

Océane Dubois

PhD in
human-robot
interaction

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I hold a PhD in Human-Robot Interaction, specializing in the impact of wearable devices on human movement. My research focuses on understanding how these technologies influence physical performance and adaptation. Throughout my PhD, I published a paper in the *Journal of NeuroEngineering and Rehabilitation (JNER)* and presented my work at international conferences such as *ICRA 2024* and *Humanoids 2024*. Additionally, I have contributed to various workshops, including *ICRA 2024*, *JNRR 2023*, and *PMC 2022*. Moving forward, I am eager to continue exploring the dynamics of human adaptation to technological devices, with a particular interest in how different control methods can influence this process, from experimental data analysis to theoretical model development.

Educational background

- 2021–2024 **PhD Candidate at the Institute of Intelligent Systems and Robotics (ISIR), Sorbonne University, Paris**
Key words : human-exoskeleton interaction, exoskeletons, force fields, human adaptation
PhD student in robotics. Topic : *Characterizing the after-effects of wearing an upper-limb exoskeleton on inter-joint coordination*. Supervised by Nathanaël Jarrassé. Defended on the 26th of November 2024. The jury was composed of : Pr. Catherine Achard, Pr. Jan Babic, Pr. Bruno Watier, Pr. Lorenzo Masia, PhD Pauline Maurice, Pr. Agnès Roby-Brami
- 2020–2021 **Master's in Biomechanics and Bioengineering, University of Technology of Compiègne (UTC)**
Master's degree completed alongside the final year of engineering school. Graduated in September 2021.
- 2015–2021 **Engineering Degree in Computer Science, University of Technology of Compiègne (UTC)**
Specialization: Real-Time Systems and Embedded Computing. Graduated in September 2021.

Academic Experience

- 2024–present **Research Engineer, ISIR, Sorbonne University, Paris**
- 2024 **Supervision of an Intern**
Supervised a six-month intern student, Giovanni Brunelli, on the topic of *Study of Human Movement Variability with a Commercial Upper-Limb Exoskeleton*. Tasks included defining the project topic, conducting interviews, and providing guidance during the internship.
- 2021 **Final-year Internship at the Institute of Cognitive and Integrative Neurosciences of Aquitaine (INCIA), University of Bordeaux,**
Key words : prosthesis, control, neural network, virtual reality
This project transferred a prosthesis control system from virtual reality to a 7-DoF robotic arm. Using an HTC Vive Pro headset and Vive Trackers, data was gathered and applied to two control modes: teleoperation, replicating the user's joint positions, and neural network-based prediction, using contextual and kinematic data to estimate joint positions. Supervised by Aymar de Rugy. Demonstration video: <https://www.youtube.com/watch?v=AJm9vPHVdj0>
- 2018 **Internship at the Institute of Movement Sciences, Aix-Marseille University**
Key words : haptic surface, control, real-time system
The internship aimed to develop a controller leveraging the resonance of haptic surfaces to optimize resonance amplitude using acoustic levitation. By calculating real-time phase shifts between input and output signals, the controller adjusted the system's resonance frequency, even during human interaction, to maximize resonance amplitude and enhance the precision of haptic illusions. Supervised by Michaël Wiertelwski

Laboratory and Scientific Community Activities

- 2022–present **Representative of non-permanent members on the laboratory council**
Representative of non-permanent members on the laboratory council. Engaged with non-permanent members to address their concerns, facilitated the implementation of meal vouchers for interns.
- 2022–present **Member of the ISIR Gender Equality Committee**
Active member of the committee, contributing to the organization of awareness activities (e.g., International Women's Rights Day on March 8, Day Against Violence Against Women). Promoted awareness of Gender-Based and Sexual Violence (GBSV) within my team. Exhibition showcasing portraits of women working in the laboratory.
- October 2022 **Organizing Team Member for the Young Researchers in Robotics Day**
Contributed to the organization of the 2022 Young Researchers in Robotics Day (JNRR). Responsibilities included website creation, managing registrations and participation, scheduling, and overall event organization.

Teaching

- 2021–present **C Programming Language Teaching**
Teaching the C programming language at Sorbonne University and the engineering school Polytech Sorbonne University. Responsibilities included managing groups of approximately 25 students, grading assignments, and preparing exam topics.
- 2019–2021 **Teacher at Acadomia, Cholet (49) and Compiègne (60), <https://www.acadomia.fr/>**
Taught Mathematics, Physics-Chemistry, and Life and Earth Sciences to high school and middle school students.

