

# Nguyen Xuan Hoang

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## EDUCATION

2022 - 2025  
HANOI-AMSTERDAM HIGH SCHOOL FOR THE GIFTED, VIETNAM  
GPA: Grade 10: 9.5/10 Grade 11: 9.8/10

## HONORS & AWARDS

- **Silver Medal**, International Olympiad on Astronomy and Astrophysics (IOAA) in Brazil
- **Silver Medal**, Nordic-Baltic Physics Olympiad (NBPhO) in Estonia
- **Third Prize**, Vietnam Physics Olympiad
- **First Prize**, Hanoi Olympiad on Astronomy and Astrophysics
- **First Prize**, Hanoi Physics Olympiad for High Schoolers
- **First Prize**, Hanoi Physics Olympiad for Middle Schoolers
- **Gold Medal**, Indonesia International IOT Olympiad
- **Top 41/300+**, Online Physics Olympiad (OPhO) | Open Round
- **Vallet Scholarship**, Vietnam Science and Training Encounters Organization
- **Top 5 Valedictorian**, Hanoi-Amsterdam High School for the Gifted Entrance Exam
- **Top 3**, AMS CUP Football Tournament

## RESEARCH

**Design and Implementation of an Embedded System for Real-Time Temperature Control in Chemical Reactors**

**Author & Presenter**

*Instructor: Dr. Huu-Nguyen Bui (Physics Dept., Hanoi University of Mining and Geology)*

- Invested 30 hours per month to develop a semi-automated remote monitoring system for chemical reactors using Arduino R3 Uno, sensors, temperature & humidity sensors, and cameras; Programmed in Python (OpenCV, Pyserial) for real-time image processing and system controls.
- Conducted two successful trials to test system performance, refining camera calibration and code adjustments to ensure accuracy.
- Presented findings at the **International Young Researchers' Conference (IYRC, June 2024)**.

April 2024 - June 2024

**Analysis of Nonlinear Dynamics in a Single Magnetic Pendulum Driven by Plate-Magnet Interaction**

**Co-author**

*Instructor: Dr. Van-Duy Nguyen (Faculty of Computer Science & Phenikaa Institute for Advanced Study, Phenikaa University)*

- Analyzed the nonlinear dynamics of a magnetic pendulum interacting with a metal plate using the magnetic vector potential  $A$  to calculate induced electric fields and Lorentz's Law for system interaction forces.
- Modeled key parameters (string length, magnetic moment, metal conductivity) in MatLab to determine conditions for pendulum stoppage before reaching the plate.
- Publication: Under review with the American Journal of Physics.

June 2024 - Present

## PRODUCTS

**Inventor --- Automatic Railroad Crossing Barrier and Warning System**

January 2024 - March 2024

- Designed a system to prevent train-related accidents by automating barrier control and issuing real-time warnings when trains approach, addressing limitations in current technology and human error.
- Implemented ultrasonic sensors to detect trains within a 10cm range, sending signals to a central control unit that autonomously lowers and raises barriers for seamless traffic flow.
- Led the full design and assembly of the model, led **presentations** at the National Traffic Safety Conference, co-hosted by the Ministry of Education, National Traffic Safety Committee, and Honda Vietnam Co., Ltd.

**Co-Inventor --- Child Presence Detection System for School Buses**

April 2024 - June 2024

*Instructor: M.S Duong Trung Hieu, The Science House Vietnam*

- Developed a safety system that uses infrared and vibration sensors to detect children left in idle vehicles, triggering an alarm if human presence is detected after 2 minutes.
- Assisted in electrical circuit integration and designed the power supply for the system.
- Showcased the invention through the Kids on Board Club to promote child safety; Published in **Nhan Dan (VIE), the official newspaper of the Communist Party of Vietnam**

**Inventor --- Mobility-Assist Chair for the Elderly**

May 2024 - June 2024

*Instructor: Prof. Dr. Chu Duc Trinh, Principal, University of Engineering and Technology, Vietnam National University*

- Designed a motorized chair with a 100 kg capacity to assist elderly and post-surgery patients in standing and sitting, incorporating dual-piston and single-piston mechanisms.
- Conceptualized and constructed the chair's steel frame and coordinated a synchronized hydraulic system for seat and armrest movements.
- **Presented** the prototype at the Rehabilitation Department of the Transports Hospital for expert feedback and testing.

