# Final Program (as of August 17, 2010)

## Monday, October 4

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>16:00-18:00</td>
<td>Registration open</td>
<td>Atrium</td>
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<tr>
<td>18:00-19:30</td>
<td>Welcome Reception</td>
<td>Atrium</td>
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## Tuesday, October 5

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>07:00-17:30</td>
<td>Registration open</td>
<td>Foyer of Régence A</td>
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<tr>
<td>07:00-07:45</td>
<td>Author’s Breakfast</td>
<td>Saint-Laurent</td>
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<tr>
<td>08:00-08:20</td>
<td>Opening Lectures</td>
<td>Régence AB</td>
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<tr>
<td>08:20-09:50</td>
<td>Session GS 1</td>
<td>Régence AB</td>
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<tr>
<td></td>
<td>Robotics for the Power Industry: Overview Presentations</td>
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<td></td>
<td><em>Session Chair:</em></td>
<td>Nicolas Pouliot, Canada</td>
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<tr>
<td>08:20 – 08:35</td>
<td>0627 - The Specific Requirements of Applied Robots for the Power Utility</td>
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<tr>
<td></td>
<td>Binhai Wang (1), Lei Han (1), and Bingqiang Li (1, 2)</td>
<td>(1) Electric Power Robotics Laboratory, Shandong Electric Power Research Institute, China</td>
</tr>
<tr>
<td>08:35 – 08:50</td>
<td>0689 - Smart View for a Smart Grid – Unmanned Aerial Vehicles for Transmission Lines</td>
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<td></td>
<td>Janos Toth, and Adelana Gilpin-Jackson</td>
<td>BC Hydro, Canada</td>
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<tr>
<td>08:50 – 09:05</td>
<td>0697 - About the Future of Power Line Robotics</td>
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<tr>
<td></td>
<td>Serge Montambault and Nicolas Pouliot</td>
<td>Robotics and Civil Engineering Department, Hydro-Québec’s research institute (IREQ), Canada</td>
</tr>
<tr>
<td></td>
<td>David Elizondo (1), Thomas Gentile (1), Hans Candia (1), and Greggory Bell (2)</td>
<td>(1) Quanta Technology, USA</td>
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</table>
09:20 – 09:35
0723 - Benefits and Challenges Involved with Introduction of Robotics at BC Hydro
Bernhard Spalteholz
BC Hydro, Canada
09:35 – 09:50
Questions and discussion

09:50-10:20 Networking Break Foyer

10:20-12:00 Parallel Technical Session Régence A
Transmission & Distribution - TD1 – Power Line Robots I

Session Chairs:
Janos Toth, Canada
Paulo Debenest, Japan

10:20 – 10:40
0673 - Transmission Line Inspection Robot and Deicing Robot: Key Technologies, Prototypes and Applications
Gongping Wu, Hua Xiao, Xiaohui Xiao, Zhenglie Huang, and Yingsong Li
School of Power and Mechanical Engineering, Wuhan University, China

10:40 – 11:00
0644 - Research of Power Transmission Line Maintenance Robots in SIACAS
Wang Hongguang (1), Jiang Yong (1), Liu Aihua (1), Fang Lijin (2), and Ling Lie (1)
(1) State Key Laboratory of Robotics, Shenyang Institute of Automation, Chinese Academy of Sciences, China
(2) School of Mechanical Engineering and Automation, Northeastern University, China

11:00 – 11:20
0650 - Exiplner - From Prototype Towards a Practical Robot for Inspection of High-Voltage Lines
Paulo Debenest and Michele Guarnieri
HiBot Corp., Japan

11:20 – 11:40
0680 - Improvement of LineROVer: A mobile Robot for De-icing of Transmission Lines
Jinlong Zhao, Rui Guo, Lei Cao and Feng Zhang
Electric Power Robotics Laboratory, Shandong Electric Power Research Institute, China

11:40 – 12:00
0610 - Field Experiences Using LineScout Technology on Large BC Transmission Crossings
Janos Toth (1), Nicolas Pouliot (2), and Serge Montambault (2)
(1) British Columbia Transmission Corporation (BCTC), Canada
(2) Robotics and Civil Engineering department, Hydro-Québec’s research institute (IREQ), Canada

10:20-12:00 Parallel Technical Session Régence B
Power Generation - PG1 – Underwater Applications

Session Chair:
Nicolas Jardin, France
Alain Croteau, Canada
10:20 – 10:40
0649 - Design of ROVs for the Mexican Power and Oil Industries
(1) CIDESI, Mexico
(2) UAQ (Universidad Autónoma de Querétaro), Mexico

10:40 – 11:00
0702 - Robotic Rectification of Underwater Structural Elements in Power Dams
Julien Beaudry (1), Luc Provencher (1), Pierre-Luc Richard (1), Stéphane Gendron (1), Dominique Thuot (2) and Michel Blain (1)
(1) Robotics & Civil Engineering Unit, Hydro-Quebec Research Institute (IREQ), Canada
(2) Department of Mechanical Engineering, Ecole de Technologie Superieure (ETS), Canada

