

Victor Nan Fernandez-Ayala

Professional Experience

- 2022-present **PhD student**, Div. of Decision and Control Systems at *KTH Royal Institute of Technology*, in *Stockholm, Sweden*.
- Focused on **multi-agent systems**, **human-in-the-loop** and **safety-critical control**.
 - Involved with **Digital Futures Smart Construction** and **EU CANOPIES precision agriculture** project.
 - Wallenberg AI, Autonomous Systems and Software Program (**WASP**) affiliated PhD student.
 - Currently working on the research project **SHARCEX** (Synergistic Human-Robot Collaboration in Extreme Environments): **underwater human-robot collaboration** using custom BlueROV2s and integrating autonomy with diver-in-the-loop supervision, simulation and experimental validation.
- 2024-2025 **Co-Founder & CTO** at Animum, in *Stockholm, Sweden*.
- Raised funding, built and led a small team, and owned the technical roadmap and delivery.
 - Developed an integrated robotic solution for **autonomous night-time supermarket shelf stocking and fronting** ("Fronta") using mobile manipulators.
 - System integration across perception, planning and control for manipulation in a retail environment; with demo and validation on a mock-up store for **ICAx**.
- 2021-2022 **Research engineer at the SML (Smart Mobility Lab)** from **KTH University**, in *Stockholm, Sweden*.
- Part-time research engineer (**amanuens**) for the Division of Decision and Control Systems.
 - Working on assistant and coordinating roles on the experiments conducted at the lab.
- 2019-2020 **Engineering Intern at Drone Hopper** (*drone-hopper.com*) in *Madrid, Spain*. Working in programming and developing autopilots and controllers for heavy lifting drones.
- **Creation of a drone simulator** with *ROS & Gazebo* to facilitate testing new controllers. **Coding a custom software** based on *ArduPilot*. **Design and creation of a multirotor prototype**.
- 2019-summer **Intenship at Continental Automotive**, in *Timișoara, Romania*. Working as a junior programmer and electronics.
- **Creation of a capacitance measurement device**. Circuit design and simulation using *LTspice* software, PCB design using *Autodesk Eagle* and creation and programming of the device using *JavaScript*.

Journals

- Submitted Nan Fernandez-Ayala V., Deka S. A. and V. Dimarogonas D. "Estimating unknown dynamics and cost as a bilinear system with Koopman-based Inverse Optimal Control". *IEEE Transactions on Automatic Control*, 2026.
- 2025-Jun Nan Fernandez-Ayala V., Silva J., Guo M. and V. Dimarogonas D. "Robust Visual Servoing under Human Supervision for Assembly Tasks". *European Journal of Control (EJC)*, 2025.

Conferences

- Submitted Peron D., Nan Fernandez-Ayala V. and Segelmark L. "From Pixels to Shelf: End-to-End Algorithmic Control of a Mobile Manipulator for Supermarket Stocking and Fronting". 2026 IEEE International Conference on Robotics and Automation (ICRA).
- 2025-May Peron D., Nan Fernandez-Ayala V., Vlahakis E. E. and V. Dimarogonas D. "Efficient Coordination and Synchronization of Multi-Robot Systems Under Recurring Linear Temporal Logic". 2025 IEEE International Conference on Robotics and Automation (ICRA), Atlanta, USA.
- 2024-Aug Shankar A. D., Sujet P., Matoses Gimenez A., Nan Fernandez-Ayala V., Wong R., Yu P., Tan X. and V. Dimarogonas D. "Enhancing Precision Agriculture Through Human-in-the-Loop Planning and Control". 2024 IEEE Conference on Automation Science and Engineering (CASE), Apulia, Italy.

2024-May	Zhang Y., Nan Fernandez-Ayala V. and V. Dimarogonas D. "Multi-robot Human-in-the-loop Control under Spatiotemporal Specifications". 2024 IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan.
2023-May	Nan Fernandez-Ayala V, Tan X and V. Dimarogonas D. "Distributed barrier function-enabled human-in-the-loop control for multi-robot systems". 2023 IEEE International Conference on Robotics and Automation (ICRA), London, UK.
2022-Sep	Nan Fernandez-Ayala V, Vimlati L, Matoses Gimenez A, Delmotte H, Ivchenko M and Mariani R. "Design of a HALE UAV for atmospheric imaging". 33rd Congress of the International Council of the Aeronautical Sciences, Stockholm, Sweden, 2022.

Theses

2025-March	Nan Fernandez-Ayala V. "Distributed planning and control of multi-robot systems under human presence". KTH Licentiate thesis (monograph) in Electrical Engineering, 2025.
2022-Jun	Nan Fernandez-Ayala V. "Control barrier function-enabled human-in-the-loop control for multi-robot systems: Centralized and distributed approaches". KTH MSc thesis: Degree Project in Electrical Engineering, specializing in Systems, Control and Robotics, 2022.

