

# Thibault Goyallon

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Ph.D - Data Scientist in ML/DL

## Professional Experiences

- 2021 - 2024 **Research Engineer and Research Project Coordinator**, *INRIA*, Grenoble, France, 3 years.  
**PerfAnalytics Project** (ANR-20-STHP-0003 - National Research Agency funding 2 M€)  
Developments in markerless motion capture for human motion, applications in high-level elite sports :
- Ensuring the reproducibility of research code and high-performance computing (HPC);
    - Development of an end-to-end pipeline from video capture to computed data feedback;
    - Teaching introductory courses to Docker usages (INSEP and LJK);
    - Maintaining GPU-accelerated docker containers using NVIDIA Docker;
    - Maintaining NoSQL Databases and their use inside front-end Apps with Dash Plotly.
  - Development of a new method for accurate and automated multi-person shape estimation.
    - 3D human pose and silhouette extraction from 2D images (Detectron2/PointRend);
    - Human body model fitting and optimization;
    - Automatic extraction of Body Segments Parameters (BSPs);
    - 3D mesh rendering and visualization in OpenGL (PyRender + Trimesh).
  - Co-supervision of master students.
- 2019 - 2020 **Postdoctoral Researcher in Applied Mathematics**, *Jean Kuntzmann Laboratory*, CNRS (UMR 5224), Grenoble, France, 19 months.  
Biomechanics and computer vision research on markerless motion tracking from multi-cameras systems in Elite Sport Climbing.
- Automatic segmentation of 3D human mesh and estimation of BSPs (Volume, mass, inertia).
- 2016 - 2019 **Doctoral Teaching Assistant**, *Savoie Mont Blanc University*, Polytech Annecy-Chambéry, 40 months.
- 192 hours of lectures, tutorials, and practical sessions over 40 months:
    - Numerical methods and Python scripting language for engineers - Image analysis (OpenCV, pandas, ScyPy, ...);
    - Continuum mechanics ;
  - Elementary School Teacher Assistant (ASTEP) - Quai Jules Philippe School - Annecy;
  - Supervision of internships/projects: PEIP, DUT GMP, and engineering students.
- 2015 - 2019 **Doctoral Thesis**, *SYMME Laboratory*, Annecy, France, 40 months.  
Osteosynthesis implant development for the treatment of proximal and mid-diaphyseal humerus fractures.  
**Clothilde Project** (INTERREG V - Franco-Swiss Funding 1.4 M€ - 40 months):
- Musculoskeletal model of the glenohumeral joint using *OpenSim* + Post-processing with *Python*;
  - Wireless and real-time 3D position measurement sensor based on inertial measurement units (*Quaternions* + *GUI*);
  - Shoulder cadaveric testing bench (*CompactRIO* + *FPGA*);
  - Osteosynthesis implant and associated ancillary (5 patents).
- 2015 **End-of-studies internship**, *French Alternative Energies and Atomic Energy Commission CEA/DAM/Le Ripault*, Development of an assembly control system for pyrotechnic devices, Monts, France. 6 months.
- 2014 **International Experience**, *SRM University*, Chennai, India, 3 months.  
3D FEA modeling of the human foot - Studies and numerical analyses of soft tissues.

## Degrees

- 2016 - 2018 **Label RES (Research and Higher Education)**, *Grenoble Alpes University, Doctoral School SISEO ED N°489 Sciences et Ingénierie des Systèmes de l'Environnement et des Organisations*, Pedagogy, Didactics and Communication.
- 2015 - 2018 **Doctoral Training**, *SISEO Doctoral School*.
- Python scripting language (SYMME Laboratory);
  - Multi-spectral image analysis (LISTIC Laboratory);
  - Research ethics;
- 2011 - 2015 **Master Degree**, *École Polytechnique Universitaire, University of Tours*.
- Mechanics and System Design – Biomechanics option;
  - 3D anatomical study of femurs for modification of monobloc revision prostheses – CHU Tours;
  - Development of a pedaling assistance system for dialysis patients – FNAIR.
- 2009 - 2011 **Higher Technician Certificate**, *Mechanical and Industrial Automation*, Lycée Grandmont, Tours, France.
- 2009 **Baccalaureate in Industrial Science and Technology**, *Electrical Engineering*, Rabelais High School, Chinon, France.

