Antoine N. **André**

Computer vision · Omnidirectional cameras · Robotics and Microrobotics

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(+81)80-4780-5989 | antoine.andre@aist.go.jp | https://antoineandre.github.io/ | 30 years old

Researcher at CNRS-AIST JRL (Joint Robotics Laboratory), IRL 3218

Education

Ph.D. on nanometric resolution 6-DoF pose measurement

Besançon, France

UBFC (Burgundy Franche-Comté University) *Oct. 2018 - Oct. 2021*

- Title of the Ph.D. thesis (defended on Oct. 18 2021): Robust visual measurement with large range to resolution ratio of 3D pose of encoded periodic patterns : applications to microrobotics
- Under the supervision of Guillaume Laurent, Patrick Sandoz and Maxime Jacquot
- Thesis comity composed by Éric Marchand, Peter Sturm and Youcef Mezouar
- Funded by the Ministry of Higher Education, Scientific Research and Innovation (MESRI)

Master in Microsystems, Instrumentation and Robotics

Besançon, France

UFC (Franche-Comté University) *2017 - 2018*

- Double degree made in parallel of the last year of engineering school to deepen knowledges in robotics.

Engineering degree in mechatronics and robotics

Besançon, France

SUPMICROTECH ENSMM (National Engineering Institute in Mechanics and Microtechnologies) *2015 - 2018*

- Specialization in mechatronics and robotics, courses included command, control, robotics and computer vision.

Research experience

Permanent researcher

Tsukuba, Japan

CNRS-AIST JRL (Joint Robotics Laboratory), IRL3218 *Oct. 2023 -*

- Perception research team principal investigator (Apr. 2025 -)

Postdoctoral researches in robotics and computer vision

Tsukuba, Japan

CNRS-AIST JRL (Joint Robotics Laboratory), IRL3218 *May 2022 - Sept. 2023*

- JSPS Postdoctoral fellow (May 2022 - May 2023)
- AIST ITH postdoctoral contract (May 2023 - Sept. 2023)

Postdoctoral researches in robotics and computer vision

Amiens, France

MIS Research Laboratory, University Picardie Jules Verne *Dec. 2021 - Apr. 2023*

International mobility and collaboration for vision based measure with high resolution

Tsukuba, Japan

National Metrology Institute of Japan (NMIJ) *Mar. 2020 - Aug. 2020*

- Collaboration with Shien Ri, Professor at the National Metrology Institute of Japan
- international mobility grant from EUR EiPhi, canceled because of borders closing

PhD main subject

Besançon, France

AS2M research department of FEMTO-ST Institute *2018 - 2021*

- 6 DoF pose measurement performed via the spectral analysis of periodic patterns
- C++ Software Development Kit for pose measurement of various periodic pattern types available at Vernier website
- Collaborations inside the research laboratory to provide a reliable, robust and precise position measurement tool for microrobotics applications

Master thesis in biomechanical robotics

Tokyo, Japan

Tokyo Denki University *Feb. 2018 - Aug. 2018*

- Supervised by Pr. Jun Ishikawa

Supervision

PhD students

- **Saqi HUSSAIN** (AS2M FEMTO-ST & CNRS-AIST JRL), Hemispherical vision based pose measurement with large range and high resolution (Oct. 2025 - Sept. 2028). Ph.D. funded by CNRS MITI, co-supervision with P. Sandoz and G. Laurent (AS2M, FEMTO-ST)
- **Amneh NASIR** (UPJV MIS & CNRS-AIST JRL), Cost function smoothing for visual servoing (Oct. 2024 - Sept. 2027). Ph.D. funded by Haut de France region, co-supervision with D. Kachi (MIS, UPJV) and G. Caron (MIS, UPJV and CNRS-AIST JRL)