Academics

2020-2022	Master of Science in Aerospace Engineering , at <i>KTH Royal Institute of Technology</i> , in <i>Stockholm, Sweden</i> . <ul style="list-style-type: none"> ➤ Specialized in Systems and Controls (Systems Engineering, Hybrid & Embedded Control, Geometric Control, Non-linear Optimization, Advanced Control, Optimal Control and Reinforcement Learning). ➤ Master Thesis: Control barrier function-enabled human-in-the-loop control for multi-robot systems. <ul style="list-style-type: none"> – Focused on formation control and platooning with STL with a human element. – Working on designing and implementing a decentralized version of the CBF algorithm. – Testing with Nexus mobile base robots and Qualisys motion capture system as well as ROS.
2016-2020	Aerospace Engineering major , at <i>Universidad Carlos III de Madrid</i> (4-year program taught entirely in English). <ul style="list-style-type: none"> ➤ Final average grade of 8.473 out of 10. Outstanding grade at (passed with honors): <ul style="list-style-type: none"> – Programming (Programación) – Control System Analysis and Design (Control de Sistemas Aeroespaciales) – Jet & Rocket Propulsion (Propulsion Aeroespacial I) – Circuit Analysis (Fundamentos de Ingeniería Electrónica) – Transportation Planning & Design (Navegación, Transporte Aereo y Aeropuertos) ➤ End-of-Degree Project: creation of a realistic Python-based platform to simulate autonomous air vehicles and analyze the future of UTM (Unmanned Traffic Management).
2018-2019	Exchange student for one year at Georgia Institute of Technology , in <i>Atlanta, USA</i> .
2014-2016	Baccalaureate at <i>I.E.S Colegio San Agustín, Santander, Spain</i> . Grade: 13.136 out of 14 (Access Exams to college).

Teaching

2023-present	EA236X Degree project in electrical engineering, master thesis (supervisor). KTH University . <ul style="list-style-type: none"> ➤ Yixiao Zhang: "Multi-robot coordination and planning with HIL under STL specifications". ➤ Davide Peron: "Multi-Robot Coordination for Precision Agriculture Under Recurring LTL". ➤ Jorge Silva: "Object Manipulation with Robust Visual Servoing under Human Supervision".
2023-2025	EL2520 Control Theory and Practice, Advanced Course (teaching and lab assistant). KTH University .
2022-2025	EF112X Degree project in electrical engineering, basic level (thesis supervisor). KTH University .
2022-2023	EL1010 Control technology, general course (teaching and lab assistant). KTH University .

Leadership & Organizations

- 2020-present Team leader in the **student research project ALPHA** (kthaero.com/alpha) from **KTH University**.
- A **HALE** (High Altitude Long Endurance) **UAV** designed to fly in the Arctic to image auroras and other atmospheric effects. Done in collaboration with the **Space and Plasma physics department** at KTH.
 - Aircraft design, CAD modelling with *Solid Edge*, *CFD* with *Fluent* and electronics & control with *ArduPilot*.
- 2020-present Team member in the **BOOMERANG REXUS 31 team** (kthaero.com/boomerang) from **KTH**. Working on creating an autonomous controller using *MATLAB/Simulink* and aircraft/paraglider design with *XFLR5* and other tools.
- 2020-2021 Team member in the **B2D2 REXUS team** (b2d2.se) from **KTH**. Participating in the **German-Swedish student programme REXUS/BEXUS 30** (rexusbexus.net). Working in the **ADCS** (Attitude Determination and Control System) in *Simulink*, as well as software implementation and testing with *STM32 (C code)* and *FPGAs (VHDL)*.
- 2019-2020 Member of **STAR UC3M** (staruc3m.com) student rocketry team. Developing telemetry and sensor reading software for High-Power Rockets as well as the software for POSE and orientation estimation with Kalman filters.
- 2018-2019 Member of the **Ramblin' Rocket Club** (rocket.gtorg.gatech.edu), university organization at Georgia Tech with the goal of designing, building and flying rockets. In charge of building a L1 High-Power Rocket.

Academic awards & Scholarships

- 2020-2022 **Scholarship** from *Svensk-Spanska Stiftelsen*, obtained during the first and second year of the aerospace master.
- 2019-2020 **Excellence Grant** from *Fundacion Botín*, obtained during my aerospace studies of the fourth year.
- 2018-2019 **UC3M mobility grant**, *Universidad Carlos III de Madrid*, for studies abroad during my third year.
- 2017-2018 **Excellence Grant** from *Fundacion Botín*, obtained during my aerospace studies of the second year.

Courses & Workshops attended

- 2020-present **Deep Learning specialization** by *deeplearning.ai*, online specialization at Coursera consisting of five courses (**Neural Networks and Deep Learning**, **Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization**, **Structuring Machine Learning Projects**, **Convolutional Neural Networks**, **Sequence Models**). coursera.org/share/6889b091da7ff8bce7f0d4f634411dd3.
- 2018-2019 **Machine Learning** by *Stanford University*, online course at Coursera focused on anti-spam, image recognition, clustering and building recommender systems. coursera.org/account/accomplishments/verify/56SAFVU6AEP8.

Languages

English	Proficient level	<i>Cambridge CAE (2016)/TOEFL iBT: 114 (2019)</i>
Spanish	Proficient level	<i>Native</i>
Romanian	Proficient level	<i>Native</i>
Swedish	Limited working level	<i>B1</i>

Software & Tools

PROGRAMMING LANGUAGES & CODING EXPERIENCE: |Python| |MATLAB/Simulink| |C/C++|

OFFICE SOFTWARE & TEXT: |Office| |LaTeX|

SIMULATION: Fluids/Aerodynamics |Ansys Fluent| |XFLR5| and **Robotics** |ROS1/2| |Gazebo| |Isaac Sim/Lab|

DESIGN: 3D Modelling |SolidEdge/SolidWorks| |Autodesk Fusion|, **3D Printing** |Cura| and **PCB Design** |KICAD|

HARDWARE/SOFTWARE: Robotics |Arduino| |Raspberry Pi| |STM32| and **Autopilots** |ArduPilot/Pixhawk|

CERTIFICATIONS: |EASA Drone License A1-A3 (EUROCONTROL)| and |EASA Drone License A2 (AES)|