

Maxence Boels

AI Research Scientist | Robotics & Computer Vision

AI researcher specialising in computer vision and robotics with 4+ years of experience developing robust deep learning models for real-world, safety-critical applications. PhD candidate at King's College London with expertise in long-sequence video understanding, action prediction, and planning. Proven track record of publishing in top-tier conferences (MICCAI, MIA) and deploying AI systems in clinical environments.    

EDUCATION

PhD in Artificial Intelligence, King's College London 2021 – 2025
Thesis: 'Surgical Video Understanding in Robotic Surgery' (Advisor: Prof. Sebastien Ourselin)

MSc in Electrical & Electronic Engineering, University of Surrey 2019 – 2020
Thesis: 'Predicting Malignancy in Breast Cancer with Deep Learning' (Advisor: Prof. Kevin Wells) .
Relevant Coursework: computer vision, deep learning, machine learning, robotics, signal processing.

MSc in Data Science and Advanced Analytics, University Nova of Lisbon 2017 – 2019
Thesis: 'Building a Data Analytics Tool for a Pharma Company', (Advisor: Prof. Leonardo Vanneschi) .

SKILLS

Deep Learning & Computer Vision:	PyTorch (advanced), OpenCV, TensorRT, C++, CUDA.
Robotics & Autonomy:	ROS2, Gazebo, Isaac Gym, ZED SDK (RGB-D, point cloud).
Edge AI & Embedded Systems:	NVIDIA Jetson (TensorRT, DeepStream), ESP32, RaspberryPi.
Software Engineering:	Python, JavaScript, React, Git, Docker, Linux.
Languages:	EN (fluent), FR (native), NL (fluent), ES (limited proficiency).

EXPERIENCE

Research Assistant, Surgical Interventional & Engineering Lab - London, UK Jun 2021 – Jun 2025

- Published **over three papers** in leading journals and conferences (MICCAI, MIA) .
- Developed predictive models** on long surgical videos for recognition, next action prediction, and planning.

Research Assistant, Centre for Vision, Speech and Signal Processing - Surrey, UK Jun 2021 – Jun 2025

- Built **CNN-based breast cancer detection model**, achieving **89% sensitivity** on mammograms .
- Implemented visual search using **SIFT + HOG descriptors**, improving retrieval accuracy by **15%** .

Deep Learning Research Scientist, Radiomics - Brussels, BEL Sep 2020 – Feb 2021

- Developed **3D segmentation models** for tumour detection in lungs and liver, improving detection accuracy by **15%** over previous methods.
- Integrated ML models into a clinical product pipeline, reducing processing time by **10%**.

Software Engineer Intern, Deloitte - Paris, FR Sep 2018 – Mar 2019

- Designed a **data integration tool** for a pharma company, automating workflows in C# and Python .
- Led client presentations and roadmap discussions, ensuring alignment with business objectives.

Data Scientist Intern, Air - Brussels, BEL Jul 2016 – Sep 2016

- Built a **customer segmentation model** for targeted marketing, increasing campaign conversion rates by **12%**.
- Presented market analysis to top executives, influencing strategic marketing decisions .

SELECTED PUBLICATIONS

- [1] **M. Boels**, H. Robertshaw, T. C. Booth, A. Granados, P. Dasgupta, and S. Ourselin. Surgical Robot Learning: From Demonstration and Simulation to World Models – A Review, *Submitted to IEEE T-MRB* (2025).
 - Comprehensive review of surgical robot learning; proposes **Surgical World Models to overcome data bottlenecks** and enable scalable autonomy.
- [2] **M. Boels**, Y. Liu, A. Granados, P. Dasgupta, and S. Ourselin. SWAG: Surgical Workflow Anticipation with Generative Modelling, *International Journal of Computer Assisted Radiology and Surgery (IJCARS)*, (2025) .

- **Pioneered** transformer-based predictive models for robotic surgery that **anticipate surgical steps**.

[3] **M. Boels**, A. Granados, P. Dasgupta, and S. Ourselin. When Imitation Learning outperforms Reinforcement Learning in surgical action planning, *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI, 2025)* [🔗](#).

- Developed a novel approach using **conditional world models and reinforcement learning** for surgical **actions prediction** in robotic surgery.

[4] Y. Liu, **M. Boels**, A. Granados, P. Dasgupta, and S. Ourselin. LoViT: Long Video Transformer for Surgical Phase Recognition, (*Medical Image Analysis, 2024*) [🔗](#).

- Improved long context understanding in surgical videos, achieving a **new state-of-the-art performance** (+3%) over previous methods.

[5] J. Huo, L. Chen, Y. Liu, **M. Boels**, A. Granados, S. Ourselin, and R. Sparks. MAPPING: Model Average with Post-processing for Stroke Lesion Segmentation, (*MICCAI ATLAS Challenge, 2022 – 1st place*) [🔗](#).

- Contributed to a **winning model** for stroke lesion segmentation, setting a new benchmark.

ACADEMIC ACTIVITIES

Teaching Assistant : ‘Advanced Machine Learning’ (2024, covering *Unsupervised and Self-Supervised Learning*).

Mentoring : MEng student (Max Kinnear-Noch) on surgical AI applications.

Program Committee : MICCAI’24 – *Participated in community support and outreach* [🔗](#).

PROJECTS

UGV: Autonomous RC car **navigation using vision-based imitation learning** from teleop expert demonstrations [🔗](#).

LeSurgeon: 3D printed and customized a SO-101 robot arm to learn a visuomotor manipulation policy [🔗](#).

FPV Drone: Built a custom **FPV drone** to explore autonomous vision-based navigation (in progress) [🔗](#).

Real-time Object Tracking: 3D printed turret with RGB-D camera and NVIDIA **Jetson Nano** edge computer [🔗](#).

Surgical Assistant App: Developed a **workflow anticipation AI** integrating LLM APIs for surgical guidance [🔗](#).

Speech Synthesis: Generation of vowels with linear predictive coding [🔗](#) and automatic **speech recognition** [🔗](#).

3D Segmentation of Lungs: Training and evaluating a **3D-UNet** for lung segmentation in CT scans [🔗](#).

CERTIFICATIONS & CONTINUAL LEARNING

Deep Learning Specialisation - Coursera (2020) [🔗](#), Machine Learning Track – DataCamp (2019) [🔗](#).