Master students

- **Ferdinand Louapre** (Mines de Paris, spring 2025), Hessian shaping for enhanced convergence domain Visual Servoing Schemes
- **Raphaël d'Orfani** (Polytech Dijon, spring 2025), RGB-D fusion for wide field of view user feedback in teleoperation context
- **Damien Harlé** (Rubika Valenciennes, summer 2024), user feedback enhancement with wide FoV cameras for robot teleoperation
- **Gwendal Crequer** (ENSTA Bretagne, spring 2024), robot masking for Spherical Visual Servoing using omnidirectional cameras
- **Thomas Duvinage** (UTBM, autumn 2023), encapsulate spherical Visual Servoing in a multi-objective control framework
- **Matthieu Quaccia** (INSA Toulouse, spring 2023, co-supervision), implementation of feature maps for Direct Visual Servoing
- **Quentin Milot** (INSA Rennes, spring 2022, co-supervision), Adaptation for omnidirectional cameras of a V-SLAM algorithm
- **Valériia Leush** (ENSMM, spring 2021), Software development of a python tool, based on the Vernier library, to generate and measure periodic pattern poses

Bachelor students

- **Sinta Schulte** (bachelor's degree, KIT, summer 2024), Visual Servoing trajectory evaluation comparison using various FoV

Research funding

D-ϕ

Remote deformation and force estimation *Apr. 2025 - March 2028*

- Funded by the JSPS (Kakenhi Wakate)
- Budget : 950 k¥
- Role: principal investigator

CALL (ANR)

Dynamic object handover using full spherical visual perception and biomechanical modeling of humans *Sept. 2025 - Aug. 2028*

- Funded by the French ANR
- Coordinator: B. Watier (CNRS-LAAS). 4 laboratories involved CNRS-LAAS (France), ENIT LGP (France) UDS 3IT (Canada) and CNRS-AIST JRL (Japan)
- Budget : 6 m€
- Role: investigator as a CNRS-AIST JRL member

Antnoid' (ANR)

leveraging ants visual familiarities for humanoid robot navigation *Jan. 2025 - June 2028*

- Funded by the French ANR
- Coordinator: G. Caron (CNRS-AIST JRL) with F. Ruffier (AMU ISM)
- Budget : 3 m€
- Role: investigator as a CNRS-AIST JRL member

Phase based deformation estimation (AIST-ITH)

Remote deformation estimation using wide fov lenses *Aug. 2024 - Feb. 2025*

- Funded by the ITH department of AIST
- Budget : 1 m ¥
- Role: principal investigator

M^{2}SV

Mobile Manipulator control based on Spherical Vision *Jan. 2024 - Jan. 2026*

- Exploratory research project of the GdR 720 ISIS
- Coordinator: N. Crombez (CIAD UTBM), 3 laboratories involved CIAD UTBM (France), UPJV MIS lab (France) and CNRS-AIST JRL (Japan)
- Budget : 7 k€
- Role: participant as CNRS-AIST JRL member

BRIDGE SIGRoLe (NTT)

Self-Improving AI for seamless human-guided robot learning *Nov. 2023 - March 2026*

- Funded by NTT Data
- Coordinator: R. Cisneros (CNRS-AIST JRL), in collaboration with CMU (United-States)
- Budget : 70 m ¥
- Role: investigator

DVS-Straight

AIST ITH International Collaboration DVS-Straight - Direct Visual Servoing with optimal robot trajectories *2021 - 2024*

- Funded by the ITH department of AIST
- Coordinator: G. Caron, 3 laboratories involved UTBM, CIAD lab (France), UPJV, MIS lab (France) and CNRS-AIST JRL (Japan)
- Role: participant as CNRS-AIST JRL member

Holonet

Toward extended visual control capabilities using digital holography *2020 - 2023*

- Funded by the I-Site Burgundy Franche-Comté
- 4 departments of FEMTO-ST Institute involved: Optics, Applied mechanics, DISC and AS2M departments
- Budget : 150 k€
- Role: participant as AS2M FEMTO-ST member

NANO6D

6 degrees of freedom nanometrology *2018 - 2021*

- Funded by the Burgundy Franche-Comté region
- 3 departments of FEMTO-ST Institute involved: AS2M, Applied mechanics and Optics departments
- Budget : 235 k€
- Role: participant as AS2M FEMTO-ST member

AI-Control-Net

Neural networks applied to microrobotics and photonics *2017 - 2021*

- Funded by the Burgundy Franche-Comté region
- 4 departments of FEMTO-ST Institute involved: Optics, Applied mechanics, DISC and AS2M departments
- Budget : 68 k€
- Role: participant as AS2M FEMTO-ST member

