

ALEXIS LUSSIER DESBIENS

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Other

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Education and Competence

Main Courses

- 2001 – ...** **University of Sherbrooke**, Sherbrooke, Canada
Bachelor of Science in Mechanical Engineering with specific courses in bioengineering, multivariable control apply to aerospace and aerodynamics.
- 1999 – 2001** **Cegep of Victoriaville**, Victoriaville, Canada
Collegial studies in sciences with extra courses in electronics circuits and surface mount component soldering.
- 1994 – 1999** **La Samare high school**, Plessisville, Canada

Special Formation

- Summer 1999** **University of Sherbrooke**, Sherbrooke, Canada
Shad Valley – Entrepreneurship in sciences summer program.

Software Knowledge

- Operating Systems : Windows, QNX and RedHat Linux.
- Engineering : AutoCAD, SolidWorks, MSC.visualNastran 4D, Symofros, MSProject and Orcad Capture/Layout.
- Programming : Matlab, Simulink, Stateflow, LabVIEW, MATRIXx, assembleur PIC18F, C/C++ and HTML.
- Publishing : L^AT_EX, Microsoft Office (Word, Excel, PowerPoint and Visio), Vim, Photoshop, Illustrator, Dreamweaver and Director.
- Many other softwares to use web, ftp, email, newgroups, CVS (server and client) and SSH.

Language

French, english and german.

Experience

Employment

- 2005** **Robotics Group – German Aerospace Center (DLR)**, Munich, Germany.
Trainee during 2005 winter semester. Identification of the contact parameters on the ROKVISS robot arm installed on the outside of the International Space Station. Study of the variation of those parameters when exposed to the space environment.
- Planing of the experiment to reduce experiment time and improve accuracy.
 - Modeling of the dynamics of the robot, the flexibility and the contact dynamics.
 - Development of tool in Matlab to tune the model and automate the analysis of the data.
- 2004** **Space Sciences Group – Canadian Spage Agency**, St-Hubert, Canada
Trainee during summer 2004.

- Design of the control system, with a FieldPoint (NI) embedded computer, of a greenhouse located in the canadian arctic.
- Planning of the trip, the shipping of material and tools and the schedule for the field seasons in the arctic.
- Installation of the electrical system : solar arrays, wind generators, voltage regulators and distribution units.
- Working with in team and solving problems in a time limited, ressources limited and remote environment.

2003 Robotics Group – Canadian Space Agency, St-Hubert, Canada

Co-op trainee during fall 2003.

- Implementation of a cartesian position controller on CART (7 DDL arm).
- Implementation of a calibration tool to compensate gravity on CART.
- Member of a team working on a demonstration of the capture between two satellites (vision system, trajectory generation, real-time simulation of the two satellites and integration of all those parts).

2003 Robotics Groups – Canadian Space Agency, St-Hubert, Canada

Co-op trainee during winter 2003.

- Implementation of a new, real-time, hardware-in-the-loop simulator of the docking between two satellites on STVF. All the dynamics are computed on a 7 nodes cluster and the contact forces were measured between a hydraulic robotic arm and a force plate.
- Repair of the MD Robotics End-Effector.
- Design of a controller with Simulink and Stateflow to ease the use of the SARAH hand.

2002 University of Sherbrooke Shock Waves Laboratory (LOCUS), Sherbrooke, Canada

Co-op trainee during summer 2002. Design of a micro shock waves tube.

- Identification of the parameters limiting the size reduction of a shock tube.
- Conception, manufacturing and calibration of a new, very small (0.5×0.5 mm) and cheap (less than \$ 5) pressure sensor built around a surface mount resistor.
- Manufacturing and calibration of a cold-wire temperature sensor.
- Machining of the calibration chamber.

1998 – 2002 McDonald’s Restaurant, Plessisville, Canada

Cook.

1999 Conseil du loisir scientifique de la Mauricie, UQTR, Canada

Youth leader of a science summer camp.

