Contact:
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Raymond Francis

Education

PhD Electrical and Computer Engineering *In progress*
University of Western Ontario 2010 - Present

NSERC CREATE scholarship with the Canadian Astrobiology Training Program
Research area: Vision systems for planetary exploration

Lunar exploration analogue missions (Four deployments in 2010 and 2011)
CSA Impacts Lunar Sample Return project & Barringer Lunar Analogue Mission

- Astronaut, Operations system design engineer, Tactical science planner/integrator, Instrument systems engineer, Operations engineer

MSc Physics (Space Science)
Royal Military College of Canada 2008 - 2010

Stratospheric balloon mission (Launched 26 May and 12 June 2009)
Flying Laboratory for Observation of ADS-B Transmissions (FLOAT)

- Co-ordinator of system engineering,
- Deputy team lead,
- Director of air operations and regulatory approval

BASc Mechanical Engineering (CO-OP)
University of Ottawa 2001 - 2006

Experience

MSL Science Team Collaborator Nov 2011 – Present
Centre for Planetary Science and Exploration London, Ontario

- Participation in the Mars Science Laboratory mission under NASA PSP
- Development of automated image-processing techniques for atmospheric studies

Flight Instructor Apr 2001 – Present
Canadian Armed Forces North Bay; Trenton, Ontario

- Training Air Cadets to pilot licence standard, in the air and classroom
- Supervision of pilots, flying skill evaluation, air traffic management
- Communication, teaching, aircraft inspections, emergency response

Experience (continued)

Robotics Engineering Intern Apr – July 2011
MDA Space Missions Brampton, Ontario

- Upgrade, adaptation, and test of a 3D scene modeling system for use in geological field deployments and analogue space missions
- Research work in autonomous robotic feature-of-interest detection and event-driven robotic science

Young Graduate Trainee July 2007 – Aug 2008
European Space Agency Noordwijk, The Netherlands

- Development of science experiment payloads for the Columbus laboratory (Fluid Science Laboratory facility) on the International Space Station
- Technical research, preparation of technical reports, design review
- Project management, verification of hardware, preparation of project statement of work, co-ordination of scientists and contractors

Engineering Student May – Aug 2005
ROUTES AstroEngineering Ottawa, Ontario

- Thermal, mechanical, vibrational analysis of satellite subsystems
- Design, analysis, and component selection for ground support equipment for International Space Station science hardware

Software Test Engineer Sep – Nov 2004
LMS International Leuven, Belgium

- Testing and development of vibration analysis software
- Mechanical, structural, acoustic and frequency analysis, prototyping

Engineering Student Jan – Apr 2004
GE Structured Products Long Sault, Ontario

- Identifying, analyzing, and implementing solutions to safety concerns and equipment failures
- PLC networks, industry-government interactions, new product development, aviation-grade production methods, quality control

Student Engineer May – Aug 2003
Hershey Canada Smiths Falls, Ontario

- Mechanical diagnosis and problem-solving in a chocolate factory
- Industrial food safety procedures, production planning and optimization

Additional Qualifications and Skills

Languages	Fluent:	English, French
	Basic:	Dutch / Flemish
	Limited capacity:	German

Software

Operating systems:	Linux, Windows, Macintosh
Modeling:	Solidworks, COSMOS/Works, LMS Test.Lab, ADINA
Simulation and control:	STK, MATLAB and Simulink, HyperTerminal
Office and management:	Microsoft Office including MS Project, Visio
Programming:	C, HTML, LaTeX, BASIC

Safety	WHMIS and university laboratory safety training Laser safety training course Military Defensive Driving Course Military Flight Safety training
Aviation	Private Pilot Licence (Aeroplane), Glider Pilot Licence with Instructor rating CF Standards Pilot and Checkpilot qualification (Gliders) Launch Control Officer qualification Balloon Safety Officer (Large unmanned balloons)
Operations	Radio operator's licence (amateur and aeronautical) Military driver's licence (DND 404) Canadian Small Craft Operator's Permit
Science	X-Ray Fluorescence Spectrometer Operator's Licence (Can.) Geological fieldwork assistant experience
Leadership & General	Officer in the Canadian Armed Forces (current) Royal Canadian Air Cadets (1994-2001)

Recent Volunteer Work

- Co-hosting an online radio program on planetary science and exploration, *Western Worlds*, on Astronomy.fm
- Science communication, public engagement, and experiment demonstrations at a public science centre
- Development and delivery of a series of robotics workshops for elementary school students
- Leading public viewing sessions at an astronomical observatory
- Organization of the technical sessions for an academic conference

Selected Publications and Conference Presentations

Francis, R.; Osinski, G.; Moores, J.; Barfoot, T.; and the ILSR Team: Co-operative human-robotic exploration of lunar analogue sites (abstract #1996), in *43rd Lunar and Planetary Science Conference*, The Woodlands, Texas, 19-23 March 2012

