Anand Kumar Bapatla

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Education

Ph.D. in Computer Science and Engineering — Aug. 2019 – July 2024
University of North Texas, Advisor: Prof. Dr. Saraju P Mohanty — *Denton, TX*

Master's in computer engineering — Aug. 2017 – May 2019
University of North Texas — *Denton, TX*

Bachelor's in Electronics and Communication Engineering — Aug. 2010 – May 2014
Gayatri Vidya Parishad College of Engineering (Autonomous) — *Visakhapatnam, India*

Research Interests

- Distributed Ledger Technologies, Blockchain and Smart Contracts, Scalable Blockchain for IoT systems, Energy efficient Consensus Mechanisms, Secure Architectures for Pharmaceutical Supply Chain Management, Reliable Prescription sharing systems with accurate demand forecasting of Pharmaceutical products, Efficient Decision Support Tools and Insurance Management systems for Smart Agriculture, Machine Learning, Federated Learning, Metaverse

Experience

Assistant Professor — Aug. 2024 – Present
University of Central Missouri, Department of Computer Science and Cybersecurity — *Warrensburg, MO*

- Deliver high-quality instruction in undergraduate and graduate courses, developing engaging course materials and supervising students through coursework, labs, and projects
- Actively contribute to curriculum updates, incorporating emerging computer science topics and participating in assessment to ensure effective learning outcomes
- Conduct and publish original research in computer science, present findings at academic conferences, and seek external funding to support research initiatives and student involvement
- Mentor students in research projects, fostering an environment that encourages inquiry, innovation, and the development of critical skills for careers in computer science
- Participate in departmental and university committees, engage in outreach to promote the program, support recruitment and retention, and contribute to professional organizations through service and conference activitie

Doctoral Researcher — Aug. 2019 – Jul. 2024
University of North Texas, Smart Electronic Systems Lab (SESL) — *Denton, TX*

- Designing and evaluating distributed systems to verify the authenticity of pharmaceutical products, reducing counterfeits, and enhancing supply chain security
- Building resilient Internet-of-Medical Things (IoMT) system architectures leveraging smart contract-based robust access control and encryption mechanisms while ensuring data privacy and security
- Distributed prescription sharing systems to prevent prescription fraud and enhance ease-of-use
- Accurate demand forecasting mechanisms for pharmaceutical products using federated machine learning
- Providing real-time decision support and insurance management tools for smart agriculture applications

Graduate Teaching Assistant — Aug. 2018 – Jul. 2024
University of North Texas — *Denton, TX*

Assisted with laboratory instruction, grading, ABET evaluation and other course-related tasks

- CSCE 3600 Principles of System Programming, Summer 2024

- CSCE 3612 Embedded System Design, Summer 2024
- CSCE 3612 Embedded System Design, Spring 2024
- CSCE 3730 Reconfigurable Logic, Fall 2023
- CSCE 3612 Embedded System Design, Summer 2023
- CSCE 3600 Principles of System Programming, Summer 2023
- CSCE 5740 Topics in Modern Electronic System Design, Spring 2023
- CSCE 6731 Advanced Topics in VLSI Systems, Spring 2023
- CSCE 3730 Reconfigurable Logic, Fall 2022
- CSCE 3055 IT Project Management, Summer 2022
- CSCE 3612 Embedded System Design, Summer 2022
- CSCE 3612 Embedded System Design, Spring 2022
- CSCE 5740 Topics in Modern Electronic System Design, Spring 2022
- CSCE 6731 Advanced Topics in VLSI Systems, Spring 2022
- CSCE 3730 Reconfigurable Logic, Fall 2021
- CSCE 3612 Embedded System Design, Summer 2021
- CSCE 2610 Assembly Language and Computer Organization, Summer 2021
- CSCE 3612 Embedded System Design, Spring 2021
- CSCE 3730 Reconfigurable Logic, Fall 2020
- CSCE 3612 Embedded System Design, Summer 2020
- CSCE 3612 Embedded System Design, Spring 2020
- CSCE 5612 Embedded Hardware/Software Design, Fall 2019
- CSCE 3730 Reconfigurable Logic, Fall 2019
- CSCE 5560 Secure Electronic Commerce, Spring 2019
- CSCE 4550 Introduction to Computer Security, Fall 2018

