

Martin DE LASA

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EDUCATION

- OCT 2010 PHD, COMPUTER SCIENCE, **University of Toronto**, Toronto, ON, CANADA
SEPT 2005 Thesis: *Feature-Based Control of Physics-Based Character Animation*
Advisor: Dr. Aaron HERTZMANN | CGPA: 3.88
* 2011 Canadian Artificial Intelligence Association (CAIAC) Doctoral Dissertation Award
- SEPT 2000 MESC, ELECTRICAL AND COMPUTER ENGINEERING, **McGill University**, Montreal, QC, CANADA
SEPT 1998 Thesis: *Dynamic Compliant Walking of the Scout II Quadruped*
Advisor: Dr. Martin BUEHLER | CGPA: 3.60
- APRIL 1998 BSC, COMPUTER SCIENCE, **University of Western Ontario**, London, ON, CANADA
SEPT 1995 Honors with Distinction | CGPA: 3.88
- APRIL 1998 BENG, MECHANICAL ENGINEERING, **University of Western Ontario**, London, ON, CANADA
SEPT 1993 Honors with Distinction | CGPA: 3.87

EXPERIENCE

- Current* **Senior Software Engineer, Autodesk Canada**, Toronto, ON, CANADA
JULY 2010 As part of the Animation Solutions team, my role is to bridge the gap between research and advanced development with the mandate of improving Autodesk's animation tools.
- OCT 2010 **Research Assistant, University of Toronto**, Toronto, ON, CANADA
SEPT 2005 Proposed and demonstrated new control approach for simulated physics-based characters. This involved developing a novel optimization algorithm and low-dimensional planner for rough-terrain locomotion. Results of this kind had not been previously demonstrated.
- To enable this work, I implemented a generalized-coordinate articulated rigid-body dynamics simulator with support for: constraint-based contact, inverse dynamics, automatic differentiation, and Jacobian computation. This simulator is currently being used across several research projects.
- JULY 2010 **Principal, MDL Consulting**, Toronto, ON, CANADA
SEPT 2005 Provided engineering consulting services in the areas of real-time software systems, articulated rigid-body dynamic simulation, and software design/implementation/performance optimization.
- SEPT 2005 **Technical Lead and Architect, Boston Dynamics**, Cambridge, MA, USA
SEPT 2003 Led company wide real-time software development activities in support of numerous DARPA robotics projects (approx. \$20M USD funding). Resulting low-level hardware drivers, logging, communications, and controls infrastructure software are currently used across all company robots. Highlights include:
- Led team of 4 while maintaining active technical role; managed team remotely for 1 year
 - Designed and implemented end-user API for closed-loop control of robots over WiFi
 - Refactored inherited codebase while ensuring in-house projects proceeded on schedule
 - Played key role in timely delivery of *LittleDog* to DARPA Learning Locomotion teams

Led development of Digital Biomechanics, BD's physics-based simulation tool. Digital Biomechanics is used to simulate robots and virtually prototype new human borne equipment (e.g., helmets and backpacks). Digital Biomechanics customers include SONY, the US Army, and US Marines. Highlights include:

- Led refactoring and performance optimization efforts; achieved speedup of over 400 %
- Worked with VP Engineering to coordinate development with in-house simulation activities
- Provided feasibility assessments for numerous project proposals
- Provided ongoing feedback to technical staff and conducted annual performance reviews

SEPT 2003 **Simulation Engineer, Boston Dynamics**, Cambridge, MA, USA

Nov 2000 Played a key role developing Digital Biomechanics (see above), helping to secure funding for on-going product development (approx. \$2M USD). Highlights include:

- Key contributor to product design and architecture, including core product libraries
- Coordinated software releases, wrote documentation, and delivered training seminars
- Supported peers formally and informally (brainstorming, clarifying requirements, etc.)
- Extended product architecture to concurrently simulate virtual characters and equipment
- Developed novel contact model from experimental material property measurements
- Implemented virtual-human control algorithms (walking, running, crawling, squatting)
- Validated walking simulations against US Army load carriage studies

FEB 2000 **Software Engineer Contractor, McGill University**, Montreal, QC, CANADA

DEC 1999 Designed and implemented backend e-commerce site software as case study for undergraduate software engineering course. Highlights include:

- Researched existing e-commerce tools and methodologies
- Modeled e-commerce architecture using UML
- Designed and implement persistent back end shopping cart server (SCS)
- Integrated SCS with sample e-commerce site to demonstrate chosen design

OCT 1997 **Director, Discovery Western Engineering & Science Camp**, London, ON, CANADA

OCT 1996 Ran engineering science camp and workshop program for children between grades 6-10.

- Raised and managed camp finances (budget \$115,000)
- Recruited and trained staff (8 employees, 1 volunteer)
- Prepared and coordinated promotional media campaign
- Determined curriculum direction and guided staff in workshop/program preparation

PUBLICATIONS REFEREED JOURNAL ARTICLES

M. de Lasa, I. Mordatch, and A. Hertzmann, *Feature-Based Locomotion Controllers*, ACM Transactions on Graphics, 2010, 29, 3, PROC. SIGGRAPH

I. Mordatch, **M. de Lasa**, and A. Hertzmann, *Robust Physics-Based Locomotion Using Low-Dimensional Planning*, ACM Transactions on Graphics, 2010, 29, 3, PROC. SIGGRAPH

