Gabriel Rodrigues de Campos

Postdoctoral research associate

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Education

- **2009-2012**
  PhD in Automatic Control : "Agreement strategies for multi-robots systems"
  Gipsa-Lab (CNRS)/ Grenoble INP, Grenoble, France
  ➤ Design of distributed algorithms with communication constraints
  ➤ Analysis of consensus algorithms
  ➤ Control design for geometric formations
  Supervisors: Alexandre Seuret (CR CNRS) and Carlos Canudas de Wit (DR CNRS)
  Context: European project FeedNetBack
  Defense date: 23th November 2012

- **2011**
  6 months
  Research visit to the Automatic Control Lab, KTH
  Royal Institute of Technology (KTH), Stockholm, Sweden
  ➤ Design and analysis of formation control algorithms
  Supervisors: Dr. Dimos Dimarogonas and Prof. Karl Henrik Johansson

- **2009-2012**
  Management Training
  Klein Consultant, Grenoble, France
  ➤ Project and team management, team communication and interpersonal relationships

- **2007-2009**
  Master degree in Electrical Engineering
  Université Reims Champagne Ardenne (URCA), Reims, France
  ➤ **Main expertise:** Automatic Control
  ➤ **Secondary expertise:** Advanced control, discrete time systems, signal processing
  ➤ Graduation *with honors*- **Ranked 1st/4**

- **2006-2007**
  Bachelor of Science degree in Electrical Engineering
  Université Reims Champagne Ardenne (URCA), Reims, France
  ➤ **Engineering courses:** Mathematics, electrical engineering, industrial computer science, embedded systems
  ➤ Graduation *with honors*- **Ranked 4th/72**

- **2004-2007**
  Bachelor of Science degree in Electrical Engineering
  Instituto Superior de Engenharia de Coimbra, Coimbra, Portugal
  ➤ **General engineering courses:** Physics, mathematics, electrical engineering, computer science
  ➤ Graduation *with honors*

- **2004**
  Training course for youth team leaders
  Slovakian Committee of Europe at School, Bratislava, Slovakia

Professional Experience

- **2015-Now**
  Postdoctoral Research Associate
  Politecnico di Milano, Milano, Italy
  ➤ Safety verification and supervisory methods for automotive applications
  ➤ Human machine interaction in critical safety systems
  ➤ Conflict resolution techniques

- **2012-2015**
  Postdoctoral Research Associate
  Chalmers University of Technology, Göteborg, Sweden
  ➤ Intelligent transportation systems
  ➤ Cooperative driving and conflict resolution techniques
  ➤ Active safety algorithms for automobile applications

- **2009**
  6 months
  Internship : "Modeling and control strategies for a Quad-rotor aircrafts"
  Centre de Recherche Sciences Technologies de l'Information et Communication- CReSTIC, Reims, France
  ➤ Aircraft modeling, control and trajectory generation

Teaching and Supervision

- **2015-Now** **Teaching Assistant**
  Politecnico di Milano, Milano, Italy
  - **Supervision:**
  - ➢ **"Driver intent inference at urban intersections"**
    Master thesis in automatic control
  - ➢ **Teaching:**
  - ➢ **Undergraduate classes:** Control theory
- **2014-2015** **Teaching Assistant**
  Chalmers University of Technology, Göteborg, Sweden
  - ➢ **Supervision:**
  - ➢ **"Distributed coordination of networked mobile systems in uncertain environments"**
    PhD thesis in automatic control
  - ➢ **"Threat-assessment and decision-making protocols for safety applications"**
    Master thesis in systems, control and mechatronics
  - ➢ **"Threat assessment and collision avoidance strategies at traffic intersections"**
    Master thesis in systems, control and mechatronics
  - ➢ **Teaching:**
  - ➢ **"Platform for Robot Swarm Behavior"**
    Bachelor thesis in automation and mechatronics
  - ➢ **"Experimental platform for autonomous collision avoidance strategies"**
    Design project in systems, control and mechatronics
  - ➢ **"Experimental platform for cooperative control of robot swarms"**
    Design project in systems, control and mechatronics
  - ➢ **"Collective control of autonomous robots: A multi-robot platform"**
    Bachelor thesis in automation and mechatronics
- **2009-2012** **Teaching Assistant**
  Université Joseph Fourrier, Grenoble, France
  - ➢ **Teaching:**
  - ➢ **Undergraduate Classes:** Introduction to Electrical systems, Automatic Control and control theory
  - ➢ **Graduate Classes:** Model Predictive Control, Feedback control, Robust Control