11:00 – 11:20
0667 - Underwater Robotized High Speed Machining for Maintenance
N. Jardin, V. Delalande, B. Delaunay
Electricité de France – R&D, France

11:20 – 11:40
0661 - The Maski Underwater Robot: Technology, Field Experience and Benefits
Alain Croteau (1) and Normand Duguay (2)
(1) Hydro-Québec (Research Institute), Canada
(2) Hydro-Québec (Generation), Canada

11:40 – 12:00
0679 - Underwater Inspection Experiment for a Long Tunnel of EDF’s Hydroelectric Facilities
F. Loisy (1), P. François (1), G. Douchet (1), P. Hope-Darby (2), K. Shimmin (2), T. Bonner (2), E. Laurent (3) and R. Colin (3)
(1) EDF R&D, France
(2) The Water Services Group Ltd., United Kingdom
(3) Advitam, France

12:00-13:30 Lunch Break Please verify your coupon for location of lunch.

13:30-14:30 Keynote Presentation Régence AB
KP1 - The Latest Topics on Field and Service Robotics at Tokyo Institute of Technology
Shigeo Hirose, Tokyo Institute of Technology, Tokyo, Japan

I will introduce some of our latest topics related to the field and service robotics, e.g. snake-like robots and snake-like rescue robot "Souryu", arm mounted buggy robot "Gryphon V" for humanitarian demining, quadruped walking robot "TITAN XI" for steep slope construction tasks, and multi-wheeled "Expliner" for the inspection of high-voltage transmission lines. The snake-like robots were started from the observation of real snake and they are already exhibiting high terrain adaptability especially suitable for rescue operations. The buggy vehicle of the "Gryphon V" is mounting an arm with wide motion range and other devices for mine detection. Through several experiments conducted on mine test sites in Cambodia and Croatia, the Gryphon V already showed high robustness and better performance of mine detection than that of human deminers. The 7 ton world largest quadruped walking robot "TITAN-XI" can walk around on the surface of steep slope by avoiding the damage of the lattice-like Ferro concrete frames by using a pair of suspension wires, new vision system and intelligent gait control system.
14:30-15:30  Session GS2  
Robotics for the Power Industry: Overview Video Session

Session Chair:  
**Jean-François Allan**, Canada

14:30 – 14:45  
0662 - **MagneBike: Compact Magnetic Wheeled Robot for Power Plant Inspection**  
Fabien Tâche (1), François Pomerleau (1), Wolfgang Fischer (1), Gilles Caprari (1), Francesco Mondada (2), Roland Moser (3), and Roland Siegwart (1)  
(1) Autonomous Systems Laboratory, Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland  
(2) Laboratoire de Systèmes Robotiques, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland  
(3) ALSTOM (Switzerland) Ltd, ALSTOM Power Service, Switzerland

14:45 – 15:00  
0676 - **Field Experience with LineScout Technology for Live-Line Robotic Inspection and Maintenance of Overhead Transmission Networks**  
Serge Montambault and Nicolas Pouliot  
Robotics and Civil Engineering department, Hydro-Québec's research institute (IREQ), Canada

15:00 – 15:15  
0704 - **Robotic System for Diagnosis of Large Underwater Hydroelectric Structures**  
Bruno Dubé and Simon Pelletier-Thibeault  
Automation Machine Design RC Inc., Canada

15:15 – 15:30  
0719 - **Robotic Penstock Welding**  
Bruce Hazel and Jean Côté  
Institut de Recherche, Hydro-Québec, Canada

15:30-15:50  Networking Break  
Foyer

15:50-17:30  Parallel Technical Session  
Transmission & Distribution - TD2 – Modeling and Control  
Régence A

Session Chairs:  
**Joao Sequeira**, Portugal  
**Bill Ross**, USA

15:50 – 16:10  
0681 - **Longitudinal Dynamics Modeling of the RIOL Robot**  
Joao Sequeira  
Institute for Systems and Robotics, Instituto Superior Técnico, Portugal

16:10 – 16:30  
0709 - **Dynamic Model and Simulation of an Inspection Robot for Power Transmission Lines: Preliminary Results**  
Applied Research Division, Center for Engineering and Industrial Development (CIDESI), Mexico
16:30 – 16:50  
0696 - Control of a Brachiating Robot for Inspection of Aerial Power Lines  
Vinicius Menezes de Oliveira (1), and Walter Fetter Lages (2)  
(1) Center for Computational Sciences, Federal University of Rio Grande, Brazil  
(2) Department of Electrical Engineering, Federal University of Rio Grande do Sul, Brazil

