

Laboratoire de  
**robotique**  
de l'Université Laval

## Third International Conference on Cable-Driven Parallel Robots (CableCon2017) Program

Note: The locations of the events are indicated between parentheses. See the table at the end of the program for the details of the locations.

### Tuesday, August 1

17:00 Registration and welcome gathering (VCH-Atrium)

18:00 Buffet with sandwiches, salads, drinks etc (VCH-Atrium)

### Wednesday, August 2

08:15 Registration (GHK-2320)

08:40 Opening remarks (GHK-2320)

08:50 Keynote address I: Cable-driven and Parallel-actuated Robots for Training of Human Gait, Posture, and Balance (S. Agrawal, Columbia University, GHK-2320)

#### Displacement Analysis I (GHK-2320)

*session chair: Marco Carricato, Università di Bologna*

09:50 Direct Kinematics of CDPDR with Extra Cable Orientation Sensors: the 2 and 3 Cables Case with Perfect Measurement and Ideal or Elastic Cables (J.-P. Merlet)

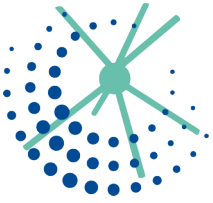
10:10 Improving the Forward Kinematics of Cable-Driven Parallel Robots Through Cable Angle Sensors (X. Garant, A. Campeau-Lecours, P. Cardou, C. Gosselin)

10:30 Coffee break



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### **Modelling I (GHK-2320)**

*session chair: Marc Arsenault, Laurentian University*

- 10:50 Manipulator Deflection for Optimum Tension of Cable-Driven Robots with Parameter Variations (L. Notash)
- 11:10 Sensitivity Analysis of the Elasto-Geometrical Model of Cable-Driven Parallel Robots (S. Baklouti, S. Caro, É. Courteille)
- 11:30 CASPR-ROS: A Generalised Cable Robot Software in ROS for Hardware (J. Eden, C. Song, Y. Tan, D. Oetomo, D. Lau)
- 12:00 Lunch (ABP-Cafeteria)

### **Trajectory Planning and Control I (GHK-2320)**

*session chair: Hamid Taghirad, K. N. Toosi University of Technology*

- 13:30 Rest-to-Rest Trajectory Planning for Planar Underactuated Cable-Driven Parallel Robots (E. Idà, A. Berti, T. Bruckmann, Marco Carricato)
- 13:50 Dynamically-Feasible Elliptical Trajectories for Fully Constrained 3-DOF Cable-Suspended Parallel Robots (G. Mottola, C. Gosselin, M. Carricato)
- 14:10 Dynamic Transition Trajectory Planning of Three-dof Cable-Suspended Parallel Robots (X. Jiang, C. Gosselin)
- 14:30 Coffee break

### **Applications I (GHK-2320)**

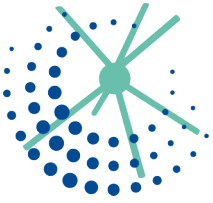
*session chair: Andreas Pott, Fraunhofer IPA*

- 14:50 Preliminary Running and Performance Test of the Huge Cable Robot of FAST Telescope (H. Li, J. Sun, G. Pan, Q. Yang)
- 15:10 On the Improvements of a Cable-Driven Parallel Robot for Achieving Additive Manufacturing for Construction (J.-B. Izard, A. Dubor, P.-E. Hervé, E. Cabay, D. Culla, M. Rodriguez, M. Barrado)
- 15:30 Inverse Kinematics for a Novel Rehabilitation Robot for Lower Limbs (A. Badi, M. Saad, G. Gauthier, P. Archambault)



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### **Social Activities**

16:00 Quebec City tour by bus (departure from Telus Stadium parking lot)

18:00 Dinner (Château Frontenac, Bellevue room)

### **Thursday, August 3**

#### **Displacement Analysis II (GHK-2320)**

*session chair: Jean-Pierre Merlet, INRIA Sophia Antipolis*

08:50 A New Approach to the Direct Geometrico-Static Problem of Cable Suspended Robots Using Kinematic Mapping (M. Husty, J. Schadlbauer, P. Zsombor-Murray)

09:10 Initial Length and Pose Calibration for Cable-Driven Parallel Robots with Relative Length Feedback (D. Lau)

09:30 Static Analysis and Dimensional Optimization of a Cable-Driven Parallel Robot (M. Newman, A. Zygielbaum, B. Terry)

#### **Modelling II (GHK-2320)**

*session chair: Leila Notash, Queen's University*

09:50 Assumed-Mode-Based Dynamic Model for Cable Robots with Non-Straight Cables (J. I. Ayala Cuevas, E. Laroche, O. Piccin)

