

Angel Villar-Corrales

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My research focuses on the intersection of self-supervised learning, computer vision, and robotics. I develop algorithms and train neural networks that enable autonomous systems to understand their environment, anticipate future states, and plan and act effectively.

Experience

Fundamental Artificial Intelligence Research (FAIR), Meta — **Paris, France**
Research Scientist — *October 2025– Present*

- Investigating video, speech and multimodal self-supervised learning from naturalistic and egocentric data
- Researching vision-language models that learn new concepts and ground them on visual experience from noisy, semantically misaligned and low-information egocentric videos

Autonomous Intelligent Systems Group, University of Bonn — **Bonn, Germany**
PhD Candidate — *February 2021 – October 2025*

- Investigated hierarchical, structured and object-centric predictive world models for robot manipulation and anticipating human behavior
- Researched object-centric and self-supervised representation learning
- Member of the NimbRo RoboCup humanoid soccer robot team (RoboCup Winners in 2022, 2023)
- Teached lab and seminar Master level courses on *Deep Learning for Visual Perception*

University of Erlangen-Nuremberg — **Erlangen, Germany**
Student Research Assistant — *April 2019 – November 2020*

- Investigated machine learning and modern signal processing techniques to perform image classification based on the evidence provided by small image patches.
- Researched scattering transform, computer vision and unsupervised learning combined artificial neural networks.
- Teaching assistant at the lab course "Machine learning and signal processing":
  - Our lab was ranked 1st out of 54 by student evaluation

International Audio Laboratories Erlangen — **Erlangen, Germany**
Student Research Assistant — *November 2018 – February 2020*

- Developed and published web-based tools for semi-automatic bounding box annotation of sheet music and score to audio alignment.
- Developed music information retrieval algorithms and contributed to the FMP notebooks
- Researched deep learning techniques for cross-version retrieval of music recordings

Fraunhofer Institute for Nondestructive Testing (IZFP) — **Saarbrücken, Germany**
Intern — *March 2018 - August 2018*

- Developed a system for controlling a teraherz time domain spectroscope and analyzed its performance characteristics.
- Performed nondestructive testing with terahertz and submilimetric waves
- Developed signal processing and analysis tools using Python and LabView

Education

PhD Candidate — **Autonomous Intelligent Systems Group, University of Bonn**
Bonn, Germany — *February 2021 – Present*

- Pending final submission and thesis defense. Expected graduation: 08.2026

- **Master in Advanced Signal Processing and Communications Engineering (ASC)** — **University of Erlangen-Nuremberg**
  Erlangen, Germany — *2018 – 2020*
  - GPA: 1.1, being 1.0 the best possible grade.
  - Master Thesis: "Pose-Based Image Retrieval in Greek Vase Paintings"
- **Bachelor in Telecommunications Engineering** — **University of Vigo**
  Vigo, Spain — *2014 – 2018*
  - Bachelor Thesis: "Development of a system for controlling a terahertz time domain spectroscope and analyzing its performance characteristics"
  - Graduated as top student in the Class of 2018
- **Bachelor in Electrical Engineering** — **Hochschule für Technik und Wirtschaft des Saarlandes**
  Saarbrücken, Germany — *2017 – 2018*
  - Double degree seeking Erasmus+ exchange during year 2017/2018

Publications

[1] **Villar-Corrales, Angel**, G. Plepi, and S. Behnke. TextOCVP: object-centric video prediction with language guidance. *Transactions on Machine Learning Research (TMLR)*, 2026.

[2] J. Spieler, **Villar-Corrales, Angel**, and S. Behnke. Slot-MPC: Goal-conditioned model predictive control with object-centric representations. *arXiv preprint arXiv:2605.14937*, 2026.

[3] M. Luthra, J. Shen, M. Poli, A. Ortiz, Y. Higuchi, Y. Benchekroun, M. Gleize, C.-E. Saint-James, D. Lin, P. Rust, **Villar-Corrales, Angel**, et al. SpidR-Adapt: A universal speech representation model for few-shot adaptation. In *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2026.

[4] D. Lin, P. Rust, **Villar-Corrales, Angel**, A. W. Tan, et al. EgoBabyVLM: Benchmarking cross-modal learning from naturalistic egocentric video data. *arXiv preprint arXiv:2605.19130*, 2026.

[5] N. J. R. Vicente, E. Lehner, **Villar-Corrales, Angel**, J. Nogga, and S. Behnke. VideoPCDNet: Video parsing and prediction with phase correlation networks. In *International Conference on Artificial Neural Networks (ICANN)*, 2025.

