

# Cao Trung Quan

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## SUMMARY

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Participating and winning top awards in several STEM Competitions and Informatics Olympiads during three years of high school, I am deeply committed to using artificial intelligence to improve accessibility and quality of life for people with disabilities. After building and leading several projects, I aspire to transform technical innovations into meaningful social impact.

## EDUCATION

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2022 - 2025 High School Diploma at **Quang Tri Town High School** GPA: 9.54 (Grade 12)

## EXPERIENCES

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**Summer in Engineering and Applied Sciences (SEAS)** Jul 2025 - Aug 2025

*Participant (selected 43 out of 400 applicants nationwide)*

- Completed an intensive two-week full-day program on Artificial Intelligence and Applications (adapted from the MIT Computer Science undergraduate curriculum).
- Collaborated on a group project applying Machine Learning to flood forecasting in Central Vietnam and presented project findings at the conclusion of the program to mentors and peers.
- Worked directly with mentors from Harvard, MIT, CERN, Stony Brook University, Ericsson Research, UIUC, UC Irvine, VinAI, and other leading institutions.

**Quang Tri Town High School STEM Club** Jun 2024 - May 2025

*President*

- Supported multiple students in developing ideas and research plans to participate in the school-level Science and Engineering Fair.
- Directly contributed to organizing the "2024 STEM and Career Guidance Festival," engaging over 1,000 school students in hands-on product creation and booth exhibitions.
- Organized an inspirational session for younger students following my 4th place achievement at the International Science and Engineering Fair, attracting more than 100 participants.

## PROJECTS

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### Autonomous Wheelchair for Mobility and Communication Assistance for ALS Patients

*Team Project — Project Leader*

- Developed an autonomous wheelchair integrating YOLO11-based eye-tracking and polynomial regression for accurate 97.11% gaze-driven virtual mouse control.
- Engineered dual wheelchair modes—manual joystick emulation and autonomous navigation with SLAM Toolbox and Nav2—achieving 0.12 m path deviation and 93.33% navigation success.
- Built an eye-operated communication system using a fine-tuned Gemma2 language model to convert word selections into 3 coherent sentences with speech and Telegram output.

**Translation Device Supporting Deaf-Mute Individuals in Communication**

*Personal Project*

- Designed a smart glove with 12 IMUs to recognize sign language gestures using the MultiLayer Perceptron model achieving 99% accuracy and converting them into natural language.
- Implemented a two-way communication system that translates spoken language back into text, enabling interactive dialogue between deaf-mute individuals and others.
- Enhanced comprehension by integrating the Gemma2:2B language model to form natural sentences from discrete signs, with bilingual (Vietnamese/English) support and extensible vocabulary.

**Applying Machine Learning to Flood Forecasting in Central Vietnam**

*Team Project — Project Leader*

- Developed a machine-learning flood forecasting system using the U.S. CAMELS dataset to predict river flows in ungauged basins of central Vietnam.
- Trained a multilayer perceptron on 110,000+ hydrological and climatic samples, achieving accurate streamflow predictions for the Long Dai River despite scarce local data.
- Deployed the model as a real-time web application providing early flood warnings, with planned extensions for satellite data integration and multi-basin coverage.

**LEADERSHIP & ACTIVITIES**

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| • International Science and Engineering Fair   Project Leader | May 2025            |
| • Summer in Engineering and Applied Sciences   Project Leader | Jul 2025 - Aug 2025 |
| • Quang Tri Town High School STEM Club   President            | Jun 2024 – May 2025 |
| • Outstanding Young Faces of Quang Tri Province               | Mar 2025            |
| • University Admission Counseling Day   Ambassador            | Jan 2024            |
| • Nghia Dung Karatedo   First Dan Black Belt in Karatedo      | Jun 2022            |

**COMPETITIONS & AWARDS**

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|---|----------|
| • 4th Place – International Science and Engineering Fair – STEM Competition     | May 2025 |
| • 1st Place – Vietnam Science and Engineering Fair – STEM Competition           | Mar 2025 |
| • 2nd Place – Provincial Science and Engineering Fair – STEM Competition        | Jan 2025 |
| • 1st Place – 12th grade Academic Excellence Selection Exams – Physics Olympiad | Oct 2024 |
| • 3rd Place – National Youth Informatics Competition – Informatics Olympiad     | Aug 2024 |
| • 1st Place – Regional Youth Informatics Competition – Informatics Olympiad     | Jul 2024 |
| • 1st Place – Provincial Youth Informatics Competition – Informatics Olympiad   | May 2024 |
| • 2nd Place – Provincial Science and Engineering Fair – STEM Competition        | Jan 2024 |
| • 3rd Place – 12th grade Academic Excellence Selection Exams – Physics Olympiad | Oct 2023 |
| • 4th Place – Provincial Science and Engineering Fair – STEM Competition        | Jan 2023 |

**SKILLS & LANGUAGES**

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Programming: C/C++, Python  
Framework/Tools: PyTorch, TensorFlow, OpenCV, Matlab, Arduino IDE  
Embedded Systems: Microcontrollers (Arduino, ESP32, Raspberry Pi)  
Languages: English (fluent, 7.0 IELTS), Vietnamese (native speaker)