Oscar Mendez Maldonado

Curriculum Vitae

Researcher in Robotics, Computer Vision and Machine Learning.

Research Interests

Profile   I am an award-winning, internationally recognised researcher, interested in the fields of Machine Learning, Robotics and Computer Vision. I've spent many years developing and building real-time robotic systems, creating autonomous agents and leading Machine Learning research. My work focuses developing Machine Learning research that leverages concepts and ideas from fields like Robotics and Computer Vision to create autonomous agents that have a better understanding of the world. I am interested in making autonomous agents not only understand the world around them, but to act upon this knowledge. Me and my research have featured in the media, including international newspaper articles, radio shows, web interviews and the University of Surrey News.

Topics   *Machine Learning, Autonomous Agents, Collaborative Robotics, 3D Reconstruction, Multi-View Geometry, SLAM, Semantic Segmentation, High-Level Understanding, Autonomous Vehicles, Path-planning, Navigation, Reinforcement Learning, Artificial Intelligence*

Career History

2021–Pres.   **Lecturer in Robotics and Artificial Intelligence**, *University of Surrey*
Focused on developing a research portfolio in the areas of Robotics, AI, Computer Vision and Machine Learning.

2019–2021   **Industrial Sponsored Project**, *University of Surrey*, **Lead RA**, Machine Learning, Autonomous Vehicles, Vehicle State Estimation, Visual Odometry
An industrial-sponsored project in collaboration with the Department of Mechanical Engineering Sciences at the University of Surrey and focused on Vehicle State Estimation using visual sensors. Represent University, supervise PGRs and enable collaboration.

2018–2020.   **AVP Project**, *University of Surrey*, **Co-Writer, Lead RA**, Deep Learning, Autonomous Vehicles
Autonomous Valet Parking (AVP), an Innovate UK Project in collaboration with Parkopedia Ltd., Streetdrone Ltd. and Transport Systems Catapult. Represented the University of Surrey in all matters related to AVP, including reporting, planning and delivery.

2018   **ExTOL Project**, *University of Surrey*, **RA**, Sign Language, Deep Learning
ExTOL: End to End Translation of British Sign Language, an EPSRC Project in collaboration with University of Oxford and University College London.

2017–2019   **SMILE Project**, *Deep Learning, Sign Language Recognition*, University of Surrey, **Lead RA**
Scalable Multimodal sign language Technology for sIgn language Learning and assessmEnt (SMILE), a Swiss National Science Foundation project in collaboration with the Idiap Research Institute and the Interkantonale Hochschule für Heilpädagogik.

2016–2018   **Project Snowblading**, *VR, SLAM and Autonomous Exploration*, University of Surrey, **Lead RA**
In collaboration with the University of Dundee (Under NDA).

2011–2012   **Interim Engineering Intern**, Qualcomm Ltd., Farnborough, Hampshire
I interned for the GERAN Systems Team at Qualcomm. My responsibilities included the VAMOS project, where I ran and scheduled performance tests, helped with debugging and testing and supported other teams with their efforts. I also helped the Firmware team develop a virtual platform for debugging.

2009   **System Administrator**, TPS Armoring, Monterrey, Mexico
During the summer of 2009 I worked as a system administrator at a company dedicated to making bulletproof cars. My roles included server maintenance, SQL database management, use and administration of Microsoft Dynamics SL as well as Active Directory Management on Windows Servers.

Education

2017–2019	**Graduate Certificate in Learning and Teaching**, University of Surrey, Guildford, Fellow of the Higher Education Academy
2013–2017	**PhD. Robotics and Computer Vision**, University of Surrey, Guildford

Completed at Centre for Vision and Signal Processing (CVSSP), it focused on autonomous exploration by collaborative agents using monocular sensors. I explored the topics of Deep Learning, Pathplanning, SLAM, Multi-View Geometry and Collaborative Robotics.

Thesis

Collaborative Strategies for Collaborative 3D Reconstruction, Localisation and Pathplanning.

Awarded the BMVA Sullivan Thesis Prize 2018.

2009–2013	**BEng. (Hons) Electronic and Computer Engineering**, University of Surrey, Guildford, **First Class**

Modules Included Digital Signal Processing, Object Oriented Design and C++, Parallel Architectures, Data & Internet Networking, Control Systems, Computer Graphics, Eng. Mathematics,Circuit Theory, Digital Electronics.