Extracurricular

2001 – ... PERIUS, Sherbrooke, Canada

Funder and team leader of a team of 11 students in mechanical, electrical and computer sciences engineering that are designing and building a cockroach-like dynamic walking robot. Mainly responsible of :

- Modelization of the robot’s dynamics with MSC.visualNastran 4D and Simulink.
- Use of computer simulations to optimize the speed and manoeuverability of the robot, the size of the pneumatic cylinders, the air tank and the spring used and to find the optimal placement/orientation of the legs and center of mass.
- Design of the control system on Matlab/Simulink.
- Design and fabrication of the on-board computers around a PIC18F.
- Design of the inertal guidance system.
- Analysis of the insect and animal locomotion (cockroach, salamander, lizard, etc.). This robot was five time faster that its competitor and win three prizes at the *SAE Walking Machine Challenge 2004* : Best use of Analytical Method in Design, Most Innovative Design and Best Research Paper.

2005 Engineering Games 2005, Montreal, Canada

Director responsible of the design of the *machine* : an autonomous robot that need to explore an entire 8x8 maze, find its way back and transmit the map of the maze.

- Coordination of the work from the seven mechanical, electrical and software engineering students.
- Design of the mechanical system with Solidworks.
- Design of the electrical system : I2C bus, motor driver, Basix24 and GP2D120.
- 2004 – ...** **Design project**, University of Sherbrooke Team design of a testbed used to measure torsional stiffness and vibration frequency and damping in alpine ski for the compagny Karhu using product development tools as market analysis, requirement and fonctionnal analysis, preliminary design, detail design, fabrication and product validation. Responsible of the data acquisition and processing.
- 2004** **Engineering Games 2004**, Trois-Rivières, Canada
Design and fabrication of an autonomous robot to complete a simulated mission toward Mars for the Engineering Games.
 - Design of the line-following sensor and the processing algorithm.
 - Fabrication of the mechanical structure.
 - Control of the robot by using the *behavior based* robotic.
 - Presentation of the robot in front of 400 engineering students.
- 2003** **Canadian Space Agency**, St-Hubert, Canada
Help with the outdoor testing on the locomotion of a mobile robot with odometry, GPS and inertial guidance.
- 2002** **Mobile Robotics and Intelligent Systems Laboratory of the University of Sherbrooke (LABORIUS)**, Sherbrooke, Canada
Debugging of the electronics of a *Pioneer 1* robot.
- 2001 – 2002** **Formula SAE**, Sherbrooke, Canada
Design of a formula 1 racing car.
 - Conception of a network (CAN) of data acquisition nodes to optimize the performances of the car.
 - Webmaster.
- 2001 – 2002** **Initiation of the new students**, Sherbrooke, Canada
Responsible of the lunch hour activities and the music.
- 1999 – 2001** **International Sciences and Engineering Fair (ISEF)**, Detroit and San Jose, United States
Design and construction of a six-legged walking robot.
 - Design of the electronic schematics : power supply, signal conditionning and microcontroller (MC68HC11).
 - Design and fabrication of the PCB with surface mount components.
 - Selection of the sensory system : strain gauges, motor current sensors, solar compass, sonar and infrared sensors.
 - Simulation of the electronics and leg’s movements on Matlab.
 - Programming of the robot in Interactive C and HC11 assembly. Use of fuzzy logic to generate the trajectory of the legs.
- 1998 – 1999** **Canada Wide Science Fair**, Edmonton, Canada
Conception of a robot that detects and marks landmines for later retrieval.
 - Design of a rocker-bogey suspension, like the one on Sojourner.
 - Design of a robot to solve a real-world problem. Must be cheap, simple and useful.

Voluntary Work

- 2002 – ...** Judge and volunteer at the Quebec Wide Science Fair.
- 2003 – ...** Organiser of the *Défi Génie Inventif*, a Quebec wide engineering competition for grade 6-11.
- 2002 – ...** Administrator of the University of Sherbrooke’s Linux User Groups (GULUS).
- 2002 – ...** Member of the student-teacher group to improve the Mechanical Engineering program at the University of Sherbrooke.
- 2002** Member of a group of student that manage \$150 000 to buy new equipment each year at the Engineering Faculty of the University of Sherbrooke.

