Manuel Mazo Espinosa (a.k.a. Manuel Mazo Jr.)

CONTACT
INFORMATION

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DATE AND PLACE
OF BIRTH

3rd of May 1979 at Logroño (Spain).

CITIZENSHIP

Spanish

LANGUAGES

Spanish (Native), English (Fluent), Dutch (Advanced), Swedish (Intermediate), Italian (Intermediate).

RESEARCH
INTERESTS

Cyber-physical systems; hybrid systems; distributed control; embedded control software synthesis; sensor/actuator networks.

EDUCATION

Delft University of Technology, The Netherlands

University Teaching Qualification (UTQ/BKO), (February 2013- July 2014)

University of California, Los Angeles (UCLA), Los Angeles, USA

PhD, (March 2007- Sept. 2010) Electrical Engineering.
- Advisor: Prof. Paulo Tabuada
- Areas of Study:
  - Distributed Event-Triggered Control Systems,
  - Symbolic Models for Control.

M.Sc., (Sept. 2005- March 2007) Electrical Engineering.
- Area of Study: Control Systems.
- Minor: Applied Mathematics and Optimization.

Royal Institute of Technology (KTH), Stockholm, Sweden

M.Sc., (Civil Ingenjör) (Sept. 2001- March 2003) Electrical Engineering.
- Thesis Topic: Robust Area Coverage Robotics.
- Advisor: Prof. Karl H. Johansson
- Area of Study: Control Systems and Robotics.

Polytechnic University of Madrid (UPM), Madrid, Spain

B.Sc./M.Sc., (Ingeniero) (Sept. 1997- July 2001) Telecommunications Engineering.
- Area of Study: Communications.
- Thesis performed at KTH under Double Degree Agreement, see above.

PROFESSIONAL MEMBERSHIPS	Institute for Electrical and Electronics Engineers (IEEE): Control Systems Society, Communications Society
	International Federation of Automatic Control (IFAC), Society for Industrial and Applied Mathematics (SIAM), Association for Computing Machinery (ACM).

AWARDS

- (2007/2008) Henry Samueli Scholarship Winner from the Henry Samueli School of Engineering and Applied Sciences, UCLA.

- (2005-2009) MECD/UCLA Fellowship for postgraduate studies.

- (2005) University of Newcastle Research Scholarship, External funding from the CDSC (Centre of Excellence, Complex Dynamical Systems and Control).

- (2002/2003) Stipend given by The Swedish-Spanish Foundation for the Promotion of Education and Studies.

- (2002/2003) Scholarship for abroad studies granted by UPM.

- (2001/2002) Socrates-Erasmus grant promoted by the European Commission for exchange studies at KTH.

GRANTS

- **Acquired:**

    - CADUSY (STW-OTP), Co-applicant. 668 k€ (500k€ subsidized) 2015-2019. Share: 1 PhD, 1 PostDoc (1 year), travel costs and equipment.
    - STW Take-off grant, co-applicant with SeaState5. 40k€. Equipment.
    - Gastprofessorenprogramm des Bayerisches Staatsministerium für Bildung und Kultus, Wissenschaft und Kunst. 1400 € to support a visit as Guest Professor at TU Munich, 2014.

- **Participant:**

    - IAVTRM (STW-OTP), 1.2 M€ (750k€ subsidized) 2015-2019. Share: 1 PostDoc (3 years)
    - S4-DRIVE (STW-OTP), 651 k€ (520k€ subsidized) 2015-2019. Share: 1 Technical staff (2 year)
    - Robust Design of Cyber-Physical Systems (STW-Perspectief), 2012-2017. Share: Travel costs for 1 PhD.
    - AMBI (Marie-Curie FP7-PEOPLE-2012-IAPP), 2013-2017. Share: Costs for 2 months stay at Honeywell, Prague.

- **Submitted and planned (re-)submissions:**

    - SENTIENT (ERC Starting), PI. 1.5M€. **In preparation**. (Different project than SEnTIENT)
    - ACSEPT (NWO-WATER), Co-PI. 1M€ requested. **Under review.**
    - SEnTIENT (CHISTERA CALL - SPTIoT), Co-applicant. 1M€ requested. **Not granted.**
    - PRINCEPS (Smart CPS - Horizon2020), Coordinator. 4.8 M€ requested. **Planned re-submission**
    - SYNBIOTS (FET-OPEN, Horizon2020), Coordinator. 3.9 M€ requested. **Planned re-submission**

