# Ignacio Alzugaray

*Curriculum Vitae*

*Birthdate: 10/11/1992 | Nationality: Spanish*
*London, United Kingdom*
*alzugaray.ign@gmail.com*
*Webpage: ialzugaray.github.io*

## Experience

Since Jul'22 **Postdoctoral Research Fellow**, *Dyson Robotics Lab, Imperial College London*.
- Research on parallel and distributed on-pixel processing for visual SLAM.
- Research on 3D implicit representations for self-supervised scene understanding.
- Supervisor: Prof. Dr. Andrew Davison.

Mar'22 - Jun'22 **Postdoctoral Researcher**, *Vision for Robotics Lab (V4RL), ETH Zürich*.
- Research on asynchronous, event-driven algorithms for visual SLAM using event cameras.
- Designing of decentralized multi-agent visual SLAM architecture using distributed processing.
- Supervisor: Prof. Dr. Margarita Chli.

Sep'21 - Jun'22 **Research Scientist**, *Facebook/Meta Reality Labs*.
- Designing of a NeRF-based pipeline for image-based visual relocalization.
- PyTorch implementation trained with real egocentric footage for AR applications.
- Intern position during Sept'21-Dec'21. External contractor position during Mar'22-Jun'22.
- Supervisor: Dr. Vasileios Balntas.

Sep'19 - Jun'19 **Software Engineer Intern**, *Disney Research Zurich*.
- Development of VR animation tools with hand tracking and gesture recognition within Unity.
- Close collaboration with Disney Animation Studio on PoseVR project.
- Supervisors: Dr. Jakob Buhmann and Dr. Martin Guay.

Sep'16 - Feb'17 **Research Assistant**, *Vision for Robotics Lab (V4RL), ETH Zürich*.
- Implementation of probabilistic event-based scene mapping.
- Design of active monocular-inertial SLAM pipeline for UAVs.
- Supervisor: Prof. Dr. Margarita Chli.

Jun'15 - Feb'16 **Research Assistant Intern**, *Institute of Robotics and Industrial Informatics (IRI-CSIC)*.
- Design of path planning algorithms for UAVs embedding the experience of expert pilots.
- Supervisor: Prof. Dr. Alberto Sanfeliu.

## Education

2022 **Ph.D. in Computer Vision**, *Vision for Robotics Lab (V4RL), ETH Zürich*.
Thesis: *Event-driven Feature Detection and Tracking for Visual SLAM*.
- Advisor: Prof. Dr. Margarita Chli.
- Examiners: Prof. Dr. Andrew Davison, Prof. Dr. Davide Scaramuzza, Prof. Dr. Laurent Kneip.

2016 **M.Sc. Automatic Control and Robotics**, *Polytechnic University of Catalonia (UPC)*.
Top student in Master's program (2014-2016), GPA – 8.70/10.
Thesis: *Path planning for MAVs with vision in the loop.*
- Advisor: Prof. Dr. Margarita Chli. Grade: 5.75/6. ETH Zürich – International student exchange.

2014 **B.Sc. Industrial Engineering**, *University of Malaga (UMA)*.
Top student in Bachelor's program (2010-2014). GPA – 8.49/10.
Thesis: *Teleoperation of Robotic Manipulators applied to Laparoscopic Surgery.*
- Advisor: Dr. Carlos Perez del Pulgar. Grade: 9.5/10.

## Research and Dissemination Activities

Since 2016 **Supervision of Students and Researchers**, *ETH Zürich / Imperial College London*.
- Supervised over 25 graduate student projects.
- Shared supervision of doctoral students on SLAM, scene understanding and 3D geometry.

Since 2016 **Reviewer of Scientific Publications**.
ICRA, IROS, 3DV, BMVC, CVPR, MVA, RSS, T-RO, T-PAMI, RA-L, IJCV.

Oct'21 **Invited Talk** at the Robotic and Perception Group, ETH Zurich / University of Zurich. Presentation title: "Event-Driven Feature Detection and Tracking for Robotic Applications."

Jun'21 **Invited Speaker** at the *Event-based Vision* workshop, CVPR 2021. Presentation title: "Towards Asynchronous SLAM with Event Cameras."

Oct'18 **Invited Speaker** at the *Unconventional Sensing and Processing for Robotic Visual Perception* workshop, IROS 2018. Presentation title: "Asynchronous Vision."

## Awards and Scholarships

2016 **Award for Academic Performance in Master's**, *Polytechnic University of Catalonia (UPC)*.
Granted to the top performing student in postgraduate programme (2014–2016). The recipient is granted with an internship sponsored by KUKA AG.

2016 **International Student Scholarship**, *ETH Zürich, Swiss-European Mobility Programme*.
Competitive scholarship granted to students in an international exchange programme.

2014 **Excellence Scholarship in Master's Programme**, *Catalunya-La Pedrera Foundation*.
Two-years scholarship granted to the Master's program applicant with the best academic record.

2014 **Award for Academic Performance in Bacherlor's**, *University of Malaga (UMA)*.
Granted to the top performing student in undergraduate programme (2010–2014).