16:50 – 17:10  
0625 - Haptic-Enabled Control of Hydraulic Manipulators Applied to Power Line Maintenance: Concept & Implementation  
Kurosh Zarei-nia (1), Nariman Sepehri (1), Tim Olson (2), and Wes Mueller (2)  
(1) Department of Mechanical & Manufacturing Engineering, University of Manitoba, Canada  
(2) Line Transmission Assets Services, Manitoba Hydro, Canada

17:10 – 17:30  
0705 - High Performance Teleoperation for Industrial Work Robots  
Bill Ross, David LaRose, Hank Wilde, L. Douglas Baker  
The National Robotics Engineering Center, Carnegie Mellon University, USA

15:50-17:30  
Parallel Technical Session  
Régence B  
Power Generation - PG2 – Hydraulic and Thermal Applications I  

Session Chairs:  
Ekkehard Zwicker, Switzerland  
Bruce Hazel, Canada

15:50 – 16:10  
0639 - A Parallel Link Scanner for Inspection of Bores and Tubes  
Wolfgang Zesch (1), Ekkehard Zwicker (1), Markus Wiesendanger (1), Jim F. Knowles (2)  
(1) ALSTOM Inspection Robotics Ltd, Switzerland  
(2) ALSTOM Power, Switzerland

16:10 – 16:30  
0657 - Robotic Refurbishment of Gate Wheel Tracks  
J.L. Gagné (1), L. Bédard-T. (1), L. Lavoie (1), B. Hazel (2), J. Côté (2), Y. Laroche (2) and P. Mongenot (2)  
(1) Énergie Électrique, Rio Tinto Alcan, Canada  
(2) IREQ, Hydro-Québec, Canada

16:30 – 16:50  
0665 - A Prototype of a Specialized Robotic System for Repairing Hydraulic Turbine Blades  
University of Brasilia, Brazil

16:50 – 17:10  
0666 - Robotic Approach to Improve Turbine Surface Finish  
M. Sabourin (1), F. Paquet (1), B. Hazel (2), J. Côté (2) and P. Mongenot (2)  
(1) Alstom Hydro Canada, Canada  
(2) Institut de Recherche, Hydro-Quebec, Canada

17:10 – 17:30  
0706 - Pneumatic Impact-drive and Tube Crawler Device for Non-destructive Inspections  
Andres Peralta  
Alstom Power - Thermal Services, Switzerland

17:30-19:00  
Networking Cocktail  
Foyer
### Wednesday, October 6

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<thead>
<tr>
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<tr>
<td>07:00-17:30</td>
<td>Information desk open</td>
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<td>Author’s Breakfast</td>
<td>Saint-Laurent</td>
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<tr>
<td>08:00-09:00</td>
<td>Keynote Lecture</td>
<td>Régence AB</td>
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<tr>
<td></td>
<td><strong>KL2 - ROBTET: Lessons Learnt from Aerial Live-line Maintenance</strong></td>
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<td>Manuel Ferre, Universidad Politécnica de Madrid, Madrid, Spain</td>
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Telerobotic systems developed for aerial live-line have proven to be powerful tools for maintenance tasks. These developments have represented a breakthrough for the security and standardization of live-power line maintenance. The experience derived from the application of ROBTET in the Spanish network from 2000 to 2004 could be a reference for future telerobotics developments. Main technologies that have been successfully applied in ROBTET are focused on two directions. The first line is to provide the operator with the sufficient information from the remote robot worksite. It has been done by using stereoscopic video cameras and reflecting the robot-environment forces to the operator, the sum of both has allowed manipulating objects with dexterity. The second line is to provide an efficient operator-machine interaction that assists the operator in executing teleoperated tasks. The main tools that have been applied for operator assistance are: voice recognition, virtual forces, and remote environment calibration. The integration of the mentioned technologies has proven a high performance of the ROBTET achieving same productivity as the classical human teamwork. Other non-technical factors that have to also be considered for exploiting telerobotics systems are related to: equipment service maintenance costs, training of operators, and norms and regulation for live-line works.

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<tr>
<td>09:00-09:30</td>
<td>Networking Break</td>
<td>Foyer</td>
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<tr>
<td>09:30-10:50</td>
<td>Parallel Technical Sessions</td>
<td>Régence A</td>
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<td></td>
<td><strong>Transmission &amp; Distribution - TD3 – Image Processing I</strong></td>
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<td>Session Chairs:</td>
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<tr>
<td></td>
<td>Wai Ho Li, Australia</td>
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<td></td>
<td>Jean-Philippe Tardif, USA</td>
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<td>09:30 – 09:50</td>
<td>0701 - <strong>Over Head Line Real-time Tracking for Automatic Inspection or User Interface</strong></td>
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<td>Enhancement</td>
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<td></td>
<td>Joao Gomes-Mota and Tiago Gusmao</td>
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<td>Albatroz Engineering, Portugal</td>
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<td>09:50 – 10:10</td>
<td>0651 - <strong>Visual Live-Line Condition Monitoring of Composite Insulators</strong></td>
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<td>Chithambaram A. Veerappan, Peter R. Green, and Simon M. Rowland</td>
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<td>The University of Manchester, Manchester, UK</td>
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<tr>
<td>10:10 – 10:30</td>
<td>0663 - <strong>Image Processing to Automate Condition Assessment of Overhead Line Components</strong></td>
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<td>Wai Ho Li (1), Arman Tajbakhsh (2), Carl Rathbone (2), and Yogendra Vashishtha (2)</td>
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<tr>
<td></td>
<td>(1) Department of Electrical and Computer Systems Engineering, Monash University, Australia</td>
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<td>(2) SP AusNet, Australia</td>
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10:30 – 10:50