- All-under-Control (Horizon2020), Co-applicant. 6.3 M€ (5.4 M€ subsidized) requested. **Not Granted.**
- SWARMEYE (Horizon2020), Co-applicant. 5 M€ requested. **Not Granted.**
- "Automatic Synthesis of Controllers for Cyber-Physical Systems" (VENI), PI, 250k€ requested. **Not granted.**

PROFESSIONAL EXPERIENCE (INCLUDING TEACHING)

- **Delft University of Technology**, The Netherlands (2012-today)
  Delft Center for Systems and Control,
  Faculty of Mechanical, Maritime and Material Sciences.
  Assistant professor

- **TU München**, Germany (November 2014)
  Hybrid Control Systems group, Faculty of Electrical Engineering and Informatics.
  Guest Professor

- **INCAS**[3], The Netherlands (2010-2012)
  Post-doctoral researcher: "Wireless sensor networks controller design'.

- **University of Groningen**, The Netherlands (2010-2012)
  Department of Discrete Technology and Production Automation,
  Faculty of Mathematics and Natural Sciences.
  Post-doctoral researcher: "Wireless sensor networks controller design'.

- **Universidad de Alcalá**, Spain (Dec. 2010, Dec. 2011, Feb. 2013)
  Department of Electronics **Invited lecturer:** "Control of Networked Cyber-Physical Systems'.
  6 hours of lectures and a workshop on the tool Pessoa.

- **University of California, Los Angeles**, USA (2007-2010)
  Electrical Engineering Department (Cyber-Physical Systems Lab)
  Graduate student researcher: "Distributed event-triggered control" and "Symbolic models for control-systems".

- **University of California, Los Angeles**, USA (2005-2007)
  Electrical Engineering Department (Cyber-Physical Systems Lab)
  Graduate student: "Control Systems".

- **The University of Newcastle**, Australia (2005)
  School of Engineering and Computer Science (CDSC)
  Teaching assistant: Digital Signal Processing, Electrical Machines;
  Graduate student researcher: "Hybrid systems identification".

- **Polytechnic University of Madrid**, Spain (2004-2005)
  Escuela Técnica Superior de Ingenieros Industriales (DISAM)
  Assistant researcher: "Motion Simulator under project PLATEL".

- **Royal Institute of Technology**, Sweden (2002-2004)
  Electrical Engineering Department (Control Section) and
  Mathematics Department (Systems and Optimization Section)
  Teaching assistant: Basic Control Systems Course (Lab Section);
  Assistant researcher: "Cooperative robotics".

- **CERN**, Switzerland (2001)
  Summer student project: SCADA system for distributed data processing.

- **Logytel S.L.**, Spain (1998, 2000, 2004)
  Summer intern: SCADA systems (IsaGraf), control networks (Lonworks/Echelon) and PLC (IEC1131) developer.

- **DISC Graduate School**, The Netherlands:
  Spring 2015, Spring 2017. "Automatic Verification and Synthesis of Complex Systems", with Alessandro Abate (Oxford University).

- **TU Delft**, The Netherlands:

  - **BSc. courses:** WBTP211-10 "Mechatronics Project" (500+ students). Fall 2012, Spring 2013, Fall 2014: Grading, lecture, examination and course redesign. Responsible instructor from Spring 2015.
  - **MSc. courses:**
    SC4070: "Control Systems Lab" (75 students). Spring 2014, Spring 2015: Responsible instructor.
    SC4240TU "Control Methods for Robotics", Dr. G. Lopes, Spring 2013, Invited lecturer 2 hours.

- **TU München**, Germany:
  Invited lecturer in the course "Modeling and Verification of Embedded Systems", Fall 2014. 2 hours.

- **University of Groningen**, The Netherlands:
  Invited lecturer NABP05E Robotics, Dr. M. Cao. Spring 2012, Spring 2011. 4 hours.

- **U. Alcala**, Spain:
  Invited lecturer. MSc. Program on "Advanced Electronic and Intelligent Systems", Prof. F. Espinosa, Winter 2011, Winter 2010. 4 hours of lectures each time, plus additional consultation hours.

- **University of Newcastle, Australia:**

  - Tutorials and grading for ELEC3400 Digital Signal Processing, Prof. R. Moheimani. Fall 2005
  - Tutorials and grading for ELEC2120 Electrical Machines, Mr. T. Summers. Fall 2005

- **KTH**, Sweden:
  Lab Sessions for ELEC1000/1110/1120 Automatic Control, General Course, Prof. E. W. Jacobsen. Fall 2002, Spring 2003

- **TU Delft:**

  - **PhD Supervision**:

    1. Cees Verdier (Sept. 2015 - today).
    2. Anqi Fu (Sept. 2013- today).
    3. Eric Trottemant (Nov. 2013-Nov. 2015).
    4. Visiting PhD Student: Carlos Santos (Sept. 2013 - Dec. 2013, Sept. 2014 - Dec. 2014).