2013 **Undergraduate Research Scholarship**, *University of Malaga, Spanish Ministry of Education*.
Nationally competitive six-months scholarship to conduct short research projects.

## Languages

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| Spanish | **Native** | |
| English | **Professional Proficiency** | *B2.2 University of Cambridge (2013)* |
| German | **Intermediate** | *B1.1 University of Zürich (2017)* |

## Skills

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|---|---|
| Programming | Python, C++, CUDA, MATLAB, C#, SIMULINK, LaTeX |
| Frameworks | PyTorch,OpenCV, ROS, Unity, Unreal Engine, Gazebo, Git |
| Technologies | NeRFs, Gaussian Splatting, Diffusion Models, Gaussian Belief Propagation |

## Software Releases

2021 **HASTE: Event-driven Feature Tracking and Optimization**, in C++.
`github.com/ialzugaray/haste`

2019 **Arc*: Event-driven Corner-Event detector**, in C++/ROS.
`github.com/ialzugaray/arc_star_ros`

## Peer-reviewed Publications

### Doctoral Thesis

[T] I. Alzugaray.
**Event-driven Feature Detection and Tracking for Visual SLAM.**
*ETH Zurich*, 2022.

### Journals

[J4] R. Murai, I. Alzugaray, P.H.J. Kelly, A.J. Davison.
**Distributed Simultaneous Localisation and Auto-Calibration using Gaussian Belief Propagation.**
*IEEE Robotics and Automation Letters (RA-L)*, 2024.

[J3] D. Hug, P. Bänninger, I. Alzugaray and M. Chli.
**Continuous-Time Stereo-Inertial Odometry.**
*IEEE Robotics and Automation Letters (RA-L)*, 2022.

[J2] Z. Lai, I. Alzugaray, M. Chli and E. Chatzi.
**Full-field structural monitoring using event cameras and physics-informed sparse identification.**
*Mechanical Systems and Signal Processing*, 2020.

[J1] I. Alzugaray and M. Chli.
**Asynchronous Corner Detection and Tracking for Event Cameras in Real Time.**
*IEEE Robotics and Automation Letters (RA-L)*, 2018.

### Conferences

[C11] I. Kapelyukh, Y. Ren, I. Alzugaray, E. Johns.
**Dream2Real: Zero-Shot 3D Object Rearrangement with Vision-Language Models.**
*IEEE International Conference on Robotics and Automation (ICRA)*, Yokohama, 2024.

[C10] M. Taher I. Alzugaray, A.J. Davison.
**Fit-NGP: Fitting Object Models to Neural Graphics Primitives .**
*IEEE International Conference on Robotics and Automation (ICRA)*, Yokohama, 2024.

[C9] P. Bänninger, I. Alzugaray, M. Karrer, M. Chli.
**Cross-Agent Relocalization for Decentralized Collaborative SLAM.**
*IEEE International Conference on Robotics and Automation (ICRA)*, London, 2023.

[C8] C. Le Gentil, I. Alzugaray, T. Vidal-Calleja.
**Continuous-Time Gaussian Process Motion-Compensation for Event-Vision Pattern Tracking with Distance Fields.**
*IEEE International Conference on Robotics and Automation (ICRA)*, London, 2023.

[C7] I. Alzugaray and M. Chli.
**HASTE: multi-Hypothesis Asynchronous Speeded-up Tracking of Events.**
*British Machine Vision Conference (BMVC)*, Virtual, 2020.

[C6] C. Le Gentil, F. Tschopp, I. Alzugaray, T. Vidal-Calleja, R. Siegwart and J. Nieto.
**IDOL: A framework for IMU-DVS odometry using lines.**
*IEEE/RSJ Conference on Intelligent Robots and Systems (IROS)*, Las Vegas, NV, USA, 2020.

[C5] I. Alzugaray and M. Chli.
**Asynchronous Multi-hypothesis Tracking of features with Event Cameras.**
*International Conference on 3D Vision (3DV)*, Quebec, Canada, 2019. Oral presentation.

[C4] I. Alzugaray and M. Chli.
**ACE: An Efficient Asynchronous Corner Tracker for Event Cameras.**
*International Conference on 3D Vision (3DV)*, Verona, Italy, 2018.

[C3] L. Texeira, I. Alzugaray and M. Chli.
**Autonomous Aerial Inspection Using Visual-Inertial Robust Localization and Mapping.**
*Conference on Field and Service Robotics (FSR)*, Zurich, Switzerland, 2017.

[C2] I. Alzugaray, L. Texeira and M. Chli.
**Short-term UAV Path-Planning with Monocular-Inertial SLAM in the Loop.**
*IEEE International Conference on Robotics and Automation (ICRA)*, Singapore, 2017.

[C1] I. Alzugaray and A. Sanfeliu.
**Learning the Hidden Human Knowledge of UAV Pilots when navigating in a cluttered environment for improving Path Planning.**
*IEEE/RSJ Conference on Intelligent Robots and Systems (IROS)*, Daejeon, Korea, 2016.