[6] **Villar-Corrales, Angel** and S. Behnke. PlaySlot: Learning inverse latent dynamics for controllable object-centric video prediction and planning. In *International Conference on Machine Learning (ICML)*, 2025.

[7] M. Mosbach, J. N. Ewertz, **Villar-Corrales, Angel**, and S. Behnke. SOLD: Reinforcement learning with slot object-centric latent dynamics. In *International Conference on Machine Learning (ICML)*, 2025.

[8] **Villar-Corrales, Angel**, M. Austermann, and S. Behnke. MCDS-VSS: Moving Camera Dynamic Scene Video Semantic Segmentation by Filtering with Self-Supervised Geometry and Motion. In *British Machine Vision Conference (BMVC)*, 2024.

[9] **Villar-Corrales, Angel**, I. Wahdan, and S. Behnke. Object-centric video prediction via decoupling of object dynamics and interactions. In *International Conference on Image Processing (ICIP)*. IEEE, 2023.

[10] D. Pavlichenko, G. Ficht, **Villar-Corrales, Angel**, L. Denninger, J. Brocker, T. Sinen, M. Schreiber, and S. Behnke. RoboCup 2023 Humanoid AdultSize winner NimbRo: NimbRoNet3 visual perception and responsive gait with waveform in-walk kicks. In *Robot World Cup*, pages 337–349. Springer, 2023.

[11] **Villar-Corrales, Angel**, A. Karapetyan, A. Boltres, and S. Behnke. MSPred: video prediction at multiple scales with hierarchical recurrent networks. In *British Machine Vision Conference (BMVC)*, 2022.

[12] **Villar-Corrales, Angel** and S. Behnke. Unsupervised image decomposition with phase-correlation networks. In *International Conference on Computer Vision Theory and Applications (VISAPP)*, 2022.

[13] D. Pavlichenko, G. Ficht, A. Amini, M. Hosseini, R. Memmesheimer, **Villar-Corrales, Angel**, S. M. Schulz, M. Missura, M. Bennewitz, and S. Behnke. RoboCup 2022 AdultSize winner NimbRo: Upgraded perception, capture steps gait and phase-based in-walk kicks. In *Robot World Cup*, pages 240–252. Springer, 2022.

[14] P. Madhu, **Villar-Corrales, Angel**, R. Kosti, T. Bendschus, C. Reinhardt, P. Bell, A. Maier, and V. Christlein. Enhancing human pose estimation in ancient vase paintings via perceptually-grounded style transfer learning. *Journal on Computing and Cultural Heritage (JOCCH)*, 2022.

[15] **Villar-Corrales, Angel**, F. Schirrmacher, and C. Riess. Deep learning architectural designs for super-resolution of noisy images. In *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2021.

[16] **Villar-Corrales, Angel** and V. I. Morgenshtern. Scattering transform based image clustering using projection onto orthogonal complement. In *Intelligent Cross-Data Analysis and Retrieval Workshop (ICDAR)*, 2021. **Best Paper Award**.

[17] F. Zalkow, **Angel Villar-Corrales**, T. Tsai, V. Arifi-Müller, and M. Müller. Tools for semi-automatic bounding box annotation of musical measures in sheet music. In *Demos and Late Breaking News of the International Society for Music Information Retrieval Conference (ISMIR)*, Delft, The Netherlands, 2019.

Awards

- "Best Paper Award" at Intelligent Cross-Data Analysis and Retrieval Workshop, organized during ICMR 2021 — 02/2020
- Extraordinary "End of Bachelors Prize" — 03/2019
- Top 2% (26/1517) in the Kaggle Histopathologic Cancer Challenge — 05/2018
- 1st Prize in the EHF Final4 Hackathon — 03/2017
- 2nd Prize in the Hack4Good Vigo Hackathon — 03/2015
- Extraordinary "Baccalaureate Prize"

Programming Skills

- Python. Advanced knowledge
- Matlab. Intermediate knowledge
- C++. Basic knowledge
- Libraries and Frameworks:
  - Deep learning frameworks: Pytorch and Keras
  - Computational research and data science: Numpy, Scikit-Learn, Matplotlib, OpenCV
  - Robot Operating System (ROS). Basic knowledge
- Software engineering skills:
  - Experience with large-scale GPU computing: Slurm, CUDA, ...
  - Use of Git version control in all projects
  - Docker. Basic knowledge
- Web programming. Intermediate knowledge:
  - Fronted: Javascript, JQuery, HTML5, ReactJS, Phonegap
  - Backend: Flask, PHP

Languages

- **Spanish:** Native
- **Galician:** Native
- **English:** Fluent, C1 Certified (Cambridge)
- **German:** Intermediate level
- **French:** Basic level