Laurence Willemet

Postdoctoral researcher

Delft University of Technology, The Netherlands

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Education

Aix-Marseille University — *Marseille, France*

PhD in Movement Science — *2017 - 2021*

- Title: On the biomechanics of the tactile perception of friction
- Advisor: Dr. Michael Wiertlewski and Dr. Bruno Cochelin
- Lab: ISM Biorobotics team, CNRS

During my PhD, I studied how the soft skin tissues deform to allow a fast sensation of friction on initial contact and during incipient slippage in humans. This work included modelling the biomechanics of the skin deformation, conducting some psychophysical studies, and confronting the results with neuroscience knowledge. It received the recognition of the Eurohaptic Society PhD Award and is currently under review to be published by Springer.

Telecom Physique — *Strasbourg, France*

MS Degree in Bioengineering — *2015 - 2017*

- medical imaging, robotic surgery, biomechanics, visualization, real-time simulation, haptics

Mines de Saint-Etienne — *Gardanne, France*

MS Degree in Electronics and Computer Science — *2014 - 2017*

- computer science, microelectronics, embedded system, robotics, management

Preparatory class Champollion — *Grenoble, France*

Undergraduate Degree — *2012 - 2014*

- mathematics, physics, engineering science

Professional Experience

2023-now **Postdoctoral Researcher**, Physics-based Remote Touch, Computer Science and AI Lab, MIT, USA.

In July 2023, I joined Prof. Edward Adelson's team within CSAIL at MIT to work on remote touch in teleoperation. For this project, I have been awarded a Marie Curie fellowhip from the European Commission. The final goal is to create a bilateral tactile telemanipulation system, bridging the gap for touch over a distance.

2021-2023 **Postdoctoral Researcher**, Role of the sense of touch in manipulation, Cognitive Robotics, Delft University of Technology, The Netherlands.

For one year after my PhD, I have been working as a postdoctoral researcher within the Human-Robot Interaction group of the Mechanical Faculty of TU Delft. I believe that finding the primitives of touch is the key to enable dexterous manipulation in soft robots. Therefore, I am currently working on grip force regulation in robotics in the quest of finding a compact representation of the deformation to distil tactile features.

2017 **Research Assistant**, Surgeon-Robot interaction during manipulation task, Nearlab, Politecnico di Milano, Italy

2016 **Research Assistant**, Connected table with sensors for gesture recognition, ISORG, Grenoble, France

2015 **Research Assistant**, Optimization of an innovative computer algorithm using JAMs molecules displacements for cancer detection, Centre de Recherche en Cancéroogie, Marseille, France

Publications

Published

Willemet, L, Kanzari, K, Monnoyer, J, Birznieks, I, Wiertlewski, M. 2021. Initial contact shapes the perception of friction. Proceedings of the National Academy of Sciences 118, no. 49.

Boonstra, D*, **Willemet, L***, Luijkx, J, Wiertlewski, M. 2024. Learning to estimate incipient slip with tactile sensing to gently grasp objects. ICRA 2024, Yokohama, Japan.

Willemet, L, Roel, F, Abbink, D, Birznieks, I, Wiertlewski, M. 2024. Grip force control under sudden change of friction. Journal of Physiology

Willemet, L, Huloux, N, Wiertlewski, M. 2023. Efficient tactile encoding of object slippage. Scientific Reports, 12 (1), 13192

Willemet, L, 2022. The Biomechanics of the Tactile Perception of Friction. Springer Nature.

Scharff, R, Boonstra, DJ, **Willemet, L**, Lin, X, Wiertlewski, M. 2022. Rapid manufacturing of color-based hemispherical soft tactile fingertips. International Conference on Soft Robotics, pp. 896-902.

Huloux, N, **Willemet, L**, Wiertlewski, M. 2021. How to measure the real area of contact of skin on glass. IEEE Transactions on Haptics, vol. 14, no. 2, pp. 235-241.

Monnoyer, J, **Willemet, L**, Wiertlewski, M. 2023. Rapid change of friction causes the illusion of touching a receding surface. Journal of the Royal Society Interface, 20(199), p. 20220718.