0647 - Vision-aided Inertial Navigation for Power Line Inspection
Jean-Philippe Tardif, Michael George, Michel Laverne, Alonzo Kelly, and Anthony Stentz
National Robotics Engineering Center, Carnegie Mellon University, USA

09:30-10:50
Parallel Technical Sessions
Régence B
Power Generation - PG3 – Nuclear Applications I

Session Chairs:
Andrew Goldenberg, Canada
Patricia García-Borras, Spain

09:30 – 09:50
0612 - AARM: A Robot Arm for Internal Operations in Nuclear Reactors
Andrew Goldenberg (1), Matt Gryniowski (1), and Todd Campbell (2)
(1) Engineering Services Inc. (ESI), Canada
(2) Atomic Energy of Canada Ltd (AECL), Canada

09:50 – 10:10
0616 - Application of Robotics for the Nuclear Power Plants in Korea
Seungho Kim, Seung Ho Jung, Sung Uk Lee, Chang Hoi Kim, Ho Chul Shin, Yong Chil Seo, Nam Ho Lee and Kyung Min Jung
Nuclear Robotics Laboratory, Korea Atomic Energy Research Institute, Korea

10:10 – 10:30
0629 - Dedicated and Standard Industrial Robots used as Force-Feedback Telemaintenance Remote Devices at the AREVA Recycling Plant
G. Piolain (1), F. Geffard (2), A. Coudray (3), P. Garrec (2), J-F. Thro (4) and Y. Perrot (2)
(1) Maintenance Department, AREVA NC La Hague plant, France
(2) Interactive Robotics Laboratory, CEA, LIST, France
(3) Robotics Department, AREVA/MECACHIMIE, France
(4) AREVA NC, Paris – La Defense, France

10:30 – 10:50
0645 - TechnoFusión Remote Handling Laboratory: Contributions to Nuclear Fusion Facilities Maintenance Tasks
Patricia García-Borras, Pablo García-Robledo, Jorge Barrio, Manuel Ferre, Rafael Aracil
Centro de Automática y Robótica, Spain

10:50-11:00
Short Break
Foyer

11:00-12:00
Parallel Technical Sessions
Régence A
Transmission & Distribution - TD4 – Image Processing II

Session Chairs:
Binhai Wang, China
Walter Fetter Lages, Brazil

11:00 – 11:20
0699 - Robotized Inspection of Power Lines with Infrared Vision
Jonathan Henrique Efigênio de Oliveira, and Walter Fetter Lages
Department of Electrical Engineering, Federal University of Rio Grande do Sul, Brazil
11:20 – 11:40
0656 - Research on the Infrared and Visible Power-Equipment Image Fusion for Inspection Robots
Hongwei Li, Binhai Wang, and Li Li
Electric Power Robotics Laboratory, Shandong Electric Power Research Institute, China

11:40 – 12:00
0643 - Advances in Vegetation Management for Power Line Corridor Monitoring Using Aerial Remote Sensing Techniques
Zhengrong Li (1), Rodney Walker (2), Ross Hayward (1), Luis Mejias (2)
(1) Faculty of Science and Technology, Queensland University of Technology (QUT), Australia
(2) Australian Research Centre for Aerospace Automation (ARCAA, QUT), Australia

11:00-12:00 Parallel Technical Sessions
PG4 – Nuclear Applications II

11:00 – 11:20
0692 - Underactuated Versatile Gripper for the Cleaning of Nuclear Sites
Clément Gosselin and Thierry Laliberté
Department of Mechanical Engineering, Université Laval, Canada

11:20 – 11:40
0714 - Dexterous Manipulators for Nuclear Inspection and Maintenance – Case Study
R. O. Buckingham and A. C. Graham
OC Robotics, UK

11:40 – 12:00
0722 - Robotic Removal of High-Activity Debris from a Nuclear Primary Heat Transfer System
Anthony Hamilton (1), Steve J. Burany (1), Samuel B. Peralta (1), and Lindsay Greenland (2)
(1) Kinectrics, Canada
(2) Ontario Power Generation, Canada

12:00-13:30 Lunch Break
Please verify your coupon for location of lunch.

