

Cris Lovell-Smith

Computer Vision and AI Engineer - Germany

 cris.lovell-smith.com  [crislovelsmith](https://www.linkedin.com/in/crislovelsmith)  cris@lovell-smith.com  +49 1590 2833218

PROFILE

I am an AI and Computer Vision Engineer with 25 years of software experience and 10 years experience developing, evaluating, and deploying computer vision and machine learning systems from research to series production. I have deep expertise in object detection, classification, segmentation, and visual understanding algorithms. I also have extensive experience analysing model performance, identifying failure modes, and improving robustness in real-world applications. I have proven my ability to communicate complex technical concepts clearly through detailed analysis and reporting. In particular, I have worked in the push towards autonomous vehicles in the automotive industry, bringing new technologies to the aquaculture industry and in improving MRI quality in healthcare. I am a freelancer living in Germany, working primarily remotely.

HARVEST HUB | HEAD OF AI
2023 - Present | Nelson, New Zealand

Leading AI development for aquaculture startup, optimising shellfish visual assessments with machine learning and computer vision.

- Development and systematic evaluation of ML/CV algorithms for shellfish condition and morphometrics, using Python, Pytorch and MLFlow.
- Analysis of model performance, including identification of failure modes and edge cases in production deployments.
- Design of annotation strategies and refinement of labelled datasets for computer vision tasks.
- Detailed analysis of system performance and communication of findings through publication-quality technical reports to investors and fellow R&D staff.
- Responsible for delivery of technical roadmap.

NELSON AI INSTITUTE | HEAD OF AI
2020 - present | Nelson, New Zealand

AI research and technical leadership. Developed and evaluated deep learning models for classification, segmentation, and object detection, deployed in the cloud and on mobile devices.

2022-present

- Honorary Research Associate at the Victoria University of Wellington, NZ.
- Technical supervision of two Masters students in AI with topics in semantic segmentation and large language models.
- Model optimisation, benchmarking, and deployment using ONNX to Android.

2020-2022

- Product definition, refinement, and AI proof-of-concept development.
- Collaboration with scientific and industry partners, academics, internal teams, and boards of directors.
- Development and evaluation of deep learning models in classification, semantic segmentation, and object detection (FasterRCNN, SSD, Yolo, U-Net, DeepLabv3) using Tensorflow/Keras with MLFlow for experiment tracking.
- Development of segmentation models for remote sensing application using satellite imagery, and aerial LIDAR and imagery.
- ML Paper Club: weekly research and presentations of SOTA ML papers, e.g., ViTs.
- Design of training and validation datasets, and data preprocessing and augmentation pipelines to improve model robustness and generalisation.

SKILLS

AI ENGINEERING

Object detection • segmentation • classification • 3.D. monocular depth estimation • self supervised learning • GenAI - LLMs • model evaluation • failure analysis

LIBRARIES/Frameworks

Pytorch • Tensorflow/Keras • MLFlow • HuggingFace • ONNX • OpenCV • NumPy • Ollama • Haystack

LANGUAGES

Python • Flutter/Dart • Modern C++ • C

TOOLS/PLATFORMS

AWS • GCP • Git • Atlassian • CMake • Linux • CVAT

SPOKEN LANGUAGES

English (Native) • German (Fluent)

EDUCATION

DEEPLARNING.AI

DEEP LEARNING SPECIALISATION
2019 | Online Coursera

STANFORD ONLINE

MACHINE LEARNING
2017 | Online Coursera

UNIVERSITY OF CANTERBURY

MASTER OF ELECTRICAL AND ELECTRONIC ENGINEERING
2010 | Christchurch, N.Z.

UNIVERSITY OF CANTERBURY

BACHELOR OF ELECTRICAL AND ELECTRONIC ENGINEERING WITH HONORS
2004 | Christchurch, N.Z.

AWARDS

Foundation for Research, Science and Technology Masters scholarship 2007

FRST student scholarship 2003

CONTINENTAL AUTOMOTIVE | AI AND CV SPECIALIST (FREELANCE)

2022 – 2023 | Lindau, Germany

Computer vision based advanced driver assistance system (ADAS) series production project for a Volvo car's next generation vehicles.

- Feature development for production ADAS head light assist (HLA) algorithm.
- Consulting on neural network architectures for object detection for HLA function for next generation product.
- Development and evaluation of production grade CV/ML algorithms in C/C++.
- Analysis of model performance in safety-critical systems, including identification of edge cases and failure scenarios.

DENSO ADAS (TOYOTA GROUP)/ADASENS AUTOMOTIVE | RESEARCH AND DEVELOPMENT ENGINEER

2015 - 2019 | Lindau, Germany

Vision-based ADAS initiatives for company push towards autonomous vehicles, designing, implementing and evaluating deep learning (DL) based visual understanding algorithms including collision warning, lens obstruction detection, and assisted parking algorithms.

- Concept and development of in-house deep learning framework including custom single stage object detector for embedded platforms in MISRA C.
- Development of DL/CV based collision warning system.
- Concept, implementation, and validation of patented lens obstruction algorithms.
- Evaluation and benchmarking of deep learning based 3.D. monocular depth estimation algorithms.
- Enhancements to 3.D. structure from motion technology for assisted parking.
- Design and implementation of validation framework used across multiple projects within department.
- Systematic evaluation of ADAS function performance, including error analysis and robustness improvements under real-world conditions, in multiple projects.

UNIVERSITY MEDICAL CENTRE, FREIBURG GERMANY | RESEARCH SCIENTIST

2010 – 2013 | Freiburg, Germany

Research and development of patient motion correction for improved image quality in magnetic resonance imaging (MRI).

- Motion correction research in MRI using vision based patient pose estimation system.
- Design and implementation of algorithms in MATLAB and C++ on Siemens MRI scanners to reduce motion artifacts.
- Development of patented MRI system calibration algorithms, and other novel approaches to calibrating patient/MRI coordinate systems using multiple modalities.
- Attendance and oral and poster presentations at MRI research conferences.
- Co-authored research papers in the field.
- Worked with a startup formed to commercialise research.

APPLIED RESEARCH ASSOCIATES NZ, CHRISTCHURCH NEW ZEALAND | MASTERS STUDENT

2007 – 2009 | Christchurch, New Zealand

Design of a novel 6.D. optical pose estimation system for NZ company while studying towards Masters of Engineering.

- Design, implementation, and evaluation of novel 6-DoF optical pose estimation system, including hardware design and implementation of firmware for real-time camera module.
- Technical communication of system design and performance through thesis and management level slides to company stakeholders and Masters supervisors.

PATENT APPLICATIONS AND PUBLICATIONS

PCT Patent Application No: PCT/NZ2023/050093 - DEVICES AND METHODS FOR BIVALVE HARVEST OPTIMISATION (2023)

NZ Provisional Patent 773998 - LAND SEGMENTATION AND CLASSIFICATION (2022)

US Patent No. 9 746 540 B2, "Device and Method for Calibrating Tracking Systems in Imaging Systems" (2013)

Zahneisen, Benjamin **Lovell-Smith, Cris** Herbst, Michael Zaitsev, Maxim Speck, Oliver Armstrong, Brian Ernst, Thomas. (2014). Fast Noniterative Calibration of an External Motion Tracking Device. Magnetic resonance in medicine : official journal of the Society of Magnetic Resonance in Medicine / Society of Magnetic Resonance in Medicine. 71. 10.1002/mrm.24806.

Honal, Matthias **Lovell-Smith, Cris** Vicari, Marco Weitzel, Elisabeth Izadpanah, Kaywan Weigel, Matthias. (2013). Accurate semiautomatic assessment of ligament length variations from MRI data. Medical physics. 40. 092301. 10.1118/1.4818058.

C. D. Lovell-Smith et al, "Combined prospective-retrospective correction applied to 3D brain imaging", Abstract and talk at ESMRMB, 2011.

C. D. Lovell-Smith et al, "Black spot: A prototype camera module" in Image and Vision Computing New Zealand, 2008. IVCNZ 2008. 23rd International Conference.

Unabridged employment and publication history from 1999 onward available on request.