REVIEWED CONFERENCE PAPERS

M. de Lasa and A. Hertzmann, *Prioritized Optimization for Task-Space Control*, IROS, St. Louis, MO, Oct 11-15, 2009

A. Layon, **M. de Lasa**, R. Playter, S. Talebi, M. LaFiandra, *Validation of a Load Carriage Simulation*, SAE Digital Human Modeling for Design and Engineering Symposium, Rochester, MI, June 15-17, 2004

T. Yamamoto, M. Fujita, **M. de Lasa**, S. Talebi, D. Jewell, R. Playter, M. Raibert, *Development of Dynamic Gaits for the AIBO Entertainment Robot: Teaching a New Dog Old Tricks*, Proceedings CLAWAR 2001, pp. 695-702, Karlsruhe, Germany, Sept 24-26, 2001

M. de Lasa and M. Buehler, *Dynamic Compliant Quadruped Walking*, ICRA 2001, pp 3153-3158, Seoul, Korea, May 21-26, 2001

M. de Lasa and M. Buehler, *Dynamic Compliant Walking of a Quadruped Robot: Preliminary Experiments*, CLAWAR 2000, Madrid, Spain, Oct 2-5, 2000

POSTERS

Full-Body Locomotion Control By Low-Dimensional Planning, Frontiers in Computer Vision, Cambridge, MA, Aug 21-24, 2011

Full-Body Locomotion Control By Low-Dimensional Planning, Dynamic Walking 2011, Jena, Germany, July 18-21, 2011

Dynamic Compliant Walking, International Symposium of Robotics (ISR), Montreal, QC, May 14-18, 2000

INVITED TALKS FEATURE-BASED LOCOMOTION CONTROLLERS

AUTODESK CANADA INC, Toronto, ON, Jan 19, 2011

UNIVERSITY OF ONTARIO INSTITUTE OF TECHNOLOGY, Oshawa, ON, Sept 22, 2010

SIGGRAPH, Los Angeles, CA, July 29, 2010

PIXAR ANIMATION STUDIOS, Emeryville, CA, Feb 11, 2010

PRIORITIZED OPTIMIZATION FOR TASK-SPACE CONTROL

IROS, St. Louis, MO, Oct 15, 2009

ARTICULATED RIGID-BODY DYNAMICS

UNIVERSITY OF TORONTO, Oct 19, 2010

UNIVERSITY OF TORONTO, Oct 21, 2008

DYNAMIC COMPLIANT WALKING OF THE SCOUT II QUADRUPED

BOSTON DYNAMICS INC, Cambridge, MA, Oct 1 2000

MEDIA *Walk like a human*, New Scientist, pp. 18-19, Aug 7, 2010

Putting the "real" in virtual reality, ComputerWorld, 15, 12, June 18, 1999

Building a better robot, McGill Reporter, 32, 18, July 27, 2000

PATENTS T. Yamamoto, **M. de Lasa**, S. Talebinejad, D. Jewell, R. Playter, M. Raibert, *Robot apparatus and method for controlling jumping of robot device*, US patent 6,484,068, SONY Corp and Boston Dynamics Inc, 2001

PROFESSIONAL ACTIVITIES CONFERENCE PROGRAM COMMITTEES

ACM/Eurographics Symposium on Computer Animation (SCA) 2011

JOURNAL REVIEWING

IEEE Computer Graphics & Applications (2010)

CONFERENCE REVIEWING

ACM SIGGRAPH (2011, 2010, 2009, 2007, 2006)

ACM SIGGRAPH ASIA (2011, 2010, 2008)

International Conference on Robotics and Automation (ICRA) (2001)

AWARDS Canadian Artificial Intelligence Association (CAIAC) Dissertation Award, 2011
BEST CANADIAN DOCTORAL DISSERTATION IN ARTIFICIAL INTELLIGENCE

NSERC PGS-D Scholarship, 2007

\$42,000 OVER 24 MONTHS, BASED ON RESEARCH POTENTIAL

Ontario Graduate Scholarship (declined), 2007

\$15,000 OVER 12 MONTHS, BASED ON ACADEMIC MERIT

NSERC PGS-A Scholarship, 1998

\$39,000 OVER 24 MONTHS, BASED ON RESEARCH POTENTIAL AND ACADEMIC MERIT

UWO Faculty of Engineering *Technical Night* Winner, 1998

BEST UNDERGRADUATE THESIS

Professional Engineers of Ontario (PEO) Scholarship, 1997

BASED ON ACADEMIC MERIT

UWO in-course scholarship, 1993-1997

\$3,500 OVER 60 MONTHS, RENEWED ANNUALLY, BASED ON ACADEMIC MERIT

COMPUTER SKILLS Many years of hands-on experience **writing, debugging, profiling, and optimizing cross-platform** software with strict **real-time/performance** requirements. Specific skills include:

LANGUAGES C, C++, Java, Python, Mel, Lua, shell scripting

PLATFORMS Windows, OS X, Unix, Linux, QNX (v4.2.x, RTP)

TOOLCHAINS Visual Studio, GNU

BUILD TOOLS Scons, Cmake, Jam, Make

APIs Qt, OpenGL, boost, Sockets, Pthreads, Blas/Lapack, OpenMaya (C++/Python), Win32

SOURCE CONTROL SVN, Git, Perforce, CVS

PERFORMANCE VTune, BoundsChecker, Gprof, Shark

WEB HTML, XML, CSS, CGI, Javascript

ENGINEERING APPS Matlab, Mathematica, Maple, SDRC Ideas

HARDWARE Mixed-signal electronics, PCB layout (WinDraft/Board), and μ C (PIC, Siemens C504, M68HC11)

LANGUAGES

Native Fluency English, French, Spanish

Beginner Polish