

**PROFILE**

Alan Turing Fellow - Researcher Associate at University of Edinburgh.  
Strong background in numerical optimization and control, and significant hands-on experience on legged robots.

**RESEARCH INTERESTS**

**Robotics** motion planning and control, legged robotics, and rigid-body dynamics.  
**Artificial Intelligence** model predictive control, numerical optimization, and machine learning.

**EDUCATION**

**Ph.D. in Bioengineering and Robotics** January 2014 - April 2017  
Istituto Italiano di Tecnologia & Università degli Studi di Genova.

- Thesis: Planning and Execution of Dynamic Whole-Body Locomotion on Challenging Terrain.
- Advisor: Dr. Ioannis Havoutis, Dr. Claudio Semini and Prof. Darwin G. Caldwell

**M.Sc. in Mechatronic Engineering** GPA 4.85/5 September 2009 - June 2013  
Mechatronic Group at Simón Bolívar University, Venezuela (2-year program)

- Thesis: Learning from Demonstration using Dynamic Movement Primitives in Excavator Robots (Outstanding Mention).
- Advisor: Prof. Gerardo Fernández-López

**WORK EXPERIENCE**

**University of Edinburgh - Alan Turing Institute**  
**Research Associate**

October 2019 - to date

- Direct-indirect hybridization of differential dynamic programming algorithms.
- Model predictive control on legged robots.
- Project manager of Crocoddyl team (EU MEMMO partners).
- Learning gait policies in legged locomotion.
- Working on EU MEMMO and ORCAHUB projects.

**LAAS - CNRS**

**Postdoc Researcher**

November 2017 - October 2019

- Highly efficient multi-contact optimal control.
- Learning a memory of motion to warm-start optimal control solvers.
- Fastest multi-contact optimal control library called [Crocoddyl](#).
- Whole-body control using passivity paradigm.
- Working on EU MEMMO project.

**Istituto Italiano di Tecnologia**

**Research Fellow**

January 2014 - November 2017

- Simultaneous gait and motion planning through mixed-integer optimization.
- Footstep and motion planning through stochastic search.
- Framework for quadrupedal locomotion on challenging terrain.
- Software architecture designer for perception, planning and control on the HyQ team.
- Mechatronic support on robot design.

**Simon Bolivar University**

**Lecturer**

April 2012 - March 2014

- Teaching control system for undergraduate students.
- Developing of a general purpose software for Model Predictive Control.

## SKILLS

## Robotics and Computer Science

- Motion planning, trajectory optimization and optimal control.
- Numerical optimization: nonlinear, stochastic, convex and mixed-integer optimization.
- Whole-body control, rigid-body dynamics and torque control.
- Machine learning, robot learning and reinforcement learning.
- State estimation, terrain mapping and computer vision.

## Mechatronics and Software

- C++, Python and Matlab (more than 10 years of experience).
- Robot middle-wares (ROS, LCM, YARP) and real-time systems (Xenomai).
- Open-source (Boost, OpenCV, PCL, Octomap, Pinocchio, Gazebo, and Bullet).
- Revision control tools (GIT, SVN and HG).
- Linux and OSX development environment.

## Soft-skills

- Self-motivation, self-confidence, optimism and divergent thinking.
- Questioning, introspection and organization.
- Open to feedback, idea exchange and persuasion.
- Mentoring, public speaking and humour.

## LANGUAGES

English (fluent), Spanish (native), Italian (fluent), French (beginner)

## ACADEMIC VISITS

Visiting researcher

2016

Agile and Dexterous Robotics Lab (ADRL), ETH Zurich, Switzerland.

## INVITED TALKS

RSS'19 workshop

June 22nd 2019

Workshop on Numerical optimization for Online multi-contact Motion Planning and control, Freiburg, Germany

- Title: Highly dynamic maneuvers computed by feasible-prone DDP.

Oxford Research Institute

December 1st 2017

University of Oxford, Oxford, UK

- Title: Motion planning for legged locomotion on challenging terrain.

Gepetto Team

April 28th 2017

LAAS, CNRS, Toulouse, France

- Title: Planning and execution of dynamic whole-body locomotion on challenging terrain.

## AWARDS

- Master thesis with Outstanding Mention. Simón Bolívar University. 2013.