10:10 Modelling of Flexible Cable-Driven Parallel Robots using a Rayleigh-Ritz Approach (H. A. Godbole, R. J. Caverly, J. Forbes)

10:30 Coffee break

#### **Workspace Analysis (GHK-2320)**

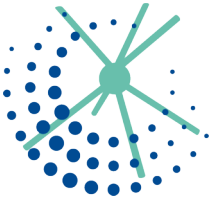
*session chair: Marc Gouttefarde, CNRS and LIRMM*

10:50 Determination of the Cable Span and Cable Deflection of Cable-Driven Parallel Robots (A. Pott)



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11:10 Geometric Determination of the Cable-Cylinder Interference Regions in the Workspace of a Cable-Driven Parallel Robot (A. Martin, S. Caro, P. Cardou)

11:30 Twist Feasibility Analysis of Cable-Driven Parallel Robots (S. Lessanibahri, M. Gouttefarde, S. Caro, P. Cardou)

12:00 Lunch (ABP-Cafeteria)

### **Trajectory Planning and Control II (GHK-2320)**

*session chair: Tobias Bruckmann, Universität Duisburg-Essen*

13:30 Transverse Vibration Control in Planar Cable-Driven Robotic Manipulators (M. Rushton, A. Khajepour)

13:50 Application of a Differentiator-Based Adaptive Super-Twisting Controller for a Redundant Cable-Driven Parallel Robot (C. Schenk, C. Masone, H. Bühlhoff, A. Pott)

14:10 Randomized Kinodynamic Planning for Cable-Suspended Parallel Robots (R. Bordalba, J. M. Porta, L. Ros)

14:30 Coffee break

### **Design (GHK-2320)**

*session chair: Stéphane Caro, CNRS and LS2N*

14:50 On the Design of a Three-DOF Cable-Suspended Parallel Robot based on a Parallelogram Arrangement of the Cables (D.-S. Vu, E. Barnett, A.-M. Zaccarin, C. Gosselin)

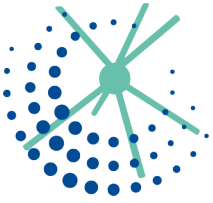
15:10 On Improving Stiffness of Cable Robots (C. Nelson)

15:30 Optimal Design of a High-Speed Pick-and-Place Cable-Driven Parallel Robot (Z. Zhang, Z. Shao, L. Wang, A. J. Shih)



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### **Social Activities**

- 16:00 Guided visit of the Huron-Wendat Museum (departure from Telus Stadium parking lot)
- 17:30 Cocktail reception (Hôtel-Musée Premières Nations)
- 18:30 Conference banquet (Restaurant la Traite)
- 21:30 Return to campus (800/801 bus station)

### **Friday, August 4**

- 08:30 Keynote address II: Cable Modelling for Large Cable Robots (M. Nahon, McGill University, GHK-2320)

#### **Modelling III (GHK-2320)**

*session chair: Darwin Lau, Chinese University of Hong Kong*

- 09:30 A Polymer Cable Creep Modeling for a Cable-Driven Parallel Robot in a Heavy Payload Application (J. Piao, X. Jin, E.-P. Choi, J.-O. Park, C.-S. Kim, J. Jung)
- 09:50 Bending Fatigue Strength and Lifetime of Fiber Ropes (M. Wehr, A. Pott, K.-H. Wehking)
- 10:10 Bending Cycles and Cable Properties of Polymer Fiber Cables for Fully Constrained Cable-Driven Parallel Robots (V. Schmidt, A. Pott)
- 10:30 Coffee break

#### **Tension Distribution (GHK-2320)**

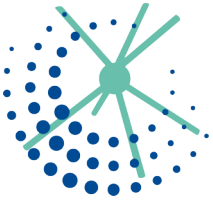
*session chair: Juan Antonio Carretero, University of New Brunswick*

- 10:50 A Fast Algorithm for Wrench Exertion Capability Computation (G. Boschetti, C. Passarini, A. Trevisani, D. Zanotto)
- 11:10 Tension Distribution Algorithm for Mobile Cable-Driven Parallel Robots (T. Rasheed, P. Long, D. Marquez-Gamez, S. Caro)



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11:30 Improvement of cable tension observability through a new cable driving unit design (M. Rognant, É. Courteille)

12:00 Lunch (ABP-Cafeteria)

### **Applications II (GHK-2320)**

*session chair: Carl Nelson, University of Nebraska-Lincoln*

13:30 On the Design of a Novel Cable-Driven Parallel Robot Capable of Large Rotation About One Axis (A. Fortin-Côté, C. Faure, L. Bouyer, B. J. McFadyen, C. Mercier, D. Laurendeau, M. Bonenfant, P. Cardou, C. Gosselin)