Scientific Outreach

- 2022–present **Member of the Smart Arm Team, <https://team-sam.fr/fr/>**
Active member of the Smart Arm team, which develops an upper-limb prosthesis for transhumeral amputees and participates in the Cybathlon, an international competition showcasing assistive devices for people with disabilities. Responsibilities include coordinating training between the pilot and engineers, managing team communication (photos, videos, Instagram, and website updates). Additionally, producing a documentary on the team's journey, including interviews, project highlights, and the team's preparation for Cybathlon 2024, with a focus on the women involved in the project.
- July 2024 **Participation in TOM France Hackathon**
Developed a system to enhance autonomy and reduce fall risks for a tetraplegic person during bed-to-wheelchair transfers. Creation of a project presentation video.
- October 2023 **Fête de la Science at ISIR, Paris**
Showcased robotic prostheses to the general public as part of the 2023 Science Day Festival.
- November 2022 **Participation in Déclics, Roissy-en-Brie, Lycée Charles le Chauve**
Engaged with high school students to discuss research careers.
- October 2018 & 2019 **Fête de la Science at UTC, Compiègne**
Welcomed primary, middle, and high school students during the week and the general public on weekends. Captured event photos for future promotion.
- 2016–2018 **Fablab Monitor at UTC, Compiègne, <https://fablabutc.fr/>**
Supported students in project development and machine usage (3D printers, laser cutters, sewing machines, sticker printers). Organized training sessions and facilitated workshops.

List of publications

JOURNAL

Thesis Article (articles not yet published are in gray):

- Océane Dubois, Agnès Roby-Brami, Ross Parry, Mahdi Khoramshahi, Nathanaël Jarrassé.(2024) JcvPCA and JsvCRP : a set of metrics to evaluate changes in joint coordination strategies. Revised and re-submitted to PLOS ONE
- Océane Dubois, Giovanni Brunelli, Agnès Roby-Brami, Ross Parry, Nathanaël Jarrassé, Modification of inter-joint coordination after repetitive exposure to an exoskeleton. In preparation for *Nature Scientific Report*
- Océane Dubois, Agnès Roby-Brami, Ross Parry, Mahdi Khoramshahi, Nathanaël Jarrassé. A guide to inter-joint coordination characterization for discrete movements: a comparative study. *Journal of NeuroEngineering and*

Rehabilitation, 2023, 20 (1), pp.132. <10.1186/s12984-023-01252-2>. <hal-04225857>.

Master Articles :

- Effie Segas, Sébastien Mick, Vincent Leconte, Océane Dubois, Rémi Klotz, Daniel Cattaert, Aymar de Rugy (2023) Intuitive movement-based prosthesis control enables arm amputees to reach naturally in virtual reality *eLife* 12:RP87317

CONFERENCE PROCEEDINGS

- Océane Dubois, Agnès Roby-Brami, Ross Parry, Nathanaël Jarrassé. Identifying individual characteristics influencing post-adaptation of motor behavior in upper-limb exoskeleton users. *2024 IEEE-RAS International Conference on Humanoid Robots*, Nov 2024, Nancy, France. <hal-04812085>
- Océane Dubois, Agnès Roby-Brami, Ross Parry, Nathanaël Jarrassé. Short term after-effects of small force fields applied by an upper-limb exoskeleton on inter-joint coordination. *2024 IEEE International Conference on Robotics and Automation (ICRA 2024)*, May 2024, Yokohama, Japan. <10.1109/ICRA57147.2024.10610645>. <hal-04670953>
- Dorine Arcangeli, Océane Dubois, Agnès Roby-Brami, Sylvain Famié, Giovanni de Marco, et al.. Human Exteroception during Object Handling with an Upper Limb Exoskeleton. *Sensors*, 2023, 23 (11), pp.5158. <10.3390/s23115158>. <hal-04262204>

Skills

Languages	French (Native), English (Fluent, First Certificate of Cambridge), Italian (Intermediate, CELI3), German (Beginner)
Programming	Languages: Python, Matlab/Simulink, C, C++, bash, IA32 Assembler, SQL, Java, HTML, PHP. Frameworks: ROS, Unity, Qt, Zend Framework 1

Hobbies and Volunteering

Music and Creativity	Clarinet in conservatory and orchestra, conducting experience. Over 15 years of photography practice, including cyanotypes, collages, sewing, and drawing. I started exhibiting my work in 2024.
Sports	Running: half-marathon (1h45), marathon (3h46), trail running (100km), and triathlon.
Volunteering	Administrative support for Secours Catholique, tutoring and lessons for Cordées de l'Espoir, six months of volunteering in Southeast Asia (assisting migrants, teaching English to children).