Distinctions, Grants, Awards

- **2015** **Best paper award**
  - ➢ FAST-zero International Symposium, 2015
- **2011** **Exchange Scholarship** supported by *Grenoble INP, France*
  - ➢ Financial support of a research visit to the Automatic Control Lab from KTH, Stockholm
- **2009-2012** **MENRT Research Grant,** supported by *Ministère de l'Enseignement et de la Recherche, France*
- **2007-2009** **Research Master degree in Electrical Engineering** *with honors* **,** by URCA, *Reims, France*
- **2006-2007** *Erasmus* **Exchange Scholarship,** supported by *European Commission*
  - ➢ 12 months educational period at Université Reims Champagne Ardenne, Reims, France

Funding and project management

- **2015-Now** **Project** BETTER CARS
- **2014- 2015** **(2) Industrial projects** with Denso Corporation
- **2014** **Research visits and travel** grants
- **2011** **Research grant** for the Royal Institute of Technology (KTH), Stockholm
- **2007-2009** **Annual subventions application** for GipsaDoc
- **2004** **Annual subventions application** for Tuna Académica de Coimbra

Skills

- **Automatic Control:**
  - ➢ **Control Theory:**, linear and non-linear control, robust control, model predictive control (MPC), optimization
  - ➢ **Multi-agent Systems:** Distributed algorithms, agreement strategies, consensus, formation control, distributed sensing
- **Engineering Science (through Education):** Numerical methods, mechanics, physics, signal processing, electrical circuits, electronics, industrial computer science
- **Management:** Project and team management competences, communication, interpersonal relationship skills

- **Software:**
  - **Technical:** MatLab, Labview, Pspice, C, C++, Assembly, Automata languages, Supervision, LaTex
  - **Text edition:** WinEdit, Word, Excel, PowerPoint in Windows and equivalent in Linux

Leadership and Complementary Assets

- **President of GipsaDoc**, the student association of Gipsa-Lab, and **Vice-president of Tuna Académica de Coimbra and of Grupo de Instr. de Sopro de Coimbra**
- **"Europe at School"** competition team leader
- **Supervisor Team Leader and Organizer of Youth Gatherings** (*Germany, Belgium, Turkey, Austria,...*)
- Active member at conferences/gatherings of **QUERCUS,** an environmental association
- **Former student of Hobo** at the Music Conservatory of Coimbra, and **musician** in several orchestras
- **Sports:** Triathlon **in competition**, squash, randonée, ski

Languages

- **Portuguese** : Native language
- **English:** Fluent (writing, reading and speaking)
  - **TOEIC** and **First Certificate in English diploma**
- **French:** Fluent (writing, reading and speaking)
  - **French Proficiency DALF diploma**
- **Italian:** Basic (writing, reading and speaking)
- **Swedish:** Basic (writing, reading and speaking)
- **Spanish, German:** Elementary

Professional Activities

- **Representative** at the Scientific Council of Grenoble INP (2009-2012), Ecole Doctorale EEATS and at the Gipsa-Lab Council
- **Organization staff member of the** "2nd IFAC Workshop on Distributed Estimation and Control in Networked System" and of the "7ème Conférence Internationale d'Automatique francophone"
- **Seminar coordinator** at the Gipsa-Lab and at the Department of Signals and Systems at Chalmers
- **Reviewing Activities**
  - **International Journals**

  Automatica, Transactions on Control Systems and Technology, Control Engineering Practice, International Journal of Systems Science, European Journal of Control, Asian Control Journal, International Journal of Robust and Non Linear Control, IET Control Theory & Applications, Journal of Intelligent and Robotic Systems, Transactions on Automation Science and Engineering, Transactions on Control of Network Systems, …

  - **International Conferences**

  Conference on Decision and Control (CDC), American Control Conference (ACC), Symposium on System, Structure and Control, European Control Conference (ECC), International Conference on Robotics and Automation (ICRA), Conference on Automation Science and Engineering (CASE), Workshop on Distributed Estimation and Control in Networked Systems (NecSys), International Conference on Control, Automation, Robotics and Vision (ICARCV), International Conference on Intelligent Transportation Systems,…

Scientific and Industrial Network

- **Co-author, co-supervisors of students, project partners**
  - LAAS (FR)
  - Royal Institute of Technology- KTH (SE)
  - Instituto Superior Técnico- IST (PT)
  - DENSO International Europe (SE)
  - Volvo Cars / Volvo Trucks (SE)
  - Politecnico di Milano (IT)
  - Université de Grenoble/ Grenoble INP /UJF (FR)
  - Chalmers University of Technology (SE)
  - Supélec (FR)
  - INRIA Rhône-Alpes (FR)
  - ÅF Group (SE)