Publications

ORCID Research Gate Google Scholar

Peer reviewed published articles

[1] **André, A. N.**, Morbidi, F., & Caron, G. (2025). UniphorM: A New Uniform Spherical Image Representation for Robotic Vision, *IEEE Transactions on Robotics, 41, 2322-2339*, DOI 10.1109/TRO.2025.3547266

[2] Benallegue, M., Lorthioir, G., Dallard, A., Cisneros-Limón, R., Kumagai, I., Morisawa, M., Kaminaga, H., Murooka, M., **André, A. N.**... & Kamon, M. (2025). Humanoid robot RHP Friends: Seamless combination of autonomous and teleoperated tasks in a nursing context, *IEEE Robotics & Automation Magazine, 32(1), 79-90*, DOI 10.1109/MRA.2024.3521995

[3] Crombez, N., Buisson, J., **André, A. N.**, & Caron, G. (2024). Dual-hemispherical photometric visual servoing, *IEEE Robotics and Automation Letters, 9(5), 4170-4177.*, DOI 10.1109/LRA.2024.3375114

[4] **André, A. N.**, Lehmann, O., Govilas, J., Laurent, G. J., Saadana, H., Sandoz, P., Gauthier, V., Lefèvre, A., Bolopion, A., Agnus, J., Placet, V. & Cévy, C. (2022). Automating Robotic Micro-Assembly of Fluidic Chips and Single Fiber Compression Tests Based-on $XY\Theta$ Visual Measurement With High-Precision Fiducial Markers, *IEEE Transactions on Automation Science and Engineering, 21(1) 353-366*, DOI 10.1109/TASE.2022.3218686

[5] Cuenat, S., Andréoli, L.,**André, A. N.**, Sandoz, P., Laurent, G. J., Couturier, R., & Jacquot, M. (2022). Fast autofocusing using tiny transformer networks for digital holographic microscopy. , *Optics Express, 30(14), 24730-24746.*, DOI 10.1364/OE.458948

[6] **André, A. N.**, Sandoz, P., Jacquot, M., & Laurent, G. J. (2022). Pose Measurement at Small Scale by Spectral Analysis of Periodic Patterns., *International Journal of Computer Vision, 1-17*, DOI 10.1007/s11263-022-01607-7

[7] **André, A. N.**, Sandoz, P., Mauzé, B., Jacquot, M., & Laurent, G. J. (2020). Sensing one nanometer over ten centimeters: A microencoded target for visual in-plane position measurement., *IEEE/ASME Transactions on Mechatronics, 25(3), 1193-1201.*, DOI 10.1109/TMECH.2020.2965211

[8] **André, A. N.**, Sandoz, P., Mauzé, B., Jacquot, M., & Laurent, G. J. (2020). Robust phase-based decoding for absolute (X, Y, Θ) positioning by vision., *IEEE Transactions on Instrumentation and Measurement, 70, 1-12.*, DOI 10.1109/TIM.2020.3009353

[9] Mauzé, B., Dahmouche, R., Laurent, G. J., **André, A. N.**, Rougeot, P., Sandoz, P., & Clévy, C. (2020). Nanometer precision with a planar parallel continuum robot., *IEEE Robotics and Automation Letters, 5(3), 3806-3813.*, DOI 10.1109/LRA.2020.2982360

Inproceedings articles

[10] Caillot, A.,**André, A. N.**, Duvinage, T., & Caron, G. (2025, September). RGB-D versus omnidirectional visual SLAM in humanoid robot positioning, *Proceedings of the IEEE-RAS 24th International Conference on Humanoid Robots (2025)*

[11] Schulte, S., **André, A. N.**, Crombez, N., & Caron, G. (2025, January). On the impact of the camera field-of-view to Direct Visual Servoing robot trajectories when using the Photometric Gaussian Mixtures as dense feature, *Proceedings of the IEEE/SICE International Symposium on System Integration (2025)*

[12] Quaccia, M., **André, A. N.**, Yoshiyasu, Y., Caron, G., A Study on Learned Feature Maps Toward Direct Visual Servoing, *Proceedings of the IEEE/SICE International Symposium on System Integration (2024)*

[13] Berenguel-Baeta, B., **André, A. N.**, Caron, G., Bermudez-Cameo, J., & Guerrero, J. J. (2023). Visual Gyroscope: Combination of Deep Learning Features and Direct Alignment for Panoramic Stabilization., *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPS) Workshops (pp. 6444-6447).*

