



Richard Modrzejewski



PhD and Engineer in Computer Vision and Machine Learning Engineering Manager / Technical Lead

Computer Vision Engineer with a PhD and experience as a technical lead, managing R&D and software development projects from design through validation and deployment. My experience combines software architecture, cloud infrastructure, AI component integration, and team management in demanding environments. Working at the interface between engineering teams, users, product, and quality, I coordinate priorities and technical decisions while ensuring solution reliability and alignment with user needs.

Professional Experience

Data Science Technical Manager, SURGAR, Clermont-Ferrand, France

2021-2025

- Led software, Data, and AI projects for computer-assisted surgery: technical roadmap definition, architecture decisions, planning, prioritization, verification, validation, and deployment.
- Managed the Data Science team and associated software development teams: objective setting and follow-up, one-to-one meetings, feedback, recruitment, onboarding, and professional development.
- Designed and deployed a software ecosystem using C++/Qt, Python/Flask, and PHP/Symfony, supported by a GCP infrastructure for the ingestion, anonymization, and secure use of clinical data.
- Coordinated with clinical, Product, Quality/Regulatory, Cybersecurity teams, and external partners: requirements gathering, translation into functional and technical requirements, and priority trade-offs.
- Defined validation strategies for AI components, including performance monitoring, traceability, risk management, and technical documentation.
- Authored procedures governing Data/AI activities, medical data management, and the model lifecycle in accordance with IEC 62304 and ISO 13485. Contributed to early process and documentation adaptations in preparation for FDA requirements.
- Designed and developed a Python/PyTorch framework for model training, validation, and integration, including reproducible pipelines, versioning, ONNX export, and CI/CD integration.
- Supervised the development, training, and integration of deep learning models for the segmentation and classification of anatomical structures in laparoscopic videos, MRI, and CT data.

R&D Engineer, SURGAR, Clermont-Ferrand, France

2020-2021

- Developed augmented reality features for computer-assisted laparoscopic surgery software, integrating computer vision, medical image and video processing, spatial registration, and visualization.
- Contributed to software design, validation, technical documentation, and development activities within a regulated medical environment compliant with ISO 13485 and IEC 62304.

PhD Researcher, Institut Pascal and IHU Strasbourg, Clermont-Ferrand and Strasbourg, France

2016-2020

PhD thesis: *Deformable registration, datasets, and evaluation protocols for augmented minimally invasive abdominal surgery*

- Designed a deformable registration framework modelling the mechanical behaviour of anatomical structures for augmented reality alignment.
- Developed a surface reconstruction method based on Multi-View Stereo with photometric constraints.
- Created datasets, evaluation protocols, and benchmarking frameworks to analyse performance, methodological limitations, and reproducibility.

R&D Engineer, Devatics, Toulouse, France

2016

Developed features for a web platform analysing user behaviour on e-commerce websites.

Education

- 2016-2020 **PhD in Computer Vision, Université Clermont Auvergne, Clermont-Ferrand, France**
Deformable registration, datasets, and evaluation protocols for augmented minimally invasive abdominal surgery.
- 2012-2015 **Engineering degree in Computer Science and Applied Mathematics, INP ENSEEIHT, Toulouse, France**
Specialization in Multimedia.
- 2014-2015 **Master IACI: Master of Research in Artificial Intelligence, Paul Sabatier University, Toulouse, France.**
- 2009-2012 **Preparatory Classes for French Grandes Écoles, Fabert High School, Metz, France**
MPSI/MP*

Core skills

Software Architecture & Technical Leadership

R&D and software project leadership • Team management • One-to-one follow-up • Recruitment and onboarding • Technical roadmaps • Planning and prioritization • Technical trade-offs • Software and data architecture • Functional and technical requirements definition •

Cloud, Data & MLOps

GCP cloud infrastructure • Access control • Secure data pipelines • Data ingestion and anonymization • Metadata enrichment • Dataset structuring • CI/CD • Containerized ML environments •

Computer Vision, Medical Imaging & 3D Perception

Medical data processing • Rigid and deformable registration • 3D reconstruction • Projective geometry • Camera calibration • Pose estimation • MVS / SfM / SLAM •

Machine Learning & Model Validation

Model training, evaluation, and validation • Image segmentation • Object classification and detection • Time-series analysis • Spatiotemporal models • RNNs / LSTMs • Attention mechanisms •

Cross-functional coordination • Testing, verification and validation • Risk management • Software cybersecurity • Technical and regulatory documentation • Agile methods and continuous improvement • IEC 62304 / ISO 13485

Reproducible training workflows • Dataset and model versioning • Traceability • Performance evaluation • Documentation for regulated environments • Model evaluation protocols

Feature matching • Photometry • RGB-D cameras • Point clouds and 3D meshes • Numerical optimization • Mechanical modelling • Real-time software constraints

Transformers • Transfer learning • Active learning • Domain adaptation • Adversarial learning • Error analysis • Model optimization • ONNX/TensorRT model integration

Technical skills

Programming Languages

Python • C++ • C# • SQL • Bash • CUDA • MATLAB • OpenGL • PHP • C • JavaScript • Google Apps Script • TypeScript

Libraries & Frameworks

PyTorch • Flask • Symfony • Qt • Node.js • OpenCV • TensorFlow • Keras • TensorRT • Ceres • ONNX • scikit-learn • NumPy • Pandas • Unity

Languages

- French* Native language
- English* Full professional proficiency
- Japanese* Basic proficiency

Software and Tools

Project Management Tools

Monday.com • Jira • Coda

Development Environments & Tools

Linux • Google Cloud Platform (GCP) • Git • GitHub • Docker • GitHub Actions

Other Tools

Blender • MITK • Gmsh • MeshLab • Figma • LaTeX

Personal Interests

Chess • Board games • Science fiction • Cinema