Graduate Research Assistant Summer 2020 - 2023
University of North Texas *Denton, TX*

- Assisted in organizing NSF-funded Easy-Med: Interdisciplinary Training in Security, Privacy-Assured Internet of Medical Things
- Delivered lectures on data privacy and security preserving architectures for IoMT systems
- Conducted hardware demo sessions for undergraduate students

Graduate Student Assistant Jun. 2018 – Aug. 2018
University of North Texas *Denton, TX*

- Front desk to assist patrons with library procedures
- Assisting in Laptop and other digital sources check out/in
- Keeping the library environment clean and presentable

Senior Systems Engineer July 2014 – July 2017
Infosys Ltd. *Hyderabad, India*

- TIBCO Business Works Application Code Development and Enhancements
- Maintenance of Logging and Error Handling Framework for all the applications in PepsiCo
- Coordinating and working with the onsite team for the smooth flow of processes
- Monitoring of File transfers from source to destination and developing various transformations to move the data to and from the peers using XSL Transformations
- Involved in BW migrations and deployments and testing in various environments

Air Navigation Systems (Intern) May 2013 – July 2013
Airports Authority of India *Vijayawada, India*

- Study the Communication equipment used to establish communication between ground and Pilots
- Worked closely with Air Traffic Control Staff in the day-to-day functions
- Understand the different protocols used in ATC tower to maintain proper communication

Publication

Journals

- **A.K. Bapatla**, S. P. Mohanty, and E. Kougianos, "PharmaChain 3.0: Efficient Tracking and Tracing of Drugs in Pharmaceutical Supply Chain using Blockchain Integrated Product Serialization Mechanism", Springer Nature Computer Science (SN-CS), Vol. 5, No. 1, Jan 2024, Article: 149, 22-pages, DOI: https://doi.org/10.1007/s42979-023-02510-9.
- **A.K. Bapatla**, D. Puthal, S. P. Mohanty, V. P. Yanambaka, and E. Kougianos, "EasyChain: An IoT-Friendly Blockchain for Robust and Energy-Efficient Authentication", Frontiers in Blockchain, Vol. 6, No. 1194883, Aug 2023, pp. 1–19, DOI: https://doi.org/10.3389/fbloc.2023.1194883.
- **A.K. Bapatla**, S. P. Mohanty, E. Kougianos, D. Puthal, and A. Bapatla, "PharmaChain: A Blockchain to Ensure Counterfeit-Free Pharmaceutical Supply Chain", IET Networks, Vol. 12, No. 2, March 2023, pp. 53–76, DOI: https://doi.org/10.1049/ntw2.12041.
- **A.K. Bapatla**,S. P. Mohanty, and E. Kougianos, "PharmaChain: A Blockchain to Ensure Counterfeit Free Pharmaceutical Supply Chain", arXiv Computer Science, arXiv:2202.02592, Feb 2022, 25-pages.
- A. Mitra, S. L. T. Vangipuram, **A. K. Bapatla**, V. K. V. V. Bathalapalli, S. P. Mohanty, E. Kougianos, and C. Ray, "Smart Agriculture: A Comprehensive Overview", Springer Nature Computer Science (SN-CS), Vol. 5, No. 8, Oct 2024, Article: 969, DOI: https://doi.org/10.1007/s42979-024-03319-w.
- A. Mitra, S. L. T. Vangipuram, **A. K. Bapatla**, V. K. V. V. Bathalapalli, S. P. Mohanty, E. Kougianos, and C. Ray, "Everything You wanted to Know about Smart Agriculture", arXiv Computer Science, arXiv:2201.04754, Jan 2022, 45-pages.
- L. Rachakonda, **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "SaYoPillow: A Blockchain-Enabled, Privacy-Assured Framework for Stress Detection, Prediction and Control Considering Sleeping Habits in the IoMT", arXiv Computer Science, arXiv:2007.07377, July 2020, 38-pages.
- L. Rachakonda, **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "SaYoPillow: Blockchain-Integrated Privacy-Assured IoMT Framework for Stress Management Considering Sleeping Habits", IEEE Transactions on Consumer Electronics (TCE), Vol. 67, No. 1, Feb 2021, pp. 20-29.
- L. Rachakonda, **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "BACTmobile: A Smart Blood Alcohol Concentration Tracking Mechanism for Smart Vehicles in Healthcare CPS Framework", Springer Nature Computer Science (SN-CS), Vol. 3, No. 3, May 2022, Article: 236, 24-pages, DOI: https://doi.org/10.1007/s42979-022-01142-9.