Thesis

Quantum Tunnelling and Band-Gap Calculations of 1-D Nanostructures

Awards & Honours

2022	**ICRA Outstanding Paper Award**, *Our paper won the IEEE ICRA 2022 Outstanding paper award and has been recognised by Amazon Science as one of the their top papers of 2022.*
2019	**Radio Interviews**, *I have been interviewed on the radio multiple times, to discuss Artificial Intelligence and other topics*
2018	**Sullivan Thesis Prize**, *I was awarded the 2018 Sullivan Doctoral Thesis Prize, an annual award for the best UK PhD Thesis in Computer Vision, by the BMVA at the BMVC formal dinner along with a cash prize*, £750
2018	**General Chair**, *BMVA Technical Meeting on Robotics meets Semantics*
2017	**NVIDIA GPU Grant**, *Received a Titan Xp from NVidia to enable my research in recognition of its the quality and impact*, £1150
2017–Pres.	**High MEQ Scores**, *I consistently receive $\geq$ 4 out of 5 on all my Module Evaluation Questionnaires*
2016	**BMVC Student Bursary**, *British Machine Vision Conference (BMVC)*, £515
2009–2013	**International Student Scholarship**, *University of Surrey*, £1500 p.a

Teaching Experience

I am passionate about teaching and currently a Fellow of the Academy of Higher Education and capable of leading pedagogical research. In 2018 I co-wrote a new Robotics module using the latest pedagogical and Robotics knowledge to create a fun, up-to-date course that reflects current trends in AI, Robotics and Autonomous Vehicles. The course was a huge success and received an MEQ of 4.5 in its first year and 4.7 in its second. It has been instrumental in increasing our MSc numbers on the robotics pathway by an order of magnitude. Module Evaluation Questionnaires (MEQ's) are used by the University of Surrey to obtain feedback from students. I have always received $\geq$4.0/5.0 MEQs, with extremely positive comments from the students.

2012–Pres.	**Lecturer**, EEE3042 Audio and Video Processing, University of Surrey

I lecture, assess and help co-ordinate a 3rd year video coding lecture.

2021–Pres.	**AI@Surrey Compute Cluster Module**, *Writer and Presenter*

I helped write the content and delivered the lectures for the University of Surrey's compute cluster introductory tutorial.

2019–Pres.	**Lecturer and Course Developer**, EEE3043 Robotics, University of Surrey, **4.6 MEQ**

I helped design, develop and deliver a Masters-level course on Robotics and AI. Course was well received and now forms a core part of the University's Robotics Pathway.

2014-Pres.	**UG/PG Project Supervisor**

2014-Pres. **UG/PG Project Supervisor**
I have consistently (at least one every year) undertaken supervision of Undergraduate and Post-Graduate projects, ranging from robotic grasping and teleprocessing, autonomous vehicles, sign language, learning-based depth estimation, etc.

2017–Pres. **Lecturer**, EEE1035 PROGRAMMING IN C, University of Surrey, **4.0 MEQ**
I lecture, assess and help co-ordinate a first year Programming in C.

2017–Pres. **Lab Co-Ordinator**, EEE1035 PROGRAMMING IN C, University of Surrey
I currently organize, run and assess first-year programming labs with 4+ contact hours per-week.

2015–2016 **Programming Labs Demonstrator**, EEE3013 OBJECT ORIENTED DESIGN AND C++, University of Surrey
Four hours a week in C++ and Object Oriented Design labs where I had hands-on experience teaching undergraduate students.

2015 **Programming Labs Demonstrator**, COM1025 WEB PUBLISHING AND DATABASES, University of Surrey
Two hours a week, where I had hands on experience teaching undergraduate students the basics of website development and database management.

2014–2016 **Programming Labs Demonstrator**, EEE1030 COMPUTERS AND PROGRAMMING, University of Surrey
Four hours a week teaching undergraduate students basic programming skills and the C language.

2014 **Electronic Labs Demonstrator**, EEE2037 LDPS IV, University of Surrey
Eight hours a week in hardware-based labs, teaching undergraduates circuit design and embedded programming on a face-to-face basis.

Research Income

2022–2025 **Precision Agriculture using Aerial Imagery**, *£144,446*, Industrially Funded Studentship

2018–2020. **Autonomous Valet Parking (AVP) (CI)**, *£229,418*, Innovate UK

2018 **Sullivan Thesis Prize**, *£750*, BMVA

2017 **NVIDIA GPU Grant**, *£1150*, NVIDIA

2016 **BMVC Student Bursary**, *£515*, BMVC

2009–2013 **International Student Scholarship**, *£1500 p.a*, University of Surrey

Selected Publications

2023 **Generalizing to New Tasks via One-Shot Compositional Subgoals** , *UNDER REVIEW*
X. Bian, **Oscar Mendez**, S. Hadfield, In IEEE Conference on Robotics and Automation (ICRA).

