Thomas Corbères

Age: 29
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PROFILE

Postdoctoral researcher at the University of Edinburgh, within the Institute of Perception, Action and Behaviour. My research focuses on legged locomotion in humanoid and quadruped robots, with a focus on control, motion planning, and reinforcement learning.

EDUCATION

2021-2024 **Ph.D. Informatics, IPAB** The University of Edinburgh
Supervised by Dr. Steve Tonneau and Dr. Thomas Flayols.
Real-time synthesis of legged locomotion maneuvers in complex, unstructured environments. Developed and integrated a fully autonomous locomotion pipeline including perception, motion and contact planning, and reactive control (Video link). Investigated hybrid approaches combining reinforcement learning and trajectory optimization.
Acquired diverse technical skills: real-time control, perception, motion planning under time constraints, and hardware/software integration. Acted as an effective manager for a demonstration as part of the H2020 MEMMO project, collaborating with the University of Oxford, LAAS-CNRS, and the University of Edinburgh.

2016-2020 **French Graduate School of Aeronautics and Space,** ISAE-SUPAERO
A highly selective three year program leading to a French master's degree, with a multidisciplinary curriculum in Computer Science, Applied Mathematics, and Physics. Specialized in Signals & Systems and Advanced Control Engineering, with a focus on Autonomous Systems, Robotics, Navigation, and Perception.

2014-2016 **Preparatory classes,** Montaigne (Bordeaux)
Two-year intensive program in mathematics, physics, and engineering, preparing for national entrance exams to French Grandes Écoles. Equivalent to a bachelor's level curriculum.

EXPERIENCE

2024-2025 **The University of Edinburgh,** Postdoctoral researcher
In collaboration with Steve Tonneau. This part of my research focuses on differentiable reinforcement simulators, contact-implicit simulations, and reinforcement learning.

2020 **LAAS-CNRS,** 6 months internship (Toulouse, France)
Master's thesis under the supervision of Nicolas Mansard. Implementation of a Model Based Predictive Controller for a quadruped robot using a reduced model dynamics, leading to the following publication [1].

2019 **THALES,** 6 months internship (Mérignac, France)
Internship within the Thales Innovation Laboratory. Contributed to the prototyping of an avionics system page for the FlytX touchscreen cockpit using Qt/QML.

2018 **AIRBUS D&S,** 5 months internship (Toulouse, France)
Internship within the the SCAO department -Attitude control system and Orbit-.
Conducted a study on noise transmission in the control loop of an E2000+ family satellite.

SKILLS

Programming

OS : Linux, Windows
Languages : Python, C++, Jax, PyTorch
Frameworks : Crocoddyl, Pinocchio, Mujoco

Languages

English : Fluent
Spanish : Level B1

PUBLICATIONS

[1] Thomas Corbères, Thomas Flayols, Pierre-Alexandre Léziart, Rohan Budhiraja, Philippe Souères, Guilhem Saurel, and Nicolas Mansard. "Comparison of predictive controllers for locomotion and balance recovery of quadruped robots". In *2021 IEEE International Conference on Robotics and Automation (ICRA)*, pages. 5021-5027, 2021.

[2] Fanny Risbourg[1], Thomas Corbères[1], Pierre-Alexandre Léziart, Thomas Flayols, Nicolas Mansard, and Steve Tonneau. "Real-time footstep planning and control of the solo quadruped robot in 3d environments". In *2022 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pages 12950-12956, 2022. [1]Joint first authors

[3] Pierre-Alexandre Léziart, Thomas Corbères, Thomas Flayols, Steve Tonneau, Nicolas Mansard, and Philippe Souères. Ïmproved control scheme for the solo quadruped and experimental comparison of model predictive controllers". *IEEE Robotics and Automation Letters (RA-L)*, 7(4):9945-9952, 2022.

[4] Carlos Mastalli, Saroj Prasad Chhatoi, Thomas Corbères, Steve Tonneau, and Sethu Vijayakumar. Ïnverse-dynamics mpc via nullspace resolution". *IEEE Transactions on Robotics (TRO)*, 39(4):3222-3241, 2023.

[5] Jaehyun Shim, Carlos Mastalli, Thomas Corbères, Steve Tonneau, Vladimir Ivan, and Sethu Vijayakumar. Topology-based mpc for automatic footstep placement and contact surface selection. In *2023 IEEE International Conference on Robotics and Automation (ICRA)*, pages 12226-12232, 2023.

[6] Thomas Corbères, Carlos Mastalli, Wolfgang Merkt, Ioannis Havoutis, Maurice Fallon, Nicolas Mansard, Thomas Flayols, Sethu Vijayakumar, and Steve Tonneau. "Perceptive locomotion through whole-body mpc and optimal region selection". *IEEE Access* 2024.

[7] Gianni Lunardi, Thomas Corbères, Carlos Mastalli, Nicolas Mansard, Thomas Flayols, Steve Tonneau, and Andrea Del Prete. Reference- free model predictive control for quadrupedal locomotion. *IEEE Access*, 12:689-698, 2024.

[8] Thomas Corbères. A Complete Framework for Agile Quadruped Locomotion: Integrating Real-Time Control, Planning, and Perception in Multi-Contact Environments. PhD thesis, The University of Edinburgh, 2024.