

PAWAN KUMAR

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EDUCATION

Ph.D. Student, Computer Engineering, Arizona State University, Tempe, AZ *Aug. 2024 – Present*

>Advised by Prof. Hokeun Kim

>Research Area: Embedded Systems, Cyber-Physical Systems, Robotics, Machine Learning

M.S. Computer Engineering, Arizona State University, Tempe, AZ *Aug. 2022 – Aug. 2024*

>Cumulative GPA: 3.52/4.0

>Relevant Coursework: Privacy and Machine Learning, Communication Networks, Probability & Random Processes, Foundations of Algorithms, Knowledge Representation, Perception in Robotics, Broadband Networks, Embedded Machine Learning.

>Advised by Prof. Hokeun Kim

>Thesis on “Cost-Effective Cyber-Physical System Prototype for Precision Agriculture with a Focus on Crop”

B.E. Electronics and Instrumentation, Dayananda Sagar College of Engineering, Bangalore, India *Aug. 2018 – July 2022*

Cumulative GPA: 8.58/10, 3.68/4.0

AWARDS & ACHIEVEMENTS

>Travel award to present in Design, Automation and Test in Europe Conference (DATE) 2026

>Travel award to present in Rapid System Prototyping (RSP) Workshop as part of ESWEEK 2024

>Best project of social relevance award for COVID detection using X-ray and CT scans in June 2022

>Best performing intern at the Student Partner Internship Program 2020

>Quarter finalist at AICTE, DST & Texas Instruments India Innovation Challenge Design Contest 2019

PUBLICATIONS

Journal Articles

Kumar, P., Arava, N., Kulkarni, A. A., Suresh, N., & Kumar, S. A. (2022). A comparative study of SARS COVID-19 using X-ray and CT scan images using deep learning techniques. *International Journal of Health Sciences*, 6(S2), 11819–11829.

Conference Papers

Pawan Kumar and Hokeun Kim, “Cyber-Physical System Design Space Exploration for Affordable Precision Agriculture,” (To appear) in *Proceedings of Design, Automation and Test in Europe Conference (DATE) 2026*. Verona Italy, April 20 - 22, 2026.

Pawan Kumar, Yejur Dube, and Hokeun Kim, “Demo Abstract: Cost-Effective Rover for Farms,” in *Proceedings of the 16th ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS)*. Irvine, CA, May. 2025.

Pawan Kumar and Hokeun Kim, "Cost-Effective Cyber-Physical System Prototype for Precision Agriculture with a Focus on Crop Growth", in *Proceedings of the 35th IEEE International Workshop on Rapid System Prototyping (RSP)*. Raleigh, NC, October 3, 2024.

Poster Presentations

Pawan Kumar, Yejur Dube, and Hokeun Kim, “Cost-Effective Rover for Farms,” in *Southwest Robotics Symposium*, Arizona State University, Tempe, AZ, October 31-November 1, 2025.

PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant at Arizona State University, Tempe, Arizona: *Aug 2025 – Present*

>Performs functions in support of testing and grading for a specific course or professor.

>Assists with the preparation, distribution, and collection of test materials.

> Observe and monitor the students during examinations and related assessments.

Graduate Service Assistant at Arizona State University, Tempe, Arizona: *Jan 2024 – May 2024*

>Performs functions in support of testing and grading for a specific course or professor.

>Assists with the preparation, distribution, and collection of test materials.

> Observe and monitor the students during examinations and related assessments.

Shift Team Lead at Aramark, Tempe, Arizona: *Aug 2022 – May 2024*

> Managed a high-volume Qdoba team, overseeing daily operations to deliver exceptional customer service.

> Effectively trained and mentored new team members, fostering a positive work environment that enhanced team performance.

> Proactively tackled operational challenges, showcasing robust problem-solving skills for a seamless and positive customer experience.

> Adapted effectively to changing circumstances, implementing strategic adjustments for improved team performance and efficiency.

Machine Learning and Communication Intern at Sooktha Consulting Private Limited, Bangalore, India: Aug 2021– Sept 2021

- > Studied and characterized NB-IoT connections to determine their suitability for real-world use cases and applications.
- > Worked on NB-IoT connectivity setup and how to transmit data in both directions using the connection with multiple sensors/devices.
- > Conducted tests on connectivity, frequency, uplink, and downlink across various devices, data intervals, and rates to characterize network capacity.
- > Integrated the sensors with the cloud platform to collect and store the data in real-time, using protocols such as TCP.
- > Developed a machine learning model to analyze the collected data and identify patterns and trends in temperature and humidity levels.

ACADEMIC PROJECTS

Heterogeneous rover–drone platform

Fall 2025 - Present

- > Designing and developing a rover and drone by integrating it with a Raspberry Pi for control and processing.
- > Adapting to a range of applications based on task-specific requirements with minor modifications.
- > Unify aerial and ground systems within a common CPS framework for scalable, intelligent, and affordable field operations.

Rover for farm applications

Fall 2024 – Fall 2025

- > Designed and developed a farming rover by repurposing a ride-on toy car and integrating it with a Raspberry Pi for control and processing.
- > Developed a data pipeline for recording and preprocessing images and sensor data to enable citrus plant detection and analysis.
- > Designed a stable, removable support structure for mounting hardware while maintaining the mobility of the rover.

Cost-Effective Cyber-Physical System Prototype for Precision Agriculture with a Focus on Crop

Fall 2023 – Summer 2024

- > Designed and implemented a cyber-physical system (CPS) prototype for real-time monitoring and prediction of crop growth in hydroponic environments.
- > Developed a cost-effective solution by integrating sensors, microcontrollers (ESP32, Raspberry Pi), and digital image processing techniques.
- > Conducted experiments to measure leaf area and biomass accumulation using non-destructive methods, comparing TF-Luna and ultrasonic sensors.
- > Built a predictive model for plant growth using linear regression and Bayesian linear regression, achieving over 90% accuracy in test data.
- > Documented system architecture, experimental results, and analysis in technical reports and research papers presented at RSP Workshop, ESWEEK 2024.

Trash Sorter Using Object Detection

Spring 2023 – Spring 2023

- > Conducted research on the various object detection techniques and algorithms to identify the appropriate approach for the trash sorter.
- > Integrated the object detection system with the Franka Emika Robot to create a functional trash sorter robot.
- > Documented the robot's design, development, and performance in technical reports and presentations.
- > Worked with the team to define and prioritize project tasks, manage project timelines, and allocate resources effectively.
- > Actively engaged in learning new skills and technologies related to robotics, object detection, and waste management.

Analysis of Poisoning Attacks in Federated Learning for Educational Data Mining

Fall 2022 – Fall 2022

- > Analyzed the KDDCUP2015 dataset to identify relevant features and data patterns for student dropout prediction.
- > Developed and trained a federated learning model using the dataset to predict student dropout risk.
- > Analyzed the impact of different types of poisoning attacks on the model's performance and identified mitigation strategies.
- > Evaluated the model's performance in terms of accuracy matrix against poisoning attacks.

Automatic Early Detection of SARS-COVID-19 Using Deep Learning Techniques

Fall 2021 – Spring 2022

- > Led a team of four to enhance Deep Learning techniques for classifying COVID-19 severity using X-rays and CT scans.
- > Conducted comparative studies on the performance of different deep learning models, including VGG-19, Resnet-50, InceptionV3, and Xception in detecting COVID-19.
- > Analyzed the performance of the models in terms of accuracy, Precision, recall, and F1 score.
- > Documented the research methodology, experimental setup, and results in technical reports and papers.