  - **PostDoc Supervision**:
    1. Anton V. Proskurnikov (Sept. 2016 - today)
    2. Dieky Adzkiya (Sept. 2014-Sept. 2015)
    3. Erkan Kayakan (Sept. 2015- Dec. 2015)

- MSc. theses supervision: (Total: 20)
  Embedded Systems: Bassilio Dahlan, Athanasios Tasoglou, Bastiaan Oosterhuis, Saurav Paul.
  Systems and Control/ Control Engineering: Arman Sharifi Kolarijani, Vignesh Radhakrishnan, Yujie Zhang, Zhengyu Li, Qianying Li, Mani Kaustubh. Bart-Jan van Roekel, Kai Kuhlmann, Nikos Kekatos, Charlotte Le Coultre, Pascal Zijlstra, Saumil Shah, Raziel Ivan Gonzalez Ramirez, Bouke N. Krom, Anton Stoop, Kai S. Kuhlmann.
- **TUDelft/Leiden iGEM Team modeling advisor**. Summer/Fall 2014.

- **Wageningen University:** Supervisor/examiner of MSc. thesis Shaojie Zhuang, Agrotechnology and Animal Sciences, July 2012.

- **University of Groningen:**

  - Supervisor/examiner of MSc. thesis Froukje de Roo, Applied Mathematics. July 2012.
  - Supervisor/examiner of MSc. thesis Sebastian Trip, Energy and Environmental Sciences. July 2012.

Service

- **University of Pretoria (South Africa):** External MSc Mechatronics examiner

- **Israeli Science Foundation:** Project Evaluator

- **HSCC 2016 and 2017 - Hybrid Systems: Computation and Control**: Program Committee

- **EBCCSP 2015 - First IEEE International Conference on Event-based Control, Communication, and Signal Processing:** Program Commitee and Work-in-progress chair.

- **2016 DISC Summer School:** Co-organizer, "A Systems and Control Perspective in Human-Robot-Environment Interaction"

- **TU Delft, Education Committee BSc. Mechanical Engineering**: Lecturer member.

- **MTNS 2014 Mini-Course:** Co-organizer of course on "Automated verification and synthesis of complex systems".

- **CDC 2013 Invited Sessions:** Co-organizer of 2 invited sessions on the topic of "Formal methods in control".

- **ADHS 2012 Invited Sessions:** Organizer of an invited session on the topic of "Event-triggered and self-triggered control".

- **CDC/ECC 2011 Invited Sessions:** Co-organizer of 3 invited sessions on the topic of "Symbolic methods for control".

- **CDC 2010 Pre-Conference Workshop:** Lecturer on "Correct-by-design embedded control software synthesis".

- **PhD Graduation Committees**:

  - Héctor J. García de Marina Peinado (U. Groningen, 2016),
  - Florian Kerber (U. Groningen, 2011)

- **TU Delft, Dutch Automated Vehicle Initiative**: Co-responsible for control related activities; organization of student meetings.

- **TU Delft, CyberZoo**: Co-initiator of the project.

- **UCLA, Graduate admissions committee:** Electrical Engineering, Signals and Systems section, 2008.

- 26-28 Oct. 2016, ANR Workshop "Control subject to computational and communication constraints" (CO4), CNRS Toulouse

- July 2016 (one week), University of Trento, Italy: Visiting researcher at Department of Information Engineering and Computer Science, invited by Prof. G.P. Picco.

- July 2016 (one week), Imperial College London, UK: Visiting researcher at Adaptive Emergent Systems Engineering group (Department of Computing), invited by Prof. J. McCann.

- November 2014 (2 weeks), TU München, Germany: Guest professor at the Hybrid Control Systems Group, hosted by Prof. M. Zamani.

- Spring 2012 (one month), UCLA: United States of America: Visiting researcher at the CyPhyLab, invited by Prof. P. Tabuada.

- Summer 2011 (one week), TU/Berlin, Germany: Visiting researcher at the Control Systems Department, invited by Prof. J. Raisch.

- Spring 2010 (one week), KTH, Sweden: Visiting researcher at the ACCESS center, invited by Prof. K. H. Johansson.

- Winter 2010, 2011, 2012 (one week each time), University of Alcala, Spