

# Mathieu Cocheteux

Computer Vision Engineer / Researcher

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## PROFESSIONAL SUMMARY

Doctoral researcher in computer vision with expertise in sensor fusion, perception algorithms, and real-time calibration for autonomous driving. Strong background in LiDAR and camera-based perception, uncertainty estimation, and embedded deployment. Strong leadership and collaboration skills, mentoring MSc students and leading hands-on tutorials. Published in premier conferences and co-inventor of an international patent.

## EDUCATION

### PhD in Computer Vision

Université de technologie de Compiègne (Sorbonne University alliance) and CNRS, France  
Thesis: Deep Learning for Automatic Multimodal Sensor Calibration

Oct 2021 – Mar 2025

### MSc in Computer Science

Université de technologie de Compiègne (Sorbonne University alliance), France

Diplôme d'ingénieur (French Engineering Title)

Study abroad semesters: Politecnico di Milano (Italy), Tampere University (Finland)

Summer School: Tohoku University Engineering Summer Program in Robotics (Japan)

Feb 2016 – Apr 2021

## PROFESSIONAL EXPERIENCE

### Doctoral Researcher

Université de technologie de Compiègne (Sorbonne University alliance) and CNRS, France

Oct 2021 – Apr 2025

- Developed state-of-the-art deep learning methods for real-time camera-LiDAR and event camera-LiDAR self-calibration, achieving high accuracy with attention to computational efficiency for embedded deployment.
- Proposed a method for uncertainty quantification in online extrinsic calibration, applied it to Visual-LiDAR odometry, demonstrating improvements in localization accuracy for autonomous systems.
- Mentored MSc students and led tutorial sessions and hands-on exercises in robotics perception courses.
- Published several papers in leading vision conferences (BMVC, CVPR, WACV) and applied for an international patent.

### Research Engineer Intern

Motional, Singapore

Jun 2022 – Dec 2022

- Created a deep learning-based method for camera-LiDAR self-calibration, achieving state-of-the-art results with a lighter model. International patent pending WO/2024/182787

### Research Engineer

Université de technologie de Compiègne (Sorbonne University alliance) and CNRS, France

Apr 2021 – Oct 2021

- Benchmarked newly acquired sensors (LiDAR + cameras) for the autonomous vehicle platforms.
- Created tools, algorithms, and documentation to prepare the adoption of this new sensor system.

### Research Engineer Intern

Toyota Motor Europe, Belgium

Jul 2020 – Jan 2021

- Worked on object detection, multi-object tracking, and anomaly detection, optimizing models for real-time deployment on NVIDIA Jetson.

### Software Engineer Intern

Safran Electronics & Defense, France

Feb 2019 – Jul 2019

- Developed a C++ application for the maintenance terminal of a NATO standard tactical drone system.

## PUBLICATIONS AND PATENTS

- Uncertainty-Aware Online Extrinsic Calibration: A conformal Prediction Approach - WACV 2025
- MULi-Ev: Maintaining Unperturbed LiDAR-Event Calibration - CVPR 2024 (Workshop on Autonomous Driving)
- PseudoCal: Towards Initialisation-Free Deep Learning-Based Camera-LiDAR Self-Calibration - BMVC 2023 (oral)
- UniCal: A Single-Branch Transformer-Based Model for Camera-to-LiDAR Calibration and Validation - arXiv 2023
- Camera-to-LiDAR Calibration and Validation Model - International Patent WO/2024/182787

## TECHNICAL SKILLS

**Programming Languages:** Python, C++   **Frameworks:** PyTorch, Lightning, OpenCV, ROS, TensorFlow

**Expertise Domains:** Computer Vision, Deep Learning, Sensor Calibration, Sensor Fusion, Uncertainty Estimation

**Tools:** Git, Docker, Conda, Hydra, Linux

## LANGUAGES

**English:** Fluent   **French:** Native

### Extracurricular Achievements:

- **Brevet d'Initiation Aéronautique (BIA):** Awarded with highest honors, reflecting a solid foundation in aeronautics and a commitment to technical learning beyond the classroom.
- **IHEDN Participation:** Actively engaged in sessions at the Institut des Hautes Études de Défense Nationale, enhancing my strategic thinking and leadership skills in a multidisciplinary, high-level defense context.

### Soft Skills:

Strong leadership, communication, teamwork, and adaptability, with a proven ability to navigate interdisciplinary and multicultural environments. Experienced in mentoring and guiding MSc students, coordinating collaborative research projects, and fostering academic engagement.

- **Elected Representative for PhD Students and Postdocs:** Acted as the official liaison between students and faculty, advocating for academic and research needs while organizing community initiatives.
- **ESN Team Leader – International Student Support:** Led efforts to welcome and integrate international students, facilitating networking, cultural exchange, and logistical support.
- **Project Coordination & Mentoring:** Provided technical and academic guidance to MSc students, helping them navigate research challenges.

### Publications and Patents:

My research focuses on improving sensor calibration and fusion techniques for autonomous perception. Contributions include novel deep learning methods for camera-LiDAR and event camera-LiDAR calibration, uncertainty-aware calibration models, and real-time deployment techniques. These works have been published at leading computer vision and robotics conferences and resulted in an international patent.

#### • Peer-Reviewed Publications:

- **Uncertainty-Aware Online Extrinsic Calibration: A Conformal Prediction Approach** – WACV 2025  
Proposed a method for quantifying uncertainty in real-time extrinsic calibration using conformal prediction. The uncertainty can be taken into account for calibration updates and in downstream tasks (odometry, object detection, etc.), making perception systems more robust.
- **MULi-Ev: Maintaining Unperturbed LiDAR-Event Calibration** – CVPR 2024 (Workshop on Autonomous Driving)  
Developed a method for LiDAR-Event camera recalibration in dynamic environments. The approach compensates for extrinsic parameter drift using a supervised deep learning model, enabling long-term stable calibration without the need for manual intervention.
- **PseudoCal: Towards Initialisation-Free Deep Learning-Based Camera-LiDAR Self-Calibration** – BMVC 2023 (Oral Presentation)  
Designed a self-calibration framework that eliminates the requirement for manual initialization. The method leverages Pillars representation of the 3D data to bypass the projection into 2D. The calibration can be done with almost no prior information, making it suitable for deployment in autonomous vehicles and robotics where manual calibration is impractical.
- **UniCal: A Single-Branch Transformer-Based Model for Camera-to-LiDAR Calibration and Validation** – arXiv 2023  
Introduced a transformer-based model that can both calibrate and validate extrinsic parameters in camera-LiDAR systems. The architecture reduces computational overhead by using early fusion and unifying feature extraction and calibration into a single-branch network, achieving competitive accuracy while improving computational efficiency.

#### • Patent:

- **Camera-to-LiDAR Calibration and Validation Model** – International Patent WO/2024/182787  
Developed UniCal, a lightweight, data-driven calibration model that achieves state-of-the-art precision while being up to 20 times smaller and 2 times faster than other deep learning-based approaches. The method is designed for embedded systems in autonomous vehicles and robotics, improving deployment feasibility in real-world scenarios.