- **Contacts**
  - Massachusetts Institute of Technology- MIT (USA)
  - University of Pennsylvania (USA)
  - Tesla (USA)
  - University of Coimbra (PT)
  - University of Exeter (UK)
  - University of Luleå (SE)
  - FTW / Vienna University of Technology (AT)
  - Mitsubishi Electric Research Laboratories (USA)
  - Berkeley (USA)
  - University of Notre Dame (USA)
  - Technische Universität München -TUM (DE)
  - Mines ParisTech (FR)
  - University of Padova (IT)
  - University of Sevilla (ES)

Invited Talks

- **2015**
  - **"Autonomous and semi-autonomous collision avoidance techniques for automotive applications"**
    - ➢ Renault, Paris, France
  - **"Autonomous and semi-autonomous conflict resolution techniques at traffic intersections"**
    - ➢ University of Nagoya, Green Mobility Collaborative Research Center, Japan
    - ➢ MINES ParisTech, Paris, France
    - ➢ Séminaire GTAA, MINES Nantes, Nantes, France
    - ➢ DENSO Europe, Göteborg, Sweden
  - **"Results and perspectives on cooperative control: agreement strategies, conflict resolution and active-safety systems"**
    - ➢ TU Delft, Delft, The Netherlands
- **2014**
  - **"On autonomous and cooperative driving techniques"**
    - ➢ KARYON project - Final Workshop, SP, Borås, Sweden
  - **"Results and Perspectives on distributed control: Theory and Applications"**
    - ➢ Supélec, Paris, France
  - **"Cooperative control: consensus algorithms, formation control and negotiation techniques"**
    - ➢ Vienna University of Technology, Institute of Telecommunications, Vienna, Austria
    - ➢ Department of Computer Science and Engineering, Chalmers, Göteborg, Sweden
  - **"Agreement strategies for multi-robot systems"**
    - ➢ COOPNET Seminar, Chalmers, Göteborg, Sweden
- **2013**
  - **"On distributed conflict resolution at road intersections"**
    - ➢ Massachusetts Institute of Technology (MIT), Boston, USA
    - ➢ Mitsubishi Electric Research Laboratories (MERL), Boston, USA
    - ➢ IEEE Workshop on Open Problems and Challenges in Automotive Control, Washington, USA
    - ➢ Workshop at the Department of Signals and Systems, Chalmers, Göteborg, Sweden
    - ➢ Volvo Cars inspiration seminar, Göteborg, Sweden
    - ➢ SAFER traffic safety workshop, Lindholmen Science Park, Göteborg, Sweden
  - **"Agreement strategies for multi-robot systems"**
    - ➢ S2 seminar, Department of Signals and Systems, Chalmers, Göteborg, Sweden
- **2012**
  - **"Agreement strategies for multi agent systems with memory"**
    - ➢ Delay Systems European Research Group (GDRE-CNRS) meeting, Supelec Paris, France
- **2011**
  - **"Towards perfectly symmetric multi-agent deployment"**
    - ➢ FeedNetBack Annual meeting, Grenoble, France
- **2010**
  - **"Continuous-time double integrator consensus algorithms improved by an appropriate sampling"**
    - ➢ FeedNetBack Junior Researchers Workshop, Annecy, France

Scientific Publications

- **Journal Papers**
  - ➢ Gabriel R. Campos, Paolo Falcone, Robert Hult, Henk Wymeersch and Jonas Sjöberg, "Traffic coordination at road intersections: autonomous decision-making algorithms using model-based heuristics", IEEE Control Systems Magazine, *Under review*
  - ➢ Robert Hult, Gabriel R. Campos, Paolo Falcone, Erik Steinmetz and Henk Wymeersch," Towards optimal coordination of cooperative automated vehicles", IEEE Signal Processing Magazine, *Under review*
  - ➢ G. Rodrigues de Campos, D. V. Dimarogonas, A. Seuret and Karl H. Johansson, "Distributed control strategy for MAS compact Formations", IMA Journal of Mathematical Control and Information, *Under review*
  - ➢ A. Colombo, G. Rodrigues de Campos, F. Della Rossa "Least restrictive collision avoidance on a road network with sparse Traffic", *To be submitted*
  - ➢ G. Rodrigues de Campos and A. Seuret, "Improved stability of consensus algorithms for MAS using appropriated sampling", *Under preparation*
  - ➢ G. Rodrigues de Campos, A. Runarsson, F. Granum, P. Falcone and K. Alenljung, "Active-safety systems: A probabilistic threat-assessment and decision-making protocol for collision avoidance at intersections", *Under preparation*
  - ➢ G. Rodrigues de Campos, "Discussion on: Stability Analysis for the Group Dynamics Consensus with Time Delayed Communications", European Journal of Control, pages 469-472, 2012.