13:30-15:10 Parallel Technical Sessions
Transmission & Distribution - TD5 – Distribution Applications

13:30 – 13:50
0611 - Autonomous Navigation for Underground Energy Line Inspection Robot
Emanuel Estrada, Luan Silveira, Eder Gonçalves, Nelson Duarte Filho, Vinicius de Oliveira, Silvia Botelho
Center for Computational Science (C3), Federal University of Rio Grande, Brazil
13:50 – 14:10
0632 - System Development of a Robotic Pole Manipulator
Andrew Paul Turner (1) and Derek C. Wilson (2)
(1) MDA Inc., Canada
(2) BC Hydro, Canada

14:10 – 14:30
0638 - The Evolution of UT Pole Climbing Robots
M. Nili Ahmadabadi (1), H. Moradi (1), A. Sadeghi (2), A. Madani (1), and M. Farahnak (1)
(1) University of Tehran, Iran
(2) Scuola Superiore Sant' Anna, Italy

14:30 – 14:50
0653 - Robotics Applied to Work Conditions Improvement in Power Distribution Lines Maintenance
R. A. Roncolatto (1), N. W. Romanelli (1), A. Hirakawa (2), O. Horikawa (2), D. M. Vieira (2), R. Yamamoto (2), V. C. Finotto (2), V. Sverzuti (2) and I. P. Lopes (2)
(1) Paulista Power and Light Company – CPFL, Brazil
(2) Escola Politécnica of the University of São Paulo, Brazil

14:50 – 15:10
0707 - Climbing and Pole Line Hardware Installation Robot for Construction of Distribution Lines
J.-F. Allan, S. Lavoie, S. Reiher and G. Lambert
Robotics and Civil Engineering department, Hydro-Québec's research institute (IREQ), Canada

13:30-15:10 Parallel Technical Sessions Régence B

Power Generation - PG5 – Hydraulic and Thermal Applications II

Session Chairs:
Gilles Caprari, Switzerland
Patrick Mongenot, Canada

13:30 – 13:50
0690 - Tubulo – A Train-like Miniature Inspection Climbing Robot for Ferromagnetic Tubes
Patrick Schoeneich (1), Frédéric Rochat (1), Olivier Truong-Dat Nguyen (3), Gilles Caprari (2), Roland Moser (3), Hannes Bleuler (1), Francesco Mondada (1)
(1) Laboratoire de Systèmes Robotiques (LSRO), Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
(2) Autonomous Systems Lab, Eidgenössische Technische Hochschule Zürich (ETHZ), Switzerland
(3) Inspection Technologies, ALSTOM Power, Switzerland

13:50 – 14:10
0691 - Automated Abrasive Water Jet Pin Cutting System
Vera de Vries (1), Roland Moser (1) and Philippe Roth (2)
(1) ALSTOM Power, Switzerland
(2) Waterjet Technologies Ltd, Switzerland

14:10 – 14:30
0686 - In-situ Robotic Interventions in Hydraulic Turbines
B. Hazel, J. Côté, Y. Laroche and P. Mongenot
Institut de Recherche, Hydro Québec, Canada
14:30 – 14:50
0641 - A Modular Inspection Robot Platform for Power Plant Applications
Ekkehard Zwicker (1), Wolfgang Zesch (1), and Roland Moser (2)
(1) ALSTOM Inspection Robotics Ltd, Switzerland
(2) ALSTOM, Switzerland

14:50 – 15:10
0640 - Light-weight Mobile Robot for Hydrodynamic Treatment of Concrete and Metal Surfaces
Zdenko Kovacic (1), Borislav Balac (2), Stjepan Flegaric (2), Kristijan Brkic (1) and Matko Orsag(1)
(1) LARICS - Laboratory for Robotics and Intelligent Control Systems, Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia
(2) Inteco d.o.o., Croatia

15:10-15:30 Networking Break Foyer

15:30-16:30 Parallel Technical Sessions Régence A
Transmission & Distribution - TD6 – Unmanned Aerial Vehicles (UAVs)

Session Chairs:
Stefan Hrabar, Australia
Julien Beaudry, Canada

15:30 – 15:50
0648 - Development of an Autonomous Helicopter for Aerial Powerline Inspections
Stefan Hrabar, Torsten Merz, and Dennis Frousheger
Australian Research Centre for Aerospace Automation (ARCAA), Commonwealth Scientific and Industrial Research Organisation (CSIRO) ICT Centre, Australia

15:50 – 16:10
0658 - On the Application of VTOL UAVs to the Inspection of Power Utility Assets
Serge Montambault, Julien Beaudry, Kristopher Toussaint and Nicolas Pouliot
Robotics and Civil Engineering department of Hydro-Québec's research institute (IREQ), Canada

16:10 – 16:30
0646 - Power Line Inspection with A Flying Robot
Binhai Wang (1), Xiguang Chen (1), Qian Wang (1), Liang Liu (1), Hailong Zhang (1) and Bingqiang Li (1,2)
(1) Electric Power Robotics Laboratory, Shandong Electric Power Research Institute, China
(2) Shandong Luneng intelligence Co., Ltd., China