Conferences

- **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "FortiRx: Distributed Ledger Based Verifiable and Trustworthy Electronic Prescription Sharing", in Proceedings of the IFIP International Internet of Things Conference (IFIP-IoT), 2023, pp. 283–301, DOI: https://doi.org/10.1007/978-3-031-45882-8_19.
- **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "FortiRx 2.0: Smart Privacy-Preserved Demand Forecasting of Prescription Drugs in Healthcare-CPS", in Proceedings of the OITS International Conference on Information Technology (OCIT), 2023, pp. 438–443, DOI: https://doi.org/10.1109/OCIT59427.2023.10430944.

- **A. K. Bapatla**, A. Gupta, S. P. Mohanty, and E. Kougianos, "SmartInsure: Blockchain and CNN Leveraged Secure and Efficient Cattle Insurance", in Proceedings of the OITS International Conference on Information Technology (OCIT), 2023, pp. 432–437, DOI: https://doi.org/10.1109/OCIT59427.2023.10430847.

- M. N. Alruwaill, **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "FarmIns: Blockchain Leveraged Secure and Reliable Crop Insurance Management System", in Proceedings of the IFIP International Internet of Things Conference (IFIP-IoT), 2023, pp. 381–389, DOI: https://doi.org/10.1007/978-3-031-45882-8_26.

- P. Mittal, **A. K. Bapatla**, M. R. Lenka, and S. P. Mohanty, "AcadChain: A Blockchain Integrated Secure and Privacy Preserved Student Feedback System", in Proceedings of the OITS International Conference on Information Technology (OCIT), 2023, pp. 102–107, DOI: https://doi.org/10.1109/OCIT59427.2023.10430683.

- **A. K. Bapatla**, S. P. Mohanty, E. Kougianos, and D. Puthal, "PharmaChain 2.0: A Blockchain Framework for Secure Remote Monitoring of Drug Environmental Parameters in Pharmaceutical Cold Supply Chain", in Proceedings of the IEEE International Symposium on Smart Electronic Systems (iSES), 2022, pp. 185–190, DOI: https://doi.org/10.1109/iSES54909.2022.00046.

- **A. K. Bapatla**, S. P. Mohanty, E. Kougianos, and D. Puthal, "PharmaChain 3.0: Blockchain Integrated Efficient QR Code Mechanism for Pharmaceutical Supply Chain", in Proceedings of the OITS International Conference on Information Technology (OCIT), 2022, pp. 625–630, DOI: https://doi.org/10.1109/OCIT56763.2022.00121. (Awarded Best Paper of the OCIT 2022.)

