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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

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.

Other

2025-Sep 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”. Animum startup – Fronta – technical report. ArXiv: 2509.11740.

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 *KTH Royal Institute of Technology*, in *Stockholm, Sweden*.

- **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.
  - 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 *Universidad Carlos III de Madrid* (4-year program taught entirely in English).

- Final average grade of **8.473** out of 10. Outstanding grade at (passed with honors):
  - **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 *Atlanta, USA*.

2014-2016 **Baccalaureate** at *I.E.S Colegio San Agustín, Santander, Spain*. **Grade**: 13.136 out of 14 (Access Exams to college).

Teaching

2023-present EA236X Degree project in electrical engineering, master thesis (supervisor). **KTH University**.

- 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	*Cambridge CAE (2016)/TOEFL iBT: 114 (2019)*
Spanish	Proficient level	*Native*
Romanian	Proficient level	*Native*
Swedish	Limited working level	*B1*

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 (AESA)|