15:30-16:30 Parallel Technical Sessions Régence B
General Session - GS3 – Construction and Maintenance Applications

Session Chairs:
José Saenz, Germany
Alberto Oscar, Italy

15:30 – 15:50
0721 - New Technology for Multiple Conductor Stringing Machinery
A. Oscar
Stringing Equipment Division, TESMEC SpA, Italy
15:50 – 16:10
0624 - Manipulator Arm of a Shredder for Power Line Corridor Maintenance Applications
Marin Ene (1), Peter Radzisewski (2), and Liviu Ciupitu (3)
(1) Department of Applied Sciences, University of Quebec in Abitibi Temiscamingue, Canada
(2) Department of Mechanical Engineering, McGill University, Canada
(3) Department of Machines and Manufacturing Systems, Politehnica University, Romania

16:10 – 16:30
0668 - Robotic Systems for Cleaning and Inspection of Large Concrete Pipes
José Saenz (1), Norbert Elkmann (1), Thomas Stuerze (1), Sven Kutzner (1) and Heiko Althoff (2)
(1) Fraunhofer IFF, Germany
(2) Emschergenossenschaft, Germany

18:00-22:00 Banquet Please refer to page ??? for details.
Thursday, October 7

07:30-12:00  Information desk open  Foyer of Régence A

07:30-08:15  Author’s Breakfast  Saint-Laurent

08:30-09:50  Parallel Technical Session  Régence A
  Transmission & Distribution - TD7 – Power Line Robots II
  
  Session Chairs:
  JiDai Wang, UK
  Joao Sequeira, Portugal

  08:30 – 08:50
  0698 - Research on a New Crawler Type Inspection Robot for Power Transmission Lines
  Jidai Wang (1), Aiqin Sun (1), Candong Zheng (1) and Jihong Wang (2)
  (1) School of Mechanical and Electronic Engineering, Shandong University of Science and Technology, China
  (2) School of Electronic, Electrical and Computer Engineering, University of Birmingham, UK

  08:50 – 09:10
  0659 - Research on the Motion System of the Inspection Robot for 500kV Power Transmission Lines
  L. J. Fang (1) and H. G. Wang (2)
  (1) School of Mechanical Engineering and Automation, Northeastern University, China
  (2) Shenyang Institute of Automation, Chinese Academy of Science, China

  09:10 – 09:30
  0670 - Development of a Novel Power Transmission Line Inspection Robot
  Ludan Wang (1), Fei Liu (1), Zhen Wang (1), Shaqpqiang Xu (1), Sheng Cheng (1), and Jianwei Zhang (2)
  (1) Laboratory of Intelligent Robot Engineering, KunShan Institute of Industrial Research, China
  (2) TAMS, University of Hamburg, Germany

  09:30 – 09:50
  0677 - Reachability Analysis of the RIOL Robot
  Joao Sequeira
  Institute for Systems and Robotics, Instituto Superior Técnico, Portugal

08:30-09:50  Parallel Technical Session  Régence B
  Power Generation - PG6 – Wind Turbines and Power Plants Applications

  Session Chairs:
  Gilles Caprari, Switzerland
  Vikram Chopra, Canada

  08:30 – 08:50
  0664 - Robot for Rotor Blade Inspection
  Torsten Felsch, Tilo Förster and Norbert Elkmann
  Fraunhofer IFF, Germany
08:50 – 09:10
0630 - Wind Turbine Control Using a Gearless Epicyclic Transmission
Xiao Qing Ma (1), Vikram Chopra (1), S. H. H. Zargarbashi (1), and Jorge Angeles (1,2)
(1) Centre for Intelligent Machines, McGill University, Canada
(2) Department of Mechanical Engineering, McGill University, Canada

09:10 – 09:30
0674 - Development of a Bridge Transport System with Telescopic Motion
Hyo Jik Lee, Jong Kwang Lee, Byung Suk Park, Kiho Kim and Ho Dong Kim
Korea Atomic Energy Research Institute, Republic of Korea

09:30 – 09:50
0615 - Highly Compact Robots for Inspection of Power Plants
Gilles Caprari (1), Andreas Breitenmoser (1), Wolfgang Fischer (1), Christoph Hürzeler (1), Fabien Tâche (1), Roland Siegwart (1), Patrick Schoeneich (2), Frédéric Rochat (2), Francesco Mondada (2), Roland Moser (3)
(1) Autonomous System Lab, ETH Zürich, Switzerland
(2) Laboratoire de Systèmes Robotiques (LSRO), Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland
(3) Inspection Technologies, ALSTOM Power, Switzerland

09:50 – 10:10
Short Break
Foyer

10:10–11:10
Parallel Technical Sessions
Régence A
Transmission & Distribution - TD8 – Inspection Robots and Subsystems
Session Chairs:
Plutarcho M. Lourenco, Brazil
Nicolas Pouliot, Canada