Kerrigan, M.; Shankar, B.; Marion, C.; **Francis, R.**; Pickersgill, A.; Capitan, R.; Osinski, G.; and the ILSR Team: Real-time Mission Control Tracking of Astronaut Positions during Analogue Missions (abstract #2756), in *43rd Lunar and Planetary Science Conference*, The Woodlands, Texas, 19-23 March 2012

McCullough, E.; Pickersgill, A.; **Francis, R.**; Bassi, A.; Shankar, B.; Mader, M.; Beauchamp, M.; Osinski, G.; and the KRASH science and operations teams: Scientific Application of Visual Systems Instrumentation used during Lunar Sample Return Analogue Missions (abstract #2687), in *43rd Lunar and Planetary Science Conference*, The Woodlands, Texas, 19-23 March 2012

Francis, R; Moores, J; Osinski, G; and the ILSR Team: Analogue mission operations in support of future lunar sample return missions, in *Canadian Space Summit 2011*, Calgary, Alberta, 23-25 November 2011

Francis, R; Noël, J; Vincent, R: Orbital monitoring of Automatic Dependent Surveillance -- Broadcast (ADS-B) signals for improved air traffic surveillance in remote and oceanic airspace, in *62nd International Astronautical Congress*, Cape Town, South Africa, 3-7 October 2011

Francis, R; Vincent, R; Noël J; Tremblay, P; Desjardins, D; Cushley, A; Wallace, M: The Flying Laboratory for the Observation of ADS-B Transmissions, *International Journal of Navigation and Observation*, vol. 2011, article 973656, 2011.

Francis, R; Jasiobedzki, P; McIsaac, K; Osinski, G: Automatic selection of instrument sampling locations in 3D imagery, in *11th Space Vision and Advanced Robotics Workshop*, Brampton, Ontario, 8 June 2011

Francis, R; Osinski, G; Barfoot, T.; Ng, H; and the SLAM 2011 Team: Sudbury Lunar Analogue Mission 2011: Testing advanced vision systems for exploration missions, in *11th Space Vision and Advanced Robotics Workshop*, Brampton, Ontario, 8 June 2011

Francis, R: Vision Systems for Exploration: Enabling astrobiological investigations with autonomous robotics, in *2nd Canadian Astrobiology Training Program annual meeting*, Montreal, 29-31 May, 2011

Shankar,B; Antonenko, I; Osinski, G; Mader, M; Preston, L; Battler, M; Beauchamp M; Chanou, A; Cupelli, L; **Francis, R**; Marion, C; McCullough, E; Pickersgill, A; Unrau, T; Veillette, D: Lunar Analogue Mission: Overview of the Site Selection Process at Mistastin Lake Impact Structure, Labrador, Canada, in *42nd Lunar and Planetary Science Conference*, The Woodlands, Texas, 7-11 March 2011

Francis, R; Tremblay, P; Noel J: CIMON: The Canadian Magnetometric Observation Nanosatellites, in *Second European Cubesat Workshop*, Noordwijk, the Netherlands, 20-22 January 2009

Vincent-Bonnieu, S; Minster, O; Dewandre, T; **Francis, R**; Liggieri, L; Loglio, G; Miller, R; Steinchen, A; Antoni, M, Clausse, D; Del Gaudio, L; Dalmazzone, C; Karapantsios, T; Dutschk, V; Rubio, R; Picker, G: FASES: An instrument for Fundamental and Applied Studies of Emulsion Stability, in *Third International Symposium on Physical Sciences in Space*, Nara, Japan, 22-26 October 2007

Invited talks

Broadcast interview on analogue mission operations and results
– Astronomy.FM, *Live From York University*, 26 September 2011

Broadcast interview on past and current work in the space sector
– Astronomy.FM, *Live From York University*, 13 June 2011

A Perspective on Space Programs Beyond North America
– Royal Astronomical Society of Canada, London Centre
London, Ontario, 20 May 2011
– Centre for Planetary Science and Exploration, University of Western Ontario
London, Ontario, 28 January 2011
– Royal Astronomical Society of Canada, Kingston Centre
Kingston, Ontario, 11 December 2009

The European Space Agency: Science, Exploration, and Operational programs,
– Royal Military College of Canada
Kingston, Ontario, 2 October 2008

Broadcast interview on experience in the ESA Young Graduate Trainee Program,
– CBC Radio One, *Sounds Like Canada*, 27 August 2008

Newspaper interview on selection for the ESA Young Graduate Trainee Program
– *Northern Life*, Sudbury, Ontario, 21 June 2007

Broadcast interview on selection for the ESA Young Graduate Trainee Program,
– CBC Radio One, *Points North*, 14 June 2007

References

This version of my CV is posted on my personal website, http://cosmicray.ca . To protect the privacy of my references, I've removed their contact information from this version.

Please contact me at the address on the first page of this resume, or via the website, for the list of references and contact information.

This CV is up to date as of 30 March 2012. The latest version is available upon request.