- **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "sFarm: A Distributed Ledger based Remote Crop Monitoring System for Smart Farming", in Proceedings of the 4th IFIP International Internet of Things Conference (IFIP-IoT), 2021, pp. 13–31, DOI: https://doi.org/10.1007/978-3-030-96466-5_2

Presentations

- **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "FortiRx: Distributed Ledger Based Verifiable and Trustworthy Electronic Prescription Sharing", in Proceedings of the IFIP International Internet of Things Conference (IFIP-IoT), 2023, pp. 283–301, DOI: https://doi.org/10.1007/978-3-031-45882-8_19.

- **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "FortiRx 2.0: Smart Privacy-Preserved Demand Forecasting of Prescription Drugs in Healthcare-CPS", in Proceedings of the OITS International Conference on Information Technology (OCIT), 2023, pp. 438–443, DOI: https://doi.org/10.1109/OCIT59427.2023.10430944.

- **A. K. Bapatla**, A. Gupta, S. P. Mohanty, and E. Kougianos, "SmartInsure: Blockchain and CNN Leveraged Secure and Efficient Cattle Insurance", in Proceedings of the OITS International Conference on Information Technology (OCIT), 2023, pp. 432–437, DOI: https://doi.org/10.1109/OCIT59427.2023.10430847.

- **A. K. Bapatla**, S. P. Mohanty, E. Kougianos and D. Puthal, "PharmaChain 2.0: A Blockchain Framework for Secure Remote Monitoring of Drug Environmental Parameters in Pharmaceutical Cold Supply Chain," 2022 IEEE International Symposium on Smart Electronic Systems (iSES), Warangal, India, 2022, pp. 185-190, doi: 10.1109/iSES54909.2022.00046.

- **A. K. Bapatla**, S. P. Mohanty, E. Kougianos and D. Puthal, "PharmaChain 3.0: Blockchain Integrated Efficient QR Code Mechanism for Pharmaceutical Supply Chain," 2022 OITS International Conference on Information Technology (OCIT), Bhubaneswar, India, 2022, pp. 625-630, doi: 10.1109/OCIT56763.2022.00121.

- **A. K. Bapatla**, S. P. Mohanty, and E. Kougianos, "sFarm: A Distributed Ledger based Remote Crop Monitoring System for Smart Farming", in Proceedings of the 4th IFIP International Internet of Things Conference (IFIP-IoT), 2021, pp. 13–31, DOI: https://doi.org/10.1007/978-3-030-96466-5_2

- **Bapatla, A.K.**, Rachakonda, L. (2022). BrainChain: Blockchain Architecture for Secure Data Sharing and Access Control. IEEE Brain Data Bank Challenge 05 November 2020, Boston, MA, USA **Second Prize**.

Academic Projects

NSF Award OAC-1924112: Easy-Med (Student Volunteer) 2019-2023

- The goal of this project is develop an off-the shelf component based IoMT enabled medical training framework, Easy-Med, to train STEM students with sensing, security, and privacy-aspects of smart healthcare and provide them a career path in smart healthcare
- Participated in process of recruiting undergraduate students for the program
- Setup canvas and assisted in scheduling classes for 6-week summer program during three years
- Delivered lectures on distributed system based security frameworks for smart healthcare systems
- Conducted hands-on training sessions using off-the shelf components

Study of Branch Prediction Techniques for Pipeline Optimization (Computer System Architecture)

- Control hazards occur in pipelining when instructions like branches, jumps and interrupts change the program counter, leading to performance loss
- Branch predictions help in mitigating control hazard
- Focused on optimizing branch prediction techniques (Not Taken, Taken, Random, Last Time Prediction) and conducted experiment on various instruction traces including integer, floating-point and multimedia

Green House E-commerce Website (Secure Electronic Commerce)

- Designed and deployed e-commerce website for potted plants, bonsai, planting tools and seeds
- Followed three-tier architecture, User interface, Functional layer, and Data management layer
- Technologies used - WordPress, HTML, CSS, JavaScript, PHP, phpMyAdmin (SQL)

Smart home IoT system (Embedded Hardware Design)

