

LAAS-CNRS, [Gepetto Team](#)carlos.mastalli@gmail.com or (+33) 76 758 1484. Citizenship: Italian & Venezuelan**PRESENT
OCCUPATION**

Postdoc Researcher at at Gepetto Team, LAAS-CNRS.

PROFILE

Researcher with strong background in optimization and control, and significant hands-on experience on torque-controlled legged robots.

**RESEARCH
INTERESTS****Robotics** whole-body motion planning and control, legged locomotion and perception for motion planning.**Artificial Intelligence** optimal control, optimization, and machine learning for motor control. (see this [video](#) for more details about my research interest).**EDUCATION****PhD in Bioengineering and Robotics** January 2014 - April 2017
Istituto Italiano di Tecnologia & Università degli Studi di Genova.

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

B.Sc. in Mechanical Engineering. GPA 7.49/9 September 2003 - December 2008
Antonio José de Sucre National Experimental Polytechnic University, Venezuela, (5-year program)
Graduated rank 1st/34. Acknowledgements as the best internship thesis.**WORK
EXPERIENCE****Research Fellow** April 2017 - November 2017
Dynamic Legged Systems lab, Department of Advanced Robotics, Istituto Italiano di Tecnologia, Italy

- Research and development about motion planning and control methods for legged locomotion on challenging terrain.
- Develop of software framework for perception, planning and control for quadrupedal robots.
- Develop a software toolbox for easy prototyping (c++ with python bindings) optimization, robotics, planning, control and visualization.

Lecturer April 2012 - March 2014
Mechatronic Group, Process and Systems Department, Simón Bolívar University, Venezuela

- Teaching activities about control system for undergraduate students.

Courses taught: Control Systems I, Control Systems II and Control Lab.

- Develop of general purpose software for Model Predictive Control.

Academic Assistant September 2009 - April 2012
Process and Systems Department, Simón Bolívar University, Venezuela

- Teaching and preparation activities in Control Labs for undergraduate students in Electrical, Chemical and Electronic Engineering.

Design Engineer

March 2009 – September 2009

Design and Development Department, Industrias Climáticas, Venezuela

- Design and installation of air-conditioned machines, e.g. evaporative, condenser, compact and chillers units.

Classroom Assistant

2005-2008

Mechanical Engineering Department, Antonio José de Sucre National Experimental Polytechnic University, Venezuela

- Worked as an classroom assistant in activities of Applied Mathematics course for Mechanical Engineering students.

TECHNICAL SKILLS

Robotics and Computer Science

- Practical and theoretical knowledge on Robotics, Optimization and Optimal Control (e.g. Ipopt, qpOASES, QuadProg and CMAES), Motion Planning, Robot Learning, Whole-body Control, Perception Systems and Machine Learning.
- Programming languages: C++, Python, Matlab, SWIG and object-oriented design (more than 6 years of experience).
- Proficiency in Robot Operating System (ROS), Lightweight Communications and Marshalling (LCM), and Simulation Laboratory (SL).
- Practical experience on real-time systems (i.e. Xenomai).
- Proficiency in OpenCV, PCL, Gazebo and SL.

Electronic Systems

- Practical and theoretical knowledge on Signal Processing, Digital Electronics, Power Electronic, Instrumentation, Computer Architecture and Electro-Mechanic Actuators.
- Practical experience in programming electronic hardware on VHDL, PIC Basic Pro and PLC Siemens.

Mechanical Systems

- Practical and theoretical knowledge on Hydraulic and Pneumatic Systems, Mechanical Design.
- Proficiency in standard mechanics software: SolidWorks, Inventor, AutoCAD, MSC Nastran, ANSYS, Working Model 3D, MAPLE and Simulink.
- Theoretical knowledge on Mechanical Fatigue and Heat Transfer.