- 2000 – 2002 Boy Scouts leader.
 1998 – 1999 Aerospace teacher for the Royal Air Force Cadets of Canada.

Prizes

- 2005 **FQRNT Postgraduate Scholarship**, Quebec
 Rank in second position in the *Engineering and applied sciences* for my master projet by the *Fonds québécois de la recherche sur la nature et les technologies*. Selection criteria were academic excellence, research ability and potential, research experience. Value of \$15 000.
- 2005 **NSERC Postgraduate Scholarship**, Canada
 Scholarship to support study at the master level by the *Natural Sciences and Engineering Research Council of Canada*. Selected on the basis of academic excellence, research ability and potential and communication, interpersonal and leadership abilities. Value of \$17 300.
- 2001 – 2005 **Millenium Scholarship**, Canada
 Canada-wide scholarship that rewards extracurricular and social implication.
- 2005 **Engineering Games**, Montreal, Canada
 Second place in the team design of a robot used to explore a 8x8 maze.
- 2004 **Bechtel Canada Scholarship**, Faculty of Engineering, University of Sherbrooke
 Reward academic excellence and leadership, cooperation and initiative abilities. Value of \$3750.
- 2004 **Engineering College Dean's List**, Engineering Faculty, Universtiy of Sherbrooke
- 2004 **Mec&Rob Student Travel Grant**, Mec&Rob, Aachen, Allemagne
 Travel grant to allow the best publications to attend the Mechatronics and Robotics conference in Aachen.
- 2004 **First place, Senior Design**, CEC, Hamilton, Canada
 Canadian Engineering competition (CEC). Team design competition that evaluates costs analysis, risks analysis, human ressources planning, design, fabrication and demonstration of a prototype that must meets given specifications. This contest take place in a context of limited time and ressources.
- 2004 **First place, Senior Design**, QEC, Tremblant, Canada
 Quebec Engineering Competition (QEC). Quebec-wide team design competition of an all-terrain vehicule for third and fourth year engineering students.
- 2004 **Third place, Machine's contest**, Engineering Games, Trois-Rivières, Canada
 Design of an autonomous robot to complete a simulated mission toward Mars. Second place in the general contest and first in aquatic sports.
- 2003 **Engineering College Dean's List**, Engineering Faculty, Universtiy of Sherbrooke
- 2002 **Engineering College Dean's List**, Engineering Faculty, Universtiy of Sherbrooke
- 2001 **Participation at the Expo-Sciences International**, Grenoble, France
 Discover other cultures trough sciences.
- 2001 **Second Place Award in Engineering**, INTEL ISEF, San Jose, United States
- 2001 & 2000 **AAAI First Place Award**, INTEL ISEF, Detroit et San Jose, United States
- 2001 **Public prize**, Expo Sciences, Arts et Technologies (ExpoSAT), Victoriaville, Canada
- 2001 **Exceptional recognition**, ExpoSAT, Victoriaville, Canada
- 2001 & 2000 **Prize of the Minister of Research, Sciences and Technologies**, Quebec Wide Science Fair, Montreal, Canada
- 2001 & 2000 **Prize of École Polytechnique**, Quebec Wide Science Fair, Montreal, Canada
- 2000 **First Place Award in Engineering**, INTEL ISEF, Detroit, United States
- 2000 **Scholarship of \$ 40 000**, Kettering University, United States
- 2000 **Gold medal in engineering**, Canada Wide Science Fair, London, Canada
- 2000 **Pédro Canada prize in innovation**, Canada Wide Science Fair, London, Canada
- 2000 **Best project in technologies**, ExpoSAT, Victoriaville.
- 1999 **Honor Citizen**, Plessisville, Canada
 Reward the involvement in the community.
- 1999 **Governor General Medal**, La Samare high school, Canada
 Best scores during grade 7-11 (94.138%).

- 1999** **Passion Prize**, Entretiens Jacques-Cartier, Lyon, France
1999 **Bronze Medal in Engineering**, Canada Wide Science Fair, Edmonton, Canada
1999 **Coupe Polytechnique**, Quebec Wide Science Fair, Sorel, Canada
1999 **Sciences for Peace**, Quebec Wide Science Fair, Sorel, Canada
1998 **Marc Garneau**, St-Jean sur Richelieu, Canada
Reward the best cadet of the Aerospace Summer Camp.