- Interfacing sensors to ESP8266 NodeMcu using serial communication protocols UART, I2C and SPI
- Creating and managing things in Samsung Smart-things Ecosystem
- Created Smart app in Samsung Smart-things Groovy IDE

Network Routing Algorithms (Network-on-Chip)

- Designed and implemented routing algorithms for on-chip network communication
- Emphasized deadlock and live-lock prevention strategies
- Employed turn-restriction routing models, including Dimension-ordered (X-Y), West-First, North-Last, and Negative-First to avoid circular waits
- Successfully achieved a partially adaptive, deadlock-free routing algorithm for mesh networks

Decentralized Architecture for Managing Electronic Healthcare Records

- Implemented robust encryption and access control to safeguard sensitive health data
- Facilitated seamless data exchange between healthcare stakeholders
- Empower patients with complete control over their health records
- Streamlined record-keeping processes, reducing overhead administrative processing

Farm2Table: Blockchain Based Solution for Organic Food Tracing and Tracking

- Leveraged blockchain technology for creating an immutable ledger for tracking organic foods from farm to table
- Enabled consumer with access to real-time information about origin, production and transportation of organic products
- To foster the confidence and trust in the authenticity of organic claims
- To improve quality by allowing stakeholders to record and verify the organic certifications

RF Radiation Exposure Assessment near Mobile Base Stations Jan 2014 – May 2014

- Gaussian network Joint-source channel coding was implemented referring the theoretical concept into a practical scenario using MATLAB
- To observe the variations in the signal strength with distance as well as with time.
- To compare the obtained values with reference standards
- To extrapolate the obtained values to the EPI model and simulate in MATLAB R2009b

Awards

- "PharmaChain 3.0: Blockchain Integrated Efficient QR Code Mechanism for Pharmaceutical Supply Chain" **Best Paper Award** at the 20th OITS International Conference on Information Technology (OCIT), 2022.
- "BrainChain: Blockchain Architecture for Secure Data Sharing and Access Control", **Second Place** IEEE Brain Data Bank Challenge 05 November 2020, Boston, MA, USA
- Awarded ISVLSI Student Travel Grant 2021
- Texas Public Education Grant, Toulouse Graduate School, University of North Texas, 2019-2023
- Tuition Benefit Scholarship, Toulouse Graduate School, University of North Texas, 2019-2023
- CENG/DT Award (85%), Department of Computer Science and Engineering, 2019-2023

Journal/Conference Reviewer

- Springer Nature Computer Science (SNCS), 2024.
- Springer Nature Computer Science (SNCS), 2023.
- IEEE Consumer Electronics Magazine (CEMAG), 2023.
- Transactions of Consumer Electronics, 2022, 2023.
- Journal of Cyber Security, 2023.
- IEEE Computer Society Annual Symposium on VLSI (ISVLSI), 2023.
- IEEE International Conference on Digital Health (ICDH), 2023.
- IEEE Great Lakes Symposium on VLSI (GLSVLSI),2022.
- IEEE International Symposium on Smart Electronic Systems (iSES), 2023.

Conference Committee

- Organizing Committee, Web Chair, IEEE International Symposium on Smart Electronic Systems 2024 Conference Website: https://www.ieee-ises.org/IEEE-iSES_2024_Website/organizing-committee.html
- Organizing Committee,Local Arrangements, 2023 IEEE IFIP International Internet of Things (IoT) Conference

Professional Development Activities

- Blockchain Basics, The state University of New York, Coursera Certificate
- Attended Graduate Student Teaching Excellence Program (GSTEP) to improve andragogical skills and experience course designing, Spring 2023
- Attended "Current Trends in Counterfeit Pills" webinar by Lexipol Media Group
- IEEE CAS Seasonal School about AgriFood Technologies, 2022.

Professional Organization Member

- IEEE Student
- IEEE Young Professionals
- Blockchain Community, IEEE