2023 **Learning Stable Topologies for Point Cloud Labelling**, *UNDER REVIEW*
A. Saha, **Oscar Mendez**, C. Russel, R. Bowden, In IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR).

2023 **Campus Map: A Large-Scale Dataset to Support Multiview VO, SLAM and BEV Estimation**, *UNDER REVIEW*
J. Ross, N. Kaygusuz, **Oscar Mendez** and M. Johnson, R. Bowden, In IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR).

2022 **G-CMP: Graph-enhanced Contextual Matrix Profile for unsupervised anomaly detection in sensor-based remote health monitoring**
N. Bijlani, **Oscar Mendez** and S. Kouchaki, In British Conference on Machine Vision (BMVC).

2022 **Translating Images into Maps**, *Best Paper Award*
A. Saha, **Oscar Mendez**, C. Russell, R. Bowden, In IEEE Conference on Robotics and Automation (ICRA).

2022 **SKILL-IL: Disentangling Skill and Knowledge in Multitask Imitation Learning**
X. Bian, **Oscar Mendez**, S. Hadfield, In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2022 **AFT-VO: Asynchronous Fusion Transformers for Multi-View Visual Odometry Estimation**
N. Kaygusuz, **Oscar Mendez**, R, Bowden, In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2022   **BEV-SLAM: Building a Globally-Consistent WorldMap Using Monocular Vision**
J. Ross, **Oscar Mendez**, A. Saha, M. Johnson, R. Bowden, In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2022   **"The Pedestrian next to the Lamppost" Adaptive Object Graphs for Better Instantaneous Mapping**
A. Saha, **Oscar Mendez**, C. Russell, R. Bowden, In IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR).

2021   **Multi-Camera Sensor Fusion for Visual Odometry using Deep Uncertainty Estimation**
N. Kaygusuz, **Oscar Mendez**, R. Bowden, In IEEE Intelligent Transportation Systems Conference (ITSC).

2021   **MDN-VO: Estimating Visual Odometry with Confidence**
N. Kaygusuz, **Oscar Mendez**, R. Bowden, In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2021   **Improving Robot Localisation by Ignoring Visual Distraction**
Oscar Mendez, M. Vowels, R. Bowden, In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2021   **Markov Localisation using Heatmap Regression and Deep Convolutional Odometry**
Oscar Mendez, S. Hadfield, R. Bowden, In IEEE Conference on Robotics and Automation (ICRA).

2021   **Enabling Spatio-temporal aggregation in Birds-Eye-View Vehicle Estimation**
A. Saha, **Oscar Mendez**, C. Russell, R. Bowden, In IEEE Conference on Robotics and Automation (ICRA).

2021   **Robot in a China Shop: Using Reinforcement Learning for Location-Specific Navigation Behaviour**
X. Bian, **Oscar Mendez**, S. Hadfield, In IEEE Conference on Robotics and Automation (ICRA)

2021   **There and Back Again: Self-supervised Multi-spectral Correspondence Estimation**
C. Walters, **Oscar Mendez**, M. Johnson, R. Bowden, In IEEE Conference on Robotics and Automation (ICRA).

2020   **SeDAR: Reading Floorplans Like a Human – Using Deep Learning to Enable Human-Inspired Localisation**
Oscar Mendez, S. Hadfield, N. Pugeault, R. Bowden, In International Journal of Computer Vision (IJCV).

2020   **Extrinsic Sensor Calibration Systems and Methods**, *US Patent App. 16/676,186*
C. Walters, R. Bowden, **Oscar Mendez**, S. Hadfield.

2019   **A Robust Extrinsic Calibration Framework for Vehicles with Unscaled Sensors**
C. Walters, **Oscar Mendez**, S. Hadfield, R. Bowden, In IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).

2019   **Water non-water Segmentation Systems and Methods**, *US Patent App. 17/891,001*
M. Johnson, C. Walters, R. Bowden, **Oscar Mendez**.

2018   **Localisation via Deep Imagination: Learn the Features not the Map.**
J. Spencer, **Oscar Mendez**, S. Hadfield, R. Bowden, In European Conference on Computer Vision (ECCV).

