETworkS (COMSNETS) — Jan 2015

Teaching | Mentoring

Iowa State University — *Ames, IA, USA*

- HON 2900—First-Year Honors Mentor Program (Research) — Spring (Jan–May) 2026
- NSF REU—Research Experiences for Undergraduates (17 Students) — Jan 2022–May 2025

Indian Institute of Space Science and Technology (IIST) — *Thiruvananthapuram, India*

- AV484—Wireless Mesh Networks — Aug–Nov 2014, 2015, 2016, 2018, 2019
- AV321—Computer Networks — Jan–May 2018
- AV341—Computer Networks Lab — Jan–May 2015, 2016, 2017, 2018
- AV482—Data Structures and DBMS — Aug–Nov 2017
- AV231—Analog Electronic Circuits Lab — Aug–Nov 2014, 2015, 2016
- AV141—Basic Electrical and Electronics Engineering Lab — Mar–May 2015

National Institute of Technology, Calicut (NITC) — *Calicut, India*

- CS3092—Operating Systems Lab — Jan–May 2011
- CS6103—Software Systems Lab — Aug–Dec 2010

Talks | Workshops | Tutorials

- Tutorial: "*ARA User Training*" — Sep 2023, Aug 2024, Sep 2025
  Venue: AraFest (ARA Annual Event) — *Ames, IA, USA*
- Talk: "*Real-World Experimental Testbed for 5G and Beyond Communication Systems*" — Oct 2024
  Venue: IEEE Student Branch, IIST — *Thiruvananthapuram, India*
- Tutorial: "*Introduction to ARA Wireless Living Lab for Smart and Connected Rural Communities*" — Sep 2024
  Venue: Midscale Experimental Research Infrastructure Forum (MERIF '24) — *Kansas City, MO, USA*
- Tutorial: "*ARA Wireless Living Lab for Smart and Connected Rural Communities*" — May 2023
  Venue: Midscale Experimental Research Infrastructure Forum (MERIF '23) — *Boston, MA, USA*
- Talk: "*WiCI & ARA: Advancing Frontiers of Wireless Innovation in Rural Broadband*" — Mar 2022
  Venue: Friday Activities at Noon (FAN), Iowa State University — *Ames, IA, USA*
- Talk: "*Type-based Analysis of Road Networks*" — Sep 2020
  Venue: Avionics Ph.D. Talk Series, Department of Avionics and IEEE Student Branch, IIST
- Workshop: "*Programming in Python*" — Oct 2018, Aug 2019
  Venue: IEEE Student Branch, IIST — *Thiruvananthapuram, India*
- Workshop: "*LaTeX: An Introduction*" — Mar 2018, Mar 2019
  Venue: Conscientia, IIST — *Thiruvananthapuram, India*
- Workshop: "*Introduction to Software Defined Networking*" — Oct 2016
  Venue: AV484 Wireless Mesh Networks, IIST — *Thiruvananthapuram, India*

Technical Skills

- Programming Languages: C, C++, Python, Bash Shell Scripting
- Documentation & Editors: LaTeX, GNU Emacs
- Plotting & Visualization: Gnuplot, Ti*k*Z, Inkscape, draw.io
- Operating Systems: Linux, TinyOS
- Cloud: OpenStack
- Hypervisors/Containerization: VirtualBox, Docker
- Database Management System: MariaDB, MySQL, SQLite
- Software Defined Networking: OpenFlow, Open vSwitch, Ryu, POX
- Simulators: UDTNSim, SUMO, Mininet, STK
- Languages: Malayalam (Native), English