## PUBLICATIONS

- [1] **C. Mastalli**, R. Budhiraja, W. Merkt, G. Saurel, B. Hammoud, M. Naveau, J. Carpentier, S. Vijayakumar and N. Mansard, [Crocoddyl: An Efficient and Versatile Framework for Multi-Contact Optimal Control](#). IEEE International Conference on Robotics and Automation (ICRA), 2020.
- [2] T.S. Tembono, **C. Mastalli**, P. Fernbach, N. Mansard and S. Calinon, [Learning How to Walk: Warm-starting Optimal Control Solver with Memory of Motion](#). International Conference on Robotics and Automation (ICRA), 2020.
- [3] K. Giraud, P. Fernbach, **C. Mastalli** and O. Stasse, [Motion Planning with Multi-Contact and Visual Servoing on Humanoid Robots](#). International Symposium on System Integration (SII), 2020.
- [4] **C. Mastalli**, I. Havoutis, M. Focchi, D. G. Caldwell and C. Semini, [Motion planning for quadrupedal locomotion: coupled planning, terrain mapping and whole-body control](#). (under-review).
- [5] **C. Mastalli\***, S Fahmi\*, M. Focchi, C. Semini, [Passivity Based Whole-body Control for Quadruped Robots: Experimental Validation over Challenging Terrain](#). IEEE Robotics and Automation Letters (RAL), 2018.
- [6] R. Budhiraja, J. Carpentier, **C. Mastalli**, N. Mansard, [Differential Dynamic Programming for Multi-Phase Rigid Contact Dynamics](#). IEEE International Conference on Humanoid Robots (ICHR), 2018.
- [7] M. Focchi, R. Orsolino, V. Barasuol, **C. Mastalli**, D. G. Caldwell and C. Semini, [Heuristic Planning for Rough Terrain Locomotion in Presence of External Disturbances and Variable Perception Quality](#). Springer Tracts in Advanced Robotics (STAR), 2018.
- [8] **C. Mastalli**, M. Focchi, I. Havoutis, Buchli, Jonas D. G. Caldwell and C. Semini, [Trajectory and Foothold Optimization using Low-Dimensional Models for Rough Terrain Locomotion](#). IEEE International Conference on Robotics and Automation (ICRA), 2017.
- [9] B. Aceituno-Cabezas, **C. Mastalli**, H. Dai, M. Focchi, A. Radulescu, D. G. Caldwell, J. Cappelletto, J. C. Grieco, G. Fernandez-Lopez and C. Semini, [Simultaneous Contact, Gait and Motion Planning for Robust Multi-Legged Locomotion via Mixed-Integer Convex Optimization](#). IEEE Robotics and Automation Letters (RAL), 2017.
- [10] R. Orsolino, M. Focchi, **C. Mastalli**, H. Dai, D. G. Caldwell, and C. Semini, [Application of Wrench based Feasibility Analysis to the Online Trajectory Optimization of Legged Robots](#). IEEE Robotics and Automation Letters (RAL), 2018.
- [11] **C. Mastalli**, I. Havoutis, M. Focchi, D. G. Caldwell and C. Semini, [Hierarchical Planning of Dynamic Movements without Scheduled Contact Sequences](#). IEEE International Conference on Robotics and Automation (ICRA), 2016.
- [12] **C. Mastalli**, I. Havoutis, A. W. Winkler, D. G. Caldwell and C. Semini, [On-line and On-board Planning and Perception for Quadrupedal Locomotion](#). IEEE International Conference on Technologies for Practical Robot Applications (TEPRA), 2015.
- [13] A. W. Winkler, **C. Mastalli**, I. Havoutis, M. Focchi, D. G. Caldwell and C. Semini, [Planning and Execution of Dynamic Whole-Body Locomotion for](#)

a Hydraulic Quadruped Robot on Challenging Terrain. IEEE International Conference on Robotics and Automation (ICRA), 2015.

- [14] **C. Mastalli** and G. Fernandez-Lopez, [A Proposed Architecture for Autonomous Operations in Backhoe Machines](#). International Conference on Intelligent Autonomous Systems (IAS), 2015.
- [15] R. Jamisola and **C. Mastalli**, [Bio-inspired holistic control through modular relative Jacobian for combined four-arm robots](#). International Conference on Advanced Robotics (ICAR), 2017.
- [16] N. Certad, **C. Mastalli**, J. Cappelletto and J. C. Grieco, [Extracting Points Features from Laser Rangefinder Data Based on Hough Transform](#). IEEE Andean Regional Conference (ANDESCON), 2014.
- [17] **C. Mastalli**, D. Ralev, N. Certad and G. Fernández-López, [Asymptotic Stability Method for PID Controller Tuning in a Backhoe Machine](#). Dynamic and System Conference, 2013.
- [18] **C. Mastalli**, J. Cappelletto, R. Acuña, A. Terrones and G. Fernández-López, [An Imitation Learning Approach for Truck-Loading Operations in Backhoe Machines](#). International Conference on Climbing and Walking Robots and The Support Technologies for Mobile Machines (CLAWAR), 2012.

**PEER-REVIEW ACTIVITIES** TMECH, RAL, ICRA, IROS, Humanoids, ASME Dynamic and System Conference.

**WORKSHOP ORG.** **Robotics: Science and Systems 2019**  
R. Orsolino, **C. Mastalli**, M. Focchi and N. Mansard. [Workshop on Numerical optimization for Online multi-contact Motion Planning and control](#)