[14] **André, A. N.**, & Caron, G. (2022). Photometric Visual Gyroscope for Full-View Spherical Camera., *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops (pp. 5232-5235).*

[15] **André, A. N.**, Sandoz, P., Jacquot, M., & Laurent, G. J. (2020, July). Robust, precise and scalable: A phase-encoded pattern for visual X, Y, Θ positioning., *2020 International Conference on Manipulation, Automation and Robotics at Small Scales (MARSS) (pp. 1-5). IEEE. Présentation annulée pour causes de fermeture des frontières*, DOI 10.1109/MARSS49294.2020.9307842

Oral communications

[16] **André, A. N.**, Sandoz, P., Jacquot, M., & Laurent, G. J. High-resolution 3D pose sensing from nano- to macro-scale by phase-based computer vision., *SPIE Photonics Europe 2022, 3 - 7 Apr. 2022*

[17] Andreoli, L., Cuenat, S., **André, A. N.**, Sandoz, P., Couturier, R., Laurent, G. J., & Jacquot, M. Extended machine vision control capabilities using digital holography and transformer neural networks., *SPIE Photonics West 2022, 22 - 27 Jan. 2022*

[18] **André, A. N.**, Sandoz, P., Mauzé, B., Jacquot, M., & Laurent, G. J. (2020). Sensing one nanometer over ten centimeters: A microencoded target for visual in-plane position measurement., *2020 International Conference on Advanced Intelligent Mechatronics (AIM 2020), Boston, USA (online)*

Patented software

[19] **André, A. N.**, Sandoz, P., & Laurent, G. J., Vernier Library software, deposited at the National Agency for the Programs protection (Agence pour la Protection des Programmes)., *identifiant IDDN.FR.001.510013.000.S.P.2020.000.41100, Dec. 2020.*

Participation in international conferences, symposia and outreach

(Upcoming) 2025 IEEE-RAS 24th International Conference on Humanoid Robots — *Seoul, Korea*
2025 IEEE/SICE International Symposium on System Integration, Session chair — *Munich, Germany*
27e Journée Francophone de la Recherche (Nov. 2024) — *Tokyo, Japan*
2024 IEEE International Conference on Robotics and Automation — *Yokohama, Japan*
2024 IEEE/SICE International Symposium on System Integration — *Ha-Long, Vietnam*
26e Journée Francophone de la Recherche (Jan. 2023) — *Tokyo, Japan*
2022 IEEE/RSJ International Conference on Intelligent Robots and System — *Kyoto, Japan*
2022 IEEE / CVF Computer Vision and Pattern Recognition Conference — *New Orleans, USA*
2021 IEEE/ASME International Conference on Advanced Intelligent Mechatronics — *Virtual*
2021 IEEE International Conference on Robotics and Automation — *Virtual*

Invited talks

(Upcoming) Omnidirectional vision for robotic applications — *Seoul, Korea*
SUNY — *1 Oct. 2025*

(Upcoming) Omnidirectional vision for robotic applications — *Seoul, Korea*
SNU, Department of Electrical and Computer Engineering — *29 Sept. 2025*

Vision sphérique en robotique : représentation d'image et applications *Paris, France*

Journée inter-GdR ISIS et Robotique - Capteurs visuels émergents pour la robotique *Nov. 2022*

Mesure visuelle à grand rapport plage sur résolution de la pose 3D de mires pseudo périodiques *Amiens, France*

MIS UPJIV Perception team *Sept. 2021*

Teaching

Computer vision practical courses (108 hrs, classes of 15 students) *Besançon, France*

M2 ENSMM students (final year of engineering school) *Nov. 2018 - Jan. 2021*

- Practical courses topics include camera calibration, homography, triangulation and stereo vision for object reconstruction
- Creation and writing of the practical courses subjects

Microcontrolers practical courses (20 hrs, classes of 15 students) *Besançon, France*

M1 ENSMM students (second year of engineering school) *Apr. 2020 - May 2020*

- Command and control of Microcontrolers (PIC16F) courses

Knowledge of foreign languages

- French: Mother tongue
- English: Excellent knowledge of the spoken and written language
- Japanese: Basic knowledge of the spoken and written language