Associations

- 2005** – ... Climbing and Walking Robots (CLAWAR).
2005 – ... Genie-Vert. Student group for environmental initiatives.
2005 – ... Engineers Without Borders.
2004 – ... Institute of Electrical and Electronics Engineers (IEEE).
2004 – ... Industrial Electronics Society (IES).
2002 – ... Society of Automotive Engineers (SAE).
2000 – ... American Association of Artificial Intelligence (AAAI).
2003 – ... Toastmasters International.
2001 – ... PÉRIUS, Robotics Group.
2002 – ... GULUS, Linux User Group.
1998 – ... Seattle Robotics Society (SRS).

Publications

Conferences

- Lespérance, Éric, Lussier Desbiens, Alexis, Roux, Marc-André, Lavoie, Marc-André and Fauteux, Phillipe (2005) Design of a Low Cost Power Management Unit for a Running Robot. International Conference on Intelligent Robots and Systems.
- Lavoie, Marc-André, Lussier Desbiens, Alexis, Roux, Marc-André and Fauteux, Phillipe (2005) Design of a Cockroach-Like Running Robot for the 2004 SAE Walking Machine Challenge, 8th International Conference on Climbing and Walking Robots.
- Giroux, Richard, Berinstain, Alain, Braham, Stephen, Graham, Thomas, Lee, Pascal, Dixon, Michael, Boucher, Marc, Cowing, Keith, Boyd, Keegan, Bamsey, Matt, Silver, Matt, Lussier Desbiens, Alexis and Yep, Raymond (2005) CSA Research on Greenhouse Operations in Extreme Environments : Current status and future plans, 5th Canadian Space Exploration Workshop.
- Lussier Desbiens, Alexis, Roux, Marc-André, Lavoie, Marc-André, Lespérance, Éric and Girard, Guillaume (2004) Design of a Cockroach-Like Walking Robot for the SAE Walking Machine Challenge 2004. Mechatronics and Robotics 2004. *Best article at the student forum.*
- Martin, E. L. Desbiens, A., Laliberté, T. and Gosselin C.M. (2004) SARAH Hand Used for Space Operations on STVF Robot, International Conference on Intelligent Manipulation and Grasping, pages 279-284.
- Lussier Desbiens, Alexis, Lavoie, Marc-André, Lespérance, Éric, Levasseur Mathieu and Roux, Marc-André (2004), Design of an Insect-Like Walking Robot by PÉRIUS, SAE Walking Machine Challenge. *Best article.*

General Public

- Lussier Desbiens, Alexis (2004) Devon Island Journal, Canadian Space Agency.
- Lussier Desbiens, Alexis (2001) Outdoor Navigation using polarized sunlight, Encoder - The Newsletter of the Seattle Robotics Society.
- Lussier Desbiens, Alexis (2001) Modifying the internal potentiometer of the TS-80, Encoder - The Newsletter of the Seattle Robotics Society.
- Webmaster du site de PÉRIUS.
- Lussier Desbiens, Alexis (2005) Students Use NI PCMCIA-CAN and LabVIEW to Design Robot, National Instruments News - Academic Edition.

- Biela, Debra and Lussier Desbiens, Alexis (2004) Contemporary Controls Helps PERIUS Team Reach Their Goal in Walking Machine Challenge, Contemporary Controls.

Interest

- Robotics.
- Space exploration, aerospace and rocketry.
- Energy, biofuel and aeroponics agriculture.
- Road biking (2000 km/year), telemark, squash, badminton, volleyball, hiking, rock climbing and canoe.
- Travelling
- Photography.
- Cooking.
- Aérospatiale, exploration spatiale et aéromodélisme.
- Énergies vertes, biodiesel et culture aéroponique.
- Vélo (environ 2000 km/année), télémark, squash, badminton, volleyball, randonnée, escalade et canot-camping.
- Observation de la nature, du comportement animal et des différents moyens de locomotion.
- Voyages.
- Photographie.
- Cuisine.