Tools for Project Management

- Proficiency in Linux, OSX and Window based development environment.
- Proficiency in revision control system like GIT, SVN, and HG.
- Proficiency in software for object-oriented design like DIA.
- Basic knowledge of continuous integration tools (e.g. Travis)
- Ability to independently develop software development plans, including timeliness and test procedures.
- Comfortable with abrupt changes to project deadlines and job responsibilities.

LANGUAGES SKILLS

Spanish: Native Language.

English: Proficient in speech, writing and reading.

Italian: Proficient in speech, writing and reading.

Japanese: Basic level in speech, and reading.

RESEARCH PORTFOLIO

Dynamic Legged Locomotion

2014-2016

Develop of an open-source library called “[Dynamic Whole-body Locomotion \(DWL\)](#)” for dynamic legged locomotion. This library contains different modules such as: rigid body kinematics and dynamics, optimization solvers, path planning solvers, and terrain perception. The library includes python bindings of the core functionalities.

Software Framework for Locomotion

2014-2016

Contribute different modules of the DLS lab software framework such as: real-time control through ROS and SL, robot descriptions for simulation and control (e.g [HyQ](#), [HyQ2Max](#), HyA, and Centaur), planning and simulation abstractions, communication interfaces through ROS and LCM, and a library for locomotion (i.e. DWL).

MPC for Robotics

2013

Develop of an open-source library of [Model Predictive Control \(MPC\)](#) over ROS. This MPC framework is developed to solve the different control problems in robotics.

Robot learning in backhoe machines

2010-2012

Develop of a robot learning approach, i.e. learning from demonstration, to make autonomous tasks in backhoe machines. Other components are developed for autonomous backhoe machines: control system, localization system and perception system.

Design a waste compactor machine

March-August 2008

Design and automation of a waste compactor machine to PEPSI-COLA VENEZUELA C.A., the project involved the design of: compression chamber and hydraulic unit (hydraulic circuits, reservoir and manifold), and automation of the machine with a PLC.

ACADEMIC VISITS

Visiting researcher

July - September 2016

[Agile and Dexterous Robotics Lab \(ADRL\)](#), ETH Zurich, Switzerland.

ACADEMIC HONOURS

- Master thesis. Approved with Outstanding Mention. Simón Bolívar University. 2013.
- Acknowledgement as the best internship thesis. Antonio José de Sucre National Experimental Polytechnic University. 2008.

INVITED TALKS

Oxford Research Institute

December 1st 2017

University of Oxford, Oxford, UK

- Thesis title: Motion planning for legged locomotion on challenging terrain.

Gepetto Team

April 28th 2017

LAAS, CNRS, Toulouse, France

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

PEER-REVIEW ACTIVITIES

TMECH, RAL, ICRA, IROS, Humanoids, ASME Dynamic and System Conference.

PUBLICATIONS

- [1] **C. Mastalli**, I. Havoutis, M. Focchi, D. G. Caldwell and C. Semini, [Motion planning for challenging locomotion: a study of decoupled and coupled approaches](#). The International Journal on Robotics Research (IJRR), (under-review).

- [2] **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.
- [3] 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.
- [4] R. Orsolino, M. Focchi, **C. Mastalli**, H. Dai, D. G. Caldwell, and C. Semini, [A New Feasibility Metric for Trajectory Optimisation of Legged Robots using Wrench Polytopes](#). IEEE Robotics and Automation Letters (RAL), (under-review).
- [5] **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.
- [6] **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.
- [7] 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.
- [8] **C. Mastalli** and G. Fernandez-Lopez, [A Proposed Architecture for Autonomous Operations in Backhoe Machines](#). International Conference on Intelligent Autonomous Systems (IAS), 2015.
- [9] 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.
- [10] **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.
- [11] **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, pp. 821–830.

EXTRA-CURRICULAR ACTIVITIES

- Member of the international group SGAC-Latin “Latin Space Generation” attached to a program of the United Nations UN (since 2008 until 2012).
- Founder and Head of Technical of the F-SAE Group of Antonio José de Sucre National Experimental Polytechnic University UNEXPO (since 2007 until 2008).