Lin, X, **Willemet, L**, Bailleul, A, Wiertlewski, M. 2020. Curvature sensing with a spherical tactile sensor using the color-interference of a marker array. ICRA 2020, Paris, France, pp. 603-609.

Under Review or in preparation

Willemet, L, Wiertlewski, M. A skin deformation model explaining frictional interaction in grasp and touch.

Willemet, L, Wiertlewski, M, Edward Adelson. Radial expansion of the skin causes a tactile illusion of slipperiness.

Awards

2024	**Best Work-in-progress.**, 2024 EuroHaptics conference	*$ 500*
2024	**Research Slam - 1st jury prize and audience prize.**, MIT, USA	*$ 900*
2021	**Best thesis award in Human Movement Sciences.**, Aix-Marseille University, France	*$ 1000*
2022	**Best thesis award, Hamburg, Germany**, 2022 Eurohaptics conference	*$ 1,000*
2021	**Best paper award, Montreal, Canada**, 2021 Worldhaptics conference	*$ 1,000*

Presentations

2024. *Remote Touch for Teleoperation*. Research SLAM: MIT, Cambridge, USA.

2024. *Skin expansion can produce an illusion of slipperiness*. Work-in-progress poster: EuroHaptics, Lille, France.

2024. *The tactile perception of friction in humans and robots*. Class: MIT, Cambridge, USA.

2022. *Delicate robotic grasping from tactile estimates of friction*. Demonstration: European Robotics Forum, Rotterdam, The Netherlands.

2022. *Getting a grip on the tactile perception of friction in humans and robots*. Invited talk: neuTouch project, University of Groningen, The Netherlands.

2022. *The minute displacements of the skin that carry frictional information for grip regulation*. Invited talk: Université Catholique de Louvain, Belgium.

2021. *On the biomechanics of the perception of friction*. PhD defense, Aix-Marseille University. Online recording

2019. *The Neuroscience of Touch: from finger skin deformation to perception*. Invited talk: Workshop WorldHaptics 2019, Tokyo, Japan.

2019. *Mind the spatiotemporal gap: Skin viscoelasticity limits our perception of discontinuous motion.* Willemet, L, Cochelin, B, Wiertlewski, M. Work-in-progress poster: WorldHaptics, Tokyo, Japan.

Teaching Experience

2021-2022 **Human-Robot Interaction**, Teaching Assistant (*) · Delft University of Technology
2018-2020 **Digital skills**, Teaching Assistant (*) · Faculty of sport science, Aix-Marseille University

Teaching assistant position includes weekly frontal tutorials, office hours, assignments grading, preparing the frontal tutorials content, handouts, assignments, and preparing and grading the final exams.

Mentoring

2022-2023 **Pepijn Bogaard (MSc)**, Tactile sensing for pivoting motion control
2022-2023 **Coco Langens (MSc)**, Designing a controller for gentle robotic grasping
2021-2022 **Felix Roel (MSc)**, A Soft Touch on Efficient Neuromuscular Control of the Precision Grip (graduated with an 8.5/10)
2021-2022 **Dirk-Jan Boonstra (MSc)**, Learning to predict the proximity of slip using high-resolution tactile sensing (graduated with an 8.5/10)
2019-2020 **Khoubeib Kanzari**, Effect of friction modulation on skin deformation

Outreach & Professional Development

Service and Outreach

2023 **Science activities for children with disabilities**, Teacher *France*
2018-2019 **Professional Association for PhD students' insertion**, Treasurer *France*
2016 **Solidarity project · french lessons in primary school**, Volunteer *Burkina Faso*
2015 **Student Association of science popularization**, President *France*
2014 **Solidarity project · greenhouses building for rural communities**, Volunteer *Bolivia*

Peer Reviews

PNAS $_{24}$, Royal Society Interface $_{23}$, International Journal of Robotics Research $_{23}$, ICRA $_{24}$, Biorob $_{24}$, International Symposium on Mixed and Augmented Reality $_{22}$, EuroHaptics $_{22,24}$, Haptic Symposium $_{22}$, Robotics and Automation Letters $_{21}$, Autonomous Robots $_{21}$, IEEE Transactions on Haptics $_{21,22,22,23}$, IEEE Transactions on Mechatronics $_{20}$

Professional Memberships

IEEE Member and Young professionals: 95784517