- **Refereed International Conferences**
  - ➢ S. M. Hosseini, N. Murgovski, G. Rodrigues de Campos and J. Sjöberg, "An Adaptive Collision Warning System For Automotive Applications", American Control Conference, 2016, *Submitted*

- G. Rodrigues de Campos, F. Della Rossa, A. Colombo, "Optimal and least restrictive supervisory control: safety verification methods for human-driven vehicles at traffic intersections", 54th IEEE Conference on Decision and Control, 2015
- N. Murgovski, G. Rodrigues de Campos, J. Sjöberg, "Convex modeling of conflict resolution at traffic intersections", 54th IEEE Conference on Decision and Control, 2015
- G. Rodrigues de Campos, Paolo Falcone, Jonas Sjöberg, "Traffic safety at intersections: a priority based approach for cooperative decision-making", 3rd FAST-zero Symposium , 2015
- R. Hult, G. Rodrigues de Campos, P. Falcone and H. Wymeersch, "An approximate solution to the optimal coordination problem for autonomous vehicles at intersections", American Control Conference, 2015
- H. Wymeersch, G. Rodrigues de Campos, P. Falcone, L. Svensson and E. Ström, "Challenges for cooperative ITS: improving road safety through the integration of wireless communications, control, and positioning", International Conference on Computing, Networking and Communications, 2015
- G. Rodrigues de Campos, P. Falcone, H. Wymeersch, R. Hult and J. Sjöberg, "A receding horizon control strategy for cooperative conflict resolution at traffic intersections", 53rd IEEE Conference on Decision and Control, 2014
- G. Rodrigues de Campos, A. Runarsson, F. Granum, P. Falcone and K. Alenljung, "Collision avoidance at intersections: A probabilistic threat-assessment and decision-making system for safety interventions", 17th IEEE Conference on Intelligent Transportation Systems, 2014
- E. Steinmetz, R. Hult, G. Rodrigues de Campos, M. Wildemeersch, P. Falcone and H. Wymeersch, "Communication Analysis for Centralized Intersection Crossing Coordination", 11th International Symposium on Wireless Communication Systems, 2014
- G. Rodrigues de Campos, P. Falcone and J. Sjöberg, "Autonomous cooperative driving: a velocity-based negotiation approach for intersections crossing", 16th International IEEE Conference on Intelligent Transportation Systems, 2013
- G. Rodrigues de Campos, L. Briñon Arranz, A. Seuret and S.-I. Niculescu, "On the consensus of heterogeneous multi-agent systems: a decoupling approach", 3rd IFAC Workshop on Distributed Estimation and Control in Networked Systems, 2012
- G. Rodrigues de Campos and A. Seuret, "Improved consensus algorithms using memory effects ", 50th IEEE Conference on Decision and Control and European Control Conference, *2011*
- G. Rodrigues de Campos and A. Seuret, "Continuous-time double integrator consensus algorithms improved by an appropriate sampling ", 2nd IFAC Workshop on Distributed Estimation and Control in Networked Systems, 2010

- **Refereed National Conferences**
  - G. Rodrigues de Campos and A. Seuret, "Algorithmes de consensus pour des systèmes double intégrateur continus améliorés par un échantillonnage approprié", 4èmes Journées Doctorales /Journées Nationales MACS, 2011

- **Refereed Extended Abstracts**
  - R. Hult, G. Rodrigues de Campos, P. Falcone and H. Wymeersch, "Towards optimal coordination of vehicles at road intersections", RSS Workshop on Distributed Control and Estimation for Robotic Vehicle Networks, 2014
  - G. Rodrigues de Campos, I. Shames and A. Bishop, "Distributed labeling in autonomous agent populations ", 20th International Symposium on Mathematical Theory of Networks and Systems, 2012

- **Technical Reports**
  - X. Diyin, F. Granum, J. Gustafsson, A. Fjeldsted and G. Rodrigues de Campos, "Experimental platform for autonomous collision avoidance strategies". Design project in systems, control and mechatronics, 2013
  - T. Olsson, E. Skog, D. Stenman and G. Rodrigues de Campos," Experimental platform for cooperative control of robot swarms". Design project in systems, control and mechatronics, 2013
  - A. Seuret, D. Simon, E. Roche, L. Briñon Arranz and G. Rodrigues de Campos, "Multi-agent systems architecture". D01.03 Building blocks and architectures, Deliverable FeedNetBack project, 2010

References

1. **Dr. Paolo Falcone**
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2. **Dr. Henk Wymeersch**
   Associate Professor (Chalmers)
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3. **Dr. Klas Alenljung**
   Driving Assist. & Safety Engineering (DENSO Europe)
   Phone: +46 762139184   **Email:** k.Alenljung@denso.se

4. **Dr. Alexandre Seuret**
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