10:10 – 10:30
0669 - Remote Detection of Internal Corrosion in Conductor Cables of Power Transmission Lines
Ary Vaz Pinto Jr (1), Mauro Zanini Sebrao (1), Celia Regina S. H. Lourenco (2), Ildejairo Sant’Anna de Almeida (1), Joao Saad Jr, (3), Plutarcho M. Lourenco (2)
(1) Department of Special Technologies, Eletrobras-Cepel, Brazil
(2) Department of Systems Automation, Eletrobras-Cepel, Brazil
(3) Department of Lines and Stations, Eletrobras-Cepel, Brazil

10:30 – 10:50
0672 - A Mobile Robot for Inspection of Substation Equipments
Rui Guo, Lei Han, Yong Sun, Mingrui Wang
Electric Power Robotics Laboratory, Shandong Electric Power Research Institute, China

10:50 – 11:10
0642 - Transmission Line Inspection Robots: Design of the Power Supply System
Joao Caxias (1), Fernando A. Silva (1,2), Joao Sequeira (1,3)
(1) Department of Electrical and Computer Engineering, Instituto Superior Técnico, Portugal
(2) Center for Innovation in Electrical and Energy Engineering, Instituto Superior Técnico, Portugal
(3) Institute for Systems and Robotics, Instituto Superior Técnico, Portugal
10:10-11:10 Parallel Technical Sessions
Power Generation - PG7 – Nuclear Applications III

Régence B

Session Chairs:
Yann Perrot, France
Éric Lavoie, Canada

10:10 – 10:30
0678 - Development of a Force Reflecting Tele-robot for Remote Handling in Nuclear Installations
D.D. Ray and Manjit Singh
Bhabha Atomic Research Centre (BARC), India

10:30 – 10:50
0623 - Master-Slave Servo Manipulator System for the PRIDE Facility
Jong Kwang Lee, Byung Suk Park, Hyo Jik Lee, Kiho Kim, and Ho-Dong Kim
Korea Atomic Energy Research Institute, Korea

10:50 – 11:10
0637 - Long Reach Articulated Robots for Inspection in Hazardous Environments, Recent Developments on Robotics and Embedded Diagnostics
Yann Perrot (1), L. Gargiulo (2), M. Houry (2), N. Kammerer (1), D. Keller (2), Y. Measson (1), G. Piolain (3), A. Verney (1)
(1) CEA, LIST, Interactive Robotics Laboratory, France
(2) Commissariat à l'Energie Atomique, Institut de Recherche sur la Fusion par confinement Magnétique, France
(3) AREVA NC, France

11:10-11:15 Short Break

11:15-11:30 Closing Words
Régence C

11:30-12:45 Box Lunches are served in foyer.
Bus departure for Robotics Demonstrations at 11:45 from main entrance of the hotel.

12:45-15:45 Robotic Demonstrations at IREQ – Hydro-Québec's Research Institute
Please refer to the following pages for details.

15:45-17:00 Bus return to hotel
Mobile Unit for Underground Distribution System Jobs

The Mobile Unit is a vehicle-mounted robotic system for remotely operating underground switchgear. The system is able to switch loads and ground medium-voltage cables prior to maintenance work. An overview is given of Hydro-Québec's underground distribution system, vault configurations, switches, security concerns and related difficulties in vault access. Such subsystems as the vehicle, long-reach arm, manipulator, tools and automatic task control are explained in detail. The Mobile Unit will perform a number of tasks on a switch to demonstrate its capabilities.

Unité Mobile d’intervention sur le réseau souterrain de distribution


Contact person / Personne ressource:
Stéphane Reiher, Hydro-Québec

Scompi Technology

Demonstration of the Scompi portable multi-process robotic technology developed for a variety of jobs at Hydro-Québec's hydroelectric generating facilities. Two typical robotic tasks will be presented: polishing a curved surface and wheel track refurbishment. Measuring, grinding, welding and hammer peening tools will be displayed.

La technologie Scompi

Présentation de la technologie de robotique portable multi-procédé Scompi permettant une variété d’intervention dans les équipements de production hydrauliques d’Hydro-Québec. Démonstration de deux cellules robotisées typiques, soit le polissage d’une surface courbe et la rectification de voie de roulement. Les équipements de mesure, de meulage, de soudage et de martelage seront exposés.

Contact person / Personne ressource:
Bruce Hazel, Hydro-Québec
Power line Robotics: LineScout and LineROVer Technologies

In 2003, Hydro-Québec's research institute, IREQ, initiated the development of LineScout Technology for the robotic inspection of live transmission lines of up to 765 kV. LineScout is designed to be installed and operated on energized conductors, conductor bundles and ground wires, while crossing such obstacles as clamps, spacer-dampers, vibration dampers and aircraft warning markers. It can perform visual and infrared inspections, assess the condition of splices by measuring their electrical resistance, repair broken conductors and remove damaged bolt-mounted components. Since 2006, LineScout has performed numerous detailed, comprehensive inspections of live transmission lines.

