

18th QI Artificial Intelligence (AI) Research-focused Project – Winter 2027

Venue: Qualcomm Institute (QI), University of California, San Diego

Dates: January 10 – February 21, 2027 (Actual Project Period: Jan. 11 – Feb. 19, 2027)

PI Information

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Executive Summary

Artificial Intelligence (AI) gives systems the ability to learn from experience without explicit programming. It can continuously improve the performance of a wide range of systems, networks, and services. As computing power grows, cloud-based big data storage expands, and demand for AI-based models increases, AI technologies have become essential across both research and industry.

The QI AI Research-focused Project is a six-week, team-based, hands-on research program. It introduces participants to the full AI research process, from big data collection and pre-processing through modeling, analysis, performance enhancement, and visualization.

The project is designed for participants who want to learn:

- How to select and apply appropriate AI algorithms to big data from application fields, such as energy, air quality, the environment, transportation, and public health
- How to analyze and interpret the results of AI-based models
- How to enhance model performance and, in turn, the performance of the systems and networks those models support
- How to visualize AI model results effectively

Participants follow a structured research workflow:

Research Question → Dataset Discovery & Pre-processing → AI/ML Training & Testing → Performance Analysis & Enhancement → Result Visualization → Research Conference Paper or Journal

Participants who complete the project build the theoretical and practical skills needed for a career as an AI researcher, scientist, or engineer. The program trains participants in AI itself and connects AI with multidisciplinary research and industrial practice.

Project Highlights

- **Six-week, team-based, hands-on research project:** Teams define a research question and carry it through data discovery and pre-processing, AI/ML model training and testing, performance analysis and enhancement, and result visualization.
- **KNIME-focused training:** Participants learn KNIME Analytics Platform, recognized as one of the top 10 AI analytics tools, and use it to analyze big data and build AI/ML models.
- **KNIME L1 Certification:** All participants are required to earn the KNIME L1 Certification as part of the program.
- **GitHub repository:** Each team is required to store and maintain its datasets, analysis source code (including KNIME workflows), and results in a team GitHub repository.
- **Research paper:** Each team is required to develop its findings into a research paper and submit it to an academic conference or journal.
- **Global AI hackathon:** All participants are required to take part in a global AI hackathon using their research results.
- **Final showcase:** The project concludes with the **QI AI Research Hackathon**, where each team presents its research and results.
- **QI Certificate:** Participants who successfully complete the QI AI Research-focused Project earn the QI Certificate.
- **Internship opportunities in San Diego:** Participants may have the opportunity to pursue internships at industry companies in San Diego.

Project Experience

The QI AI Research-focused Project is an intensive, practical, research-centered program. It combines technical lectures, review sessions, office hours, technical seminars, social events, weekly presentations, and a final hackathon.

The lectures cover the full big data analysis pipeline: collection, pre-processing, modeling, analysis, enhancement, and visualization. Through this process, participants learn how AI algorithms behave on real-world data. They also come to understand:

- The strengths and limitations of different AI/ML algorithms
- How to select the right model for each application field
- How to tune AI/ML models to improve the performance and capacity of the systems and networks they serve

Alongside the theory, participants gain hands-on experience with the tools used to analyze big data and make inferences with AI/ML algorithms. KNIME is the core tool, with Python as an optional addition, and the training prepares participants for the KNIME L1 Certification. Teams also use GitHub to manage their datasets, KNIME workflows, source code, and results throughout the project, building an organized and reproducible record of their research.

Participants take on assigned roles and responsibilities and work together on a final team research task, applying the theoretical and practical skills learned in lectures. Office hours and review sessions give them ongoing support. Weekly presentations let participants and instructors track progress and review the skills being developed.

By the end of the project, participants will understand how AI models work and which models best fit different real-world problems. They will know how to analyze and improve model performance, and they will have a stronger foundation in state-of-the-art AI techniques.

Participants also have the opportunity to draw on the resources of UC San Diego, one of the top universities in the world. They work alongside UCSD faculty, staff, and students, meet and collaborate with respected experts in the field, and have access to seminars and workshops hosted by QI and UCSD.

Project Guidelines

- All participants are required to bring their own laptops for the duration of the project.
- All participants are required to earn the KNIME L1 Certification.
- Each team is required to store and maintain its datasets, analysis source code (including KNIME workflows), and results in a team GitHub repository.
- Each team is required to develop its findings into a research paper and submit it to an academic conference or journal.
- All participants are required to take part in a global AI hackathon and the QI AI Research Hackathon using their research results.
- All outcomes of the project, including research results, datasets, source code, KNIME workflows, the contents of each team's GitHub repository, and any resulting papers or publication submissions, belong to the Qualcomm Institute, UC San Diego.

Cost and Eligibility

The cost of the QI AI Research-focused Project is \$4,950 per participant. The fee includes lectures, technical review sessions, all materials, special events, social activities, and the visiting research scholar intern processing fee.

Participants are expected to have the following skills:

- Basic mathematical knowledge, such as linear algebra and probability
- Familiarity with basic analytical software tools, such as Python and MATLAB
- Basic familiarity with GitHub (preferred, not required)