13:50 Concept Studies of Automated Construction Using Cable-Driven Parallel Robots (T. Bruckmann, C. Reichert, M. Meik, P. Lemmen, A. Spengler, H. Mattern, M. König)

14:10 Design and Analysis of a Novel Cable-Driven Haptic Master Device for Planar Grasping (K. Jadhao, P. Lambert, T. Bruckmann, J. L. Herder)

14:30 Coffee break

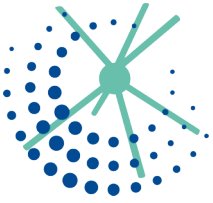
14:50 **Tour of the Laboratoire de robotique** (departure from GHK-2320, rooms PLT-3702, PLT-00370, PLT-00136)

16:30 Closing remarks (PLT-Main hall)



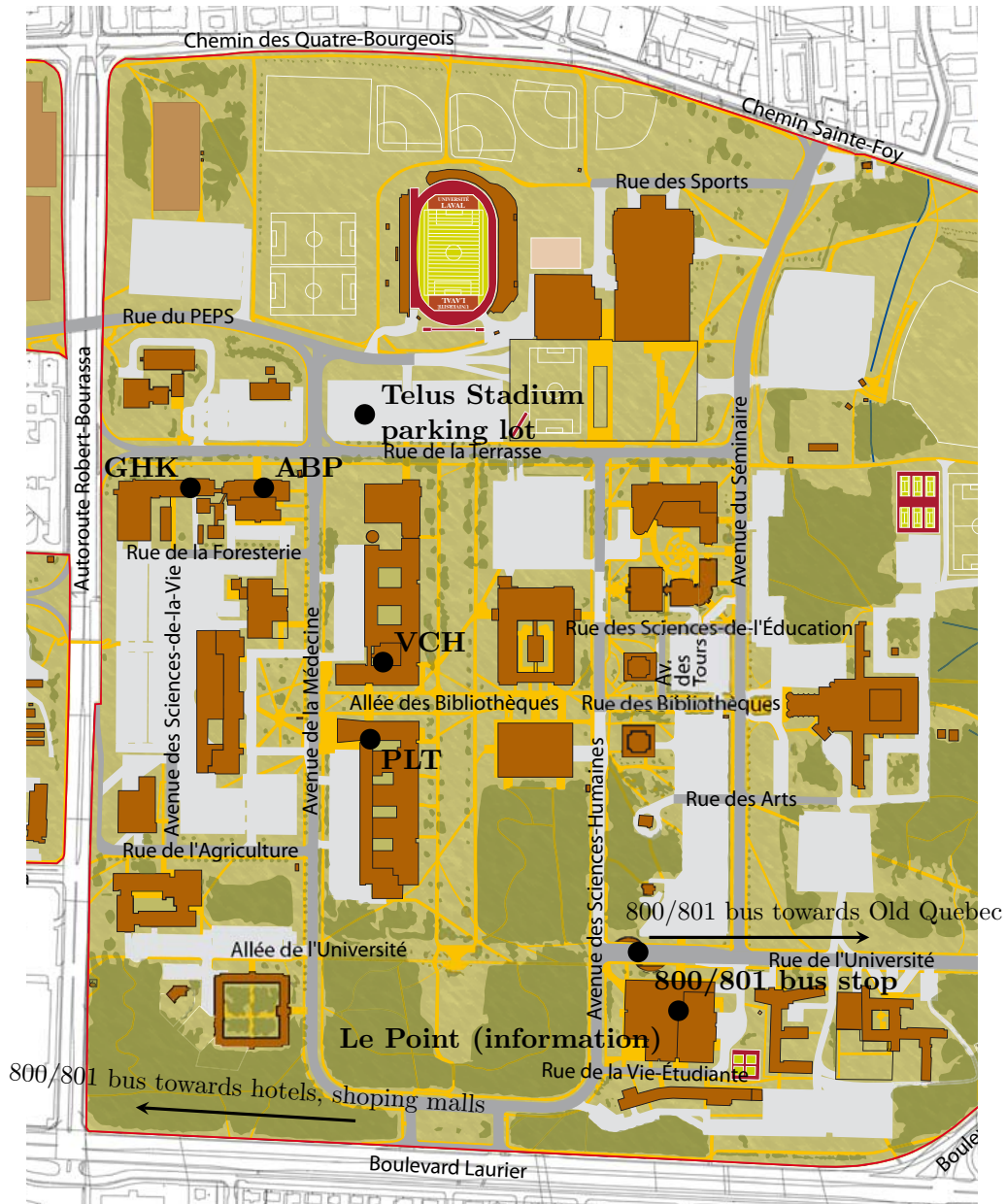
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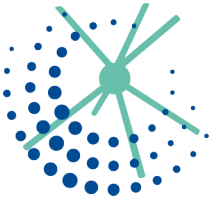




## Campus Map

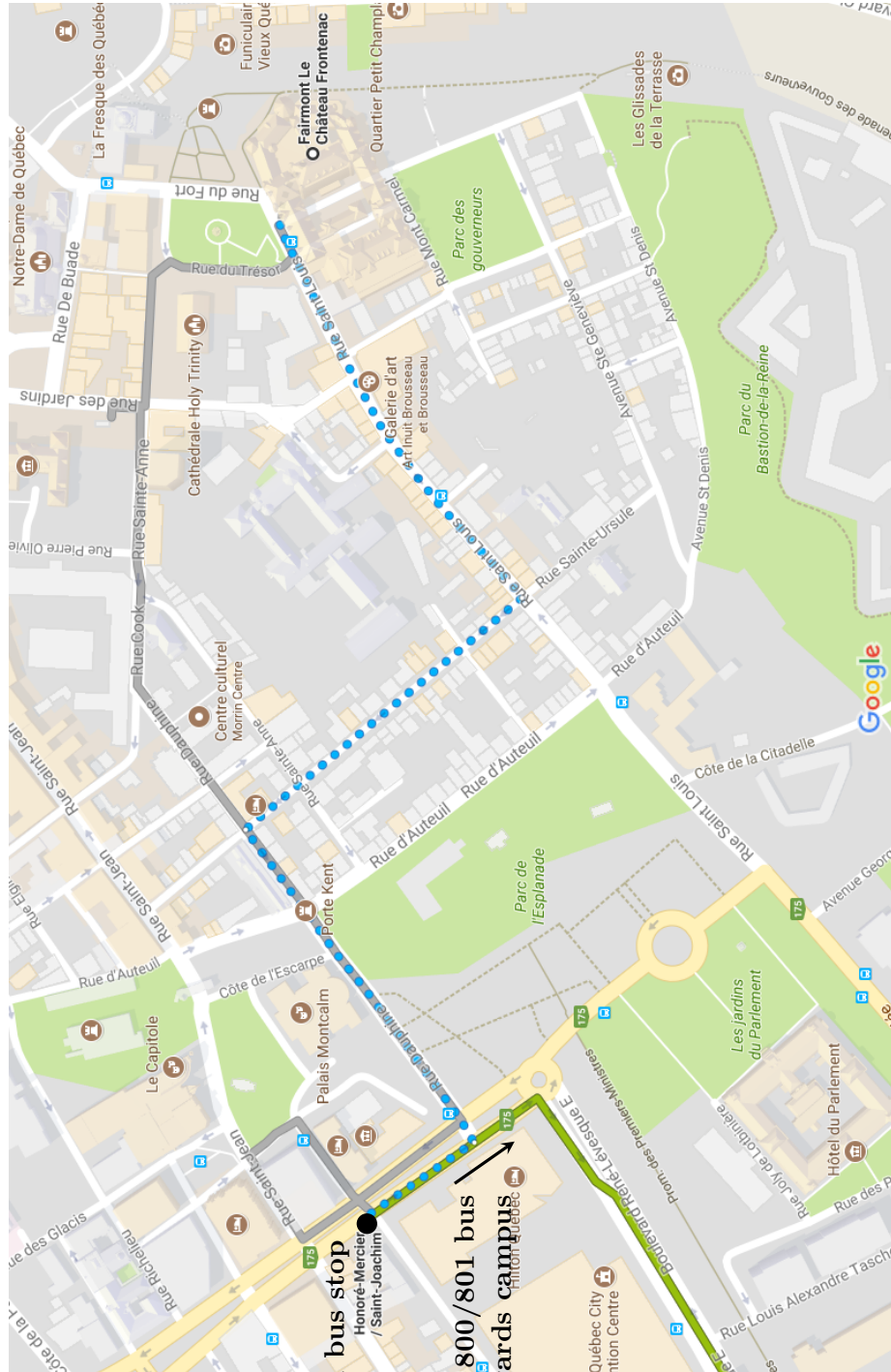
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|-------------------------------------|---------------------------------------|
| <b>ABP:</b> Abitibi-Price Building  | <b>GHK:</b> Gene-H.-Kruger Building   |
| <b>PLT:</b> Adrien-Pouliot Building | <b>VCH:</b> Alexandre-Vachon Building |





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## From Château Frontenac to Campus



800/801 bus stop  
Honoré-Mercier  
/ Saint-Joachim

800/801 bus  
towards campus



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