2018   **Semantic Detection and Ranging: Humans Can Localise without LiDAR, can Robots?**
Oscar Mendez, S. Hadfield, N. Pugeault, R. Bowden, In IEEE Conference on Robotics and Automation (ICRA).

2018   **Collaborative strategies for autonomous localisation, 3D reconstruction and pathplanning.**, *Doctoral Thesis*
Oscar Mendez

2017   **Taking the Scenic Route to 3D: Optimising Reconstruction from Moving Cameras**
Oscar Mendez, S. Hadfield, N. Pugeault, R. Bowden, In IEEE International Conference on Computer Vision (ICCV).

2016   **Next-Best Stereo: Extending Next Best View Optimisation for Collaborative Sensors**, *Oral*
Oscar Mendez, S. Hadfield, N. Pugeault, R. Bowden, In British Conference on Machine Vision (BMVC).

Professional Activity

External Administrative Roles

2022–Pres.   **BMVA Executive Committee**, *Industry Liason Officer.*

2022	**IEEE ICRA 2023**, *Associate Editor*
2018	**Robotics Meets Semantics, BMVA Symposium**, *Chair*
	Chaired a BMVA Technical Meeting with highly regarded keynote speakers from across Europe including Cyrill Stachniss (University of Bonn), Daniel Cremers (TU Munich) & Andrew Davison (Imperial College).

Internal Administrative Roles

As the leading Robotics expert in my research group, I have been involved in turning the CVSSP's Robot Lab into an attractive lab full of robotic platforms and interesting research activity. I am in charge maintaining our existing robotic platforms (Pepper, Baxter, Self-Driving Car, 13 Turtlebots) and acquiring new ones. My work in the Robot Lab has helped CVSSP secure funding, engage prospective students and improve our standing in the field of Robotics.

2022–Pres.	**Health and Safety Committee Chair**, *Area 5*
	I am the chair of the Area 5 H&S committee, overseeing multiple research and teaching labs, training and developing policy.
2019–Pres.	**Introduction to Condor Seminar**, *Organiser and Presenter*
	I help organise and run the Introduction to Condor seminar for new starters.
2018–2022.	**Health and Safety Officer**, *CVSSP Robot Lab*
	I oversee H&S aspects of the CVSSP Robot Lab, including reporting, training and implementing procedures.
2017–Pres.	**Robot Lab Demonstrations**, *Organiser and Presenter*
	I have organised the CVSSP Robot Lab's presence for the CVSSP 30th Anniversary, Festival of Wonder, Annual Review, Evening on Space Robotics and many other events.
2016–Pres.	**Reading Group**, *Organiser*
	I organise a 20+ member monthly reading group aimed at giving PhD students experience dissecting literature.
2016–Pres.	**Applicant Days**, *Organiser and Presenter*
	Prepare demonstrations and introduce potential students to the Robot Lab and the Robotics research at CVSSP.

Reviewer

Journals	IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI), IEEE Transactions on Robotics, IEEE Access and Elsevier Computers & Graphics, etc.
Conferences	IEEE/CVF Computer Vision and Pattern Recognition, International Conference on Learning Representations (ICLR), British Machine Vision Conference (BMVC), IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Computer Vision and Pattern Recognition (CVPR), IEEE International Conference on Robotics and Automation (ICRA), European Conference on Computer Vision (ECCV), International Conference on Computer Vision (ICCV), IEEE Intelligent Vehicle Symposium (IV), IEEE Intelligent Transportation Systems Society, etc.

PhD Supervision

2023–Pres	**TBA**, University of Surrey, Expected Completion in 2026
	Robot Sheep Dog.
2023–Pres	**Sadiq Macaulay**, University of Surrey, Expected Completion in 2026
	Visual Servoing, Event Cameras, Grasping.
2022–Pres	**Christopher Thirgood** , University of Surrey, Expected Completion in 2025
	Localisation, 3D Reconstruction, Raman Spectrometry.
2022–Pres	**Georgina Alcolado Nuthall**, University of Surrey, Expected Completion in 2025
	SPOT, NERFs, Pathplanning, Navigation.
2022–Pres	**Tavis Shore**, University of Surrey, Expected Completion in 2025
	Geolocalisation, Visual Localisation, Representation Learning.
2022–Pres	**Daniel Ayuba**, University of Surrey, Expected Completion in 2025
	Remote Sensing, Precision Agriculture, Hyperspectral Sensors.
2022–Pres	**Nivedita Bijlani** , University of Surrey, Expected Completion in 2025
	Anomaly Detection, GNNs, AI for Healthcare.