## LEADERSHIP

### Founder and President --- Stellar Explorers

December 2023 - Present

- Established and directed an astronomy club, monitored 9 members to develop a high-impact content series, "Cultural Approaches to Physics and Astronomy," attracted 5,000+ weekly engagements, enriching students' global perspectives in astronomy.
- Executed the "Stellar Minds: Astronomy Challenge," engaged 70 participants, and organized the "Exploring the Universe Through the Senses" program as a social welfare for 50+ visually impaired children using 3D solar systems models and sound simulations.

### Founder and President --- Mechatronics

July 2023 - Present

- Launched a robotics club to teach 11 underprivileged children robotics, circuit design, and assembly; organized the "Junior Robotics Workshop," attracted 30+ elementary and middle school students to build autonomous vehicle models.
- Led a 2-day trip to Ta Phin Secondary School to instruct 50+ eighth-graders on assembling car models and donate 5 assembly kits worth \$430

### President --- Kids On Board

February 2024 - October 2024

- Managed a team of 6 to found a club promoting traffic safety education for children and organized an art competition "Draw for Safety—Draw for the Future," attracted 50+ submissions/2 weeks.
- Conducted a live demonstration of the train warning system and child safety alert for 40+ fourth graders and teachers at Hanoi Star Primary School.

### Founder & Writer --- The Amplitude

October 2023 - August 2024

- Launched a blog detailing personal journeys in international competitions and exploring physics/astronomy through unique lenses.
- Created a content series: "Solutions for IPhO 2024 and APPhO 2024" that is on the first Google search page when typed the keyword "IPhO/AphO 2024 solution".
- Mentored youth in physics and astronomy, offering Olympiad strategies, cross-cultural insights, and exploring physics intersections with music, history, and billiards.
- Authored 10+ articles analyzing recent astronomical discoveries and predicting future research trends.

### Technical Manager --- Science Fair

March 2024 - July 2024

- Trained 10 members to create an evaluation rubric for 20 teams and a content series on green technology ideas, reaching 1,000+ viewers.
- Orchestrated the flagship Science Fair event at Newton School, Hanoi, Vietnam, featuring 20 exhibits on green technology, including a lake-cleaning robot and air quality monitors, attracted 1,500+ attendees.

### Co-founder --- Filamstropie

April 2023 - September 2024

- Supervised 30 members to organize a three-day fundraising campaign; raised \$1,300 to support 142 elderly individuals and 162 disabled and abandoned children at Thuy An Rehabilitation Center.
- Organized an outreach event in Hanoi with workshops for 50+ disabled individuals on soft skills and technology; raised \$600 for Typhoon No. 3 victims in Thai Nguyen, donated to the Vietnam Central Committee Relief Fund.

### Vice Head of Mechanics - CAD Department --- GreenAms Robotics Team

October 2022 - May 2023

- Led 7 members in developing a robot prototype; dedicated 15 hours weekly to conceptualization, chassis design, and electronics integration; Secured 2nd place out of 7 teams (56 competitors) at the club's annual competition and participated in the school's FIRST Robotics qualifier.

### Head of Technical Committee, GART TOUR 2023

March 2023 - May 2023

- Spearheaded project ideation and led a team of 6 in designing educational content on robotics.
- Conducted STEM workshops for 30 sixth graders at Nguyen Gia Thieu Secondary School, focusing on creating electrochemical batteries from potatoes and lemons, and introducing tensegrity structures.

## EMPLOYMENT/ INTERNSHIP

### Intern, Quantum AI Lab --- Phenikaa University

February 2024 - July 2024

#### Certificate of Internship - Letter of Recommendation

- Developed theoretical models, including the chain fountain phenomena, and solved Physics Olympiad experiment problems.
- Created experimental setups leading to one research paper publication (research 2 above).

### Intern --- Faculty of Electronics and Telecommunication,

March 2024 - June 2024

#### University of Engineering and Technology, Vietnam National University

#### Certificate of Internship - Letter of Recommendation

- Gained hands-on experience in robotics with YuMi robots, Arduino, and passive electronic components.
- Researched and developed a bidirectional motion controller for the "**Mobility-Assist Chair for the Elderly**" (product 3 above).

### Physics Private Tutor

March 2023 - May 2023

- Conducted 30 tutoring sessions for three ninth-graders, enhancing their comprehension, presentation skills, and analytical thinking; and provided guidance on solving past Hanoi Physics Olympiad problems.
- Achievements:** 2 out of 3 students reached the top 20 finalists in the Hanoi Physics Olympiad, and 1 student secured admission to Physics Honor Class of Hanoi-Amsterdam for the 2024 academic year.

## INTERESTS

- Piano: "Melody of the Night 5", "Ballade Pour Adeline"
- Beatmaking: Vid Tutorial: Remix Techniques
- Swimming
- Kickboxing
- Numismatics
- Billiards