La Technologie LineScout, un robot mobile pour l'inspection sous tension des lignes de transport, circule sur les conducteurs, les faisceaux de conducteurs et les câbles de garde en franchissant la plupart des obstacles s'y trouvant tel que les chaînes d'isolateurs et les balises de signalisation aérienne. Il permet l'inspection visuelle, l'inspection thermographique, la mesure de la résistance électrique des manchons, l'intervention sur les assemblages boulonnés et la réparation temporaire de brins brisés. La démonstration permettra de voir le LineScout franchir des obstacles et déployer son bras manipulateur. Des extraits vidéo des nombreuses inspections réalisées sous tension depuis 2006 seront aussi présentés.

Contact person / Personne ressource:
Serge Montambault, Hydro-Québec

Remote Removal of Feeders for Gentilly-2 Nuclear Power Plant

In planning the refurbishment of Gentilly-2 nuclear power plant, Hydro-Québec conducted research on a method of remotely controlled removal of feeders as an alternative to the method proposed by the plant designer, AECL. Based on robotic teleoperation techniques and remote visual control, this method minimizes worker exposure to radiation at reasonable cost for jobs with a very tight schedule. This demonstration not only simulates the proposed method but also implements on our full-scale model the actual removal of a feeder from one of the most hard-to-reach area of the reactor.

Retrait à distance des Tuyaux d'Alimentation du Réacteur (TAR) pour la centrale nucléaire de Gentilly 2

En prévision de la réfection de la centrale nucléaire Gentilly-2 prévue pour 2012, Hydro-Québec a étudié une méthode robotisée de retrait à distance des tuyaux d'alimentation du réacteur en guise d’alternative à la méthode proposée par le concepteur (AECL). Cette méthode, basée sur des techniques de télémanipulation robotique avec des systèmes de vision à distance, permettrait de limiter considérablement l'exposition des travailleurs à la radiation, tout en conservant un échéancier très court et des coûts raisonnables. Cette démonstration montrera une simulation virtuelle de la méthode proposée ainsi que le retrait physique complet d'un TAR de l'une des zones les plus contraintes du réacteur, reproduit en grandeur réelle dans les laboratoires de l'IREQ.

Contact person / Personne ressource:
Eric Lavoie, Hydro-Québec
The Maski Underwater Robot

The Maski underwater robot has been used by Hydro-Québec Production for dam inspections since 2006. Visitors will see the inside of the control station and watch the vehicle live as it moves around the test pool. Simulations of typical tasks will show Maski’s most distinctive features: automatic control, measurement of visual observations and 3D reconstruction from sonar data. Members of the Maski operation team will share the experience they have gained through numerous jobs in the field.

Le robot sous-marin Maski

Le robot sous-marin Maski est utilisé depuis 2006 par Hydro-Québec Production pour l’inspection de ses barrages. On pourra visiter l’intérieur du poste de commande et observer le véhicule en direct alors qu’il se déplace dans le bassin d’expérimentation. Le sous-marin simulera quelques tâches qui permettront d’illustrer ses caractéristiques les plus marquantes, telles que la navigation en mode automatique, la mesure d’observation visuelles et la reconstruction 3D à partir de données sonar. Des membres de l’équipe d’exploitation de Maski seront présents pour partager l’expérience qu’ils ont acquise lors de nombreux chantiers.

Contact person / Personne ressource:
Alain Croteau, Hydro-Québec

Neptune: Underwater Robotic System for High-Precision Inspection on Hydro Power Facilities

The Neptune system is designed for high-precision inspections of underwater embedded parts in hydro power facilities. Its modular structure allows the system to be adjusted to fit the vast majority of facilities. Inspections are performed using a submersible laser scanner mounted on a 3-DOF robot arm, precisely aligned sighting wires and laser tracking of the system’s bearings. The results will include measurements of flatness, and vertical, horizontal and parallel alignment. Residual metal thickness can also be measured using a special ultrasonic scanner. The demonstration will use a mock-up of the complete system with major subsystems presented in greater detail.

Neptune : système robotisé submersible pour le diagnostic à haute précision des installations hydro-électriques

Le système Neptune est conçu pour fournir un diagnostic précis des pièces encastrées submergées des centrales hydro-électriques. Sa structure modulaire lui permet de s’ajuster à la grande majorité des configurations de centrales. Le diagnostic est basé sur un scanner laser monté sur un bras robotisé, sur des fils de localisation précisément alignés ainsi qu’un trackeur laser à la surface pour obtenir le référentiel du système. Neptune permet la mesure de la planéité, de la verticalité/horizontalité ainsi que du parallélisme. L’épaisseur résiduelle des pièces peut également être mesurée grâce à un scanner à ultrasons. La démonstration utilisera une maquette du système où chacun des principaux sous-systèmes pourra être présenté plus en détail.

Contact person / Personne ressource:
Michel Blain, Hydro-Québec