2022–Pres	**Maksym Ivashechkin**, University of Surrey, Expected Completion in 2025
	Body Pose Estimation, Tracking, Kinematics, Projective Geometry.
2020–Pres	**James Ross**, University of Surrey, Expected Completion in 2023
	Autonomous Marine Vehicles, Birds-Eye View Estimation, Semantic Segmentation.
2019–Pres	**Avishar Saha**, University of Surrey, Expected Completion in 2023
	Birds-Eye View Estimation, GNNs, Prediction.
2019–Pres	**Nimet Kaygusuz**, University of Surrey, Expected Completion in 2023
	Autonomous Vehicle Control and Stability, Sensor Fusion, Visual Odometry.
2019–2023	**Xihan Bian**, University of Surrey, Completed
	Reinforcement & Imitation Learning, Visual Navigation, Multi-Task Learning.
2017–2021	**Celyn Walters**, University of Surrey, Completed
	Robotics, Autonomous Marine Vehicles, Motion Planning.

Undergraduate/Masters Supervision

2015–Pres.	**Co-Supervisor**, UNDERGRADUATE THESIS, University of Surrey
	I have supervised and co-supervised ¡5 students annually. Topics included Virtual Reality, Robotic Interaction, Robotic Grasping, Autonomous Vehicles, Semantic Segmentation, Precision Agriculture, Remote Sensing, etc.

Media & Press

2022	**Amazon Science**, *The 10 most viewed publications of 2022* , Amazon Science, Most viewed publications authored by Amazon scientists and collaborators in 2022.
2022	**Amazon Science**, *Top 10 blog posts of 2022* , Amazon Science, Article listing our number as one of the top read blogs for amazon science in 2022.
2019	**National Newspaper**, *"Impulsa Regio Inteligencia Artifical"*, El Norte, Newspaper article about my contribution to Artificial Intelligence.
2019	**National Radio Interview**, *"Los Productores"*, *"Ricardo Raphael"*, Radio Centro, Radio Interview about Artificial Intelligence and my achievements in the field.
2018	**Webcast Interview**, *SMILE: How It Works*, HfH, Idiap, Interview talking about the SMILE Sign Language Assessment System
2018	**BMVA One-Day Technical Meeting Chair**, *Robotics meets Semantics: Enabling Human-Level Understanding in Robots*, BMVA
2017	**Robotics Research Presenter**, *EPSRC Visit to CVSSP*, University of Surrey
2017	**Demonstration Developer**, *Festival of Wonder*, University of Surrey, ∼3000 Attendees
2016–2017	**RobotLab Presenter**, *Applicant Day*, University of Surrey, ∼18 Attendees per visit
2016	**Oral Presenter**, *British Machine Vision Conference*, University of York, ∼300 Attendees
2016	**CVSSP Presenter**, *Evening on Space Robotics*, University of Surrey, ∼300 Attendees
2015	**Seminar Presenter**, *SMSAS PGR Seminar*, University of Kent, ∼30 Attendees
2014	**Poster Presenter**, *PGR Conference*, University of Surrey, ∼200 Attendees

Society Membership

2021–Pres	Member of the UK Research and Innovation (UKRI) Early Career Researcher Forum
2019–Pres	Fellow of the Higher Education Academy (HEA)
2014–Pres	Member of British Machine Vision Association (BMVA)
2012–Pres	Member of Institute of Engineering and Technology (IET)
2017–Pres	Member of Institute for Electrical and Electronics Engineers (IEEE)

Professional Skills

Languages	PYTHON, C, C++, LaTeX, MATLAB, JAVA, BASH, CUDA

Libraries	Pytorch, Robot Operating System (ROS), Point Cloud Library (PCL), Caffe, Tensorflow, OpenCV, OpenMP, Mobile Robot Programming Toolkit (MRPT), Open Motion Planning Library (OMPL), MoveIt!, etc
Miscellaneous	Robot Hardware Design, Baxter Robot, Pepper Robots, UAVs, Networking Devices and Protocols

Languages

Spanish	Mothertongue	
English	Fully Fluent	*Native-Level Speaker*
British Sign Language	Level 1	

Personal Interests

- Robot Building
- Cooking
- Basketball
- Running

- Bass Playing
- Camping
- Weightlifting