## Skills

Python	OpenCV, SciPy, Pandas, NumPy, Trimesh, PyRender, Tensorflow, PyTorch, TorchVision, Dash Plotly
Data Integrity	Git, Docker + GPU (NVIDIA, NVCC, CUDA)
Programmation	Bash, Linux servers, compilation gcc/g++, Matlab, Arduino, L <sup>A</sup> T <sub>E</sub> X
CAD and FEA	Solidworks, Catia, Abaqus, Ansys
3D mesh	OpenGL, Maya, Blender and MeshLab
Languages	French (native), English

## Co-supervisions

- 2023 **Hugo COMOTH**, *Spatial and Temporal Calibration of a Multi-View Camera System with 2D ArUco Markers*, Grenoble INP/ENSIMAG Master Student, 6 months.
- 2023 **Gabriel BREHAULT**, *3D Modeling and Integration of Inverse Kinematics in a 3D Video Analysis Workflow for Athlete Movements in Boxing and Climbing*, Grenoble INP/ENSIMAG Master Student, 6 months.  
*He will start a PhD in June 2024 with my former team and TRINOMA company.*
- 2022 **Pierre MARREC**, *3D Human Mesh Reconstruction from Multi-Camera Streams: Application Case in High-Level Sports*, École normale supérieure de Lyon Master Student, 6 months.  
*He is presently visiting National Institute of Informatics of Tokyo and will start a PhD next year with my former team.*
- 2022 **Florian SCHNEIDER**, *Evaluation and Comparison of Simulation Software in High-Level Sport and Biomechanics Applications*, Institut Polytechnique de Paris Master Student, 6 months.
- 2021 **Ilyes TALBI**, *Extraction and Processing of Boxer Poses for Automatic Detection of Landed Punches.*, Institut de Statistique de Sorbonne Université Master Student, 6 months.
- 2021 **Alexandre SCHORTGEN**, *Automatic Pre-Qualification of Events Occurring in a Wrestling Match to Optimize Video Analysis*, Centrale Paris Master Student, 6 months.  
*He started a PhD in 2022 with the PerfAnalytics Project in collaboration with the INSEP in Paris.*
- 2017 - 2020 **Christian ELMO**, *Mechatronics / Instrumentation Engineer*, Symme Laboratory, Anecy, France, 3 years.  
*He pursued a PhD in Surgical Navigation and successfully completed his thesis in 2023.*
- 2018 **Aurélien BRETON**, *Finite element analyses for optimizing a humeral implant*, Polytech Anecy-Chambery Undergraduate Student, 6 months.
- 2018 **Kévin CO**, *Musculoskeletal modeling of shoulder joints*, IUT Anecy GMP Undergraduate Student, 3 months.  
*He started a PhD at the Montréal University in 2022*
- 2018 **Théo ROBERT**, *Mechanical design and construction of a cadaveric test bench.*, IUT Anecy GMP Undergraduate Student, 3 months.
- 2017 **Killian TOUR**, *Development of a test bench reproducing the specificity of shoulder stresses*, IUT Anecy GMP Undergraduate Student, 3 months.
- 2016 **Emma LEBRET**, *Feasibility study of a cadaveric test bench, designed to be transportable to anatomy laboratories*, IUT Anecy Undergraduate GMP Student, 3 months.

## Publications

- 2021 **Fayat R., Delgado Betancourt V., Goyallon, T., Petremann M., et al.**, *Inertial Measurement of Head Tilt in Rodents: Principles and Applications to Vestibular Research*, Sensors, MDPI, 2021, 21 (18), pp.6318.
- 2020 **Patents as Inventor, France.**
- Instrument for guiding a fixation member through an intramedullary rod - FR3096884A1
  - System for the distal fixation of an intramedullary rod in the shaft of a bone -FR3096881A1
  - Orthopedic implant comprising at least two parts assembled with a tightening screw -FR3096882A1
- 2020 **Patents as Inventor, Worldwide.**
- Shoulder prosthesis with modular epiphyseal part -WO2020245514A1
  - Fixation system between a medical device and at least one portion of a bone - WO2020245515A1
- 2018 **Osteosynthesis implant developpement for the treatment of proximal and mid-diaphyseal humerus fractures.** **Goyallon, T.**, *Thesis*, Supervisors : Vacher P., Vittecoq, É., Depres, C.

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## Conferences

- 2023 **Sauliere, G., Schortgen, A., Goyallon, T., Reveret, L., et al.**, "Quantifying and characterizing punches in elite boxing matches during an official competition.", ECSS 2023 - 28th Congress of the European College of Sport Science, Jul 2023.  
Paris, France
- 2023 **Vitel, V., Talbi, I., Schortgen, A., Goyallon, T., et al.**, "Detecting punches from multi-views videos data for performance analysis in elite boxing.", ECSS 2023 - 28th Congress of the European College of Sport Science, Jul 2023.  
Paris, France
- 2023 **Leroy, P., Fruchard, B., Goyallon, T., Duprat, G., et al.**, "Design of a Software Suite to Support Indexing, Annotating, and Analyzing Climbing Videos.", ECSS 2023 - 28th Congress of the European College of Sport Science, Jul 2023.  
Paris, France
- 2023 **Goyallon, T., Lahkar, B. K., Marrec, P., Dumas, R., et al.**, "Automatic Estimation of Center of Mass from Multi-Camera Video System.", CMBBE 2023 - 18th International Symposium on Computer Methods in Biomechanics and Biomedical Engineering., 3 - 5 may 2023.  
Paris, France
- 2022 **Lahkar, B. K., Goyallon, T., Chaumeil, A., Pagnon, D., et al.**, "Assessment of a markerless motion capture system for upper extremity joint kinematics during boxing." pp.153-156., 3D-AHM 2022 - 17th International Symposium of 3-D Analysis of Human Movement, Jul 2022.  
Tokyo, Japan
- 2022 **Pagnon, D., Domalain, M., Robert, T., Lahkar, B. K., Goyallon, T. et al.**, "A 3D markerless protocol with action cameras - Key performance indicators in boxing.", ECSS 2022 - 27th Congress of the European College of Sport Science, Aug 2022.  
Sevilla, Spain
- 2018 **Goyallon, T., Vacher, P., Depres, C., Goujon, L., et al.**, "4P Medicine: Towards Specialized and Preventive Medicine. Custom shoulder implant.", ORTHOMANUFACTURE 2018 - The 2nd European Congress on Implantable Technologies, 20-21 Juin 2018.  
Yverdon-les-Bains, Switzerland
- 2018 **Goyallon, T., Vacher, P., Depres, C., Goujon, L., et al.**, "The 'Clothilde' implant for treating shoulder fractures.", CNRIUT 2018 - Congrès National de la Recherche des IUT, 7-8 Juin 2018.  
Aix-en-Provence, France
- 2017 **Goyallon, T., Vacher, P., Depres, C., Goujon, L., et al.**, "A method for measuring the scapulo-humeral circumduction", swiss orthopaedics 77th Annual congress Swiss Orthopaedics, Jun 2017.  
St Gallen, Switzerland

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## Others

- 2023 **Guillaume Saulière, G., Fruchard, B., Reveret, L., Goyallon, T.**, "Boxing: How to better understand fights to assist athletes through video analysis.", The conversation France.
- 2019 **Vacher, P., Goyallon, T., Vittecoq, É., Elmo, C., et al.**, "Clothilde : Implant d'ostéosynthèse pour le traitement des fractures de l'humérus proximal et diaphysaire moyen", Projet Video.

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## Referees

- HdR, PhD, **Research Scientist**, INRIA Grenoble / Jean Kuntzmann Laboratory (LJK, UMR 5224),  
Lionel, lionel.reveret@inria.fr,  
REVRET Computer Vision and Markerless motion analysis, Supervisor from 2019 to 2024.  
Grenoble, France
- HdR, PhD, **Research Scientist**, Laboratory of biomechanics an impact mechanics (LBMC, UMR T9406),  
Thomas, thomas.robert@univ-eiffel.fr,  
ROBERT Inverse Dynamics and Biomechanics models, Collaborative work for 4 years from 2020 to 2024.  
Lyon, France
- Pr, PhD, **Professor**, SYMME laboratory, SYstème et Matériaux pour la MÉcatronique,  
Pierre, pierre.vacher@univ-smb.fr,  
VACHER Digital image correlation and Biomechanics, Thesis supervisor from 2015 to 2019.  
Annecy, France
- HdR, PhD, **Associate Professor**, SYMME laboratory, SYstème et Matériaux pour la MÉcatronique,  
Ludovic, ludovic.charleux@univ-smb.fr,  
CHARLEUX Mechanical engineering and Numerical modelling, Teaching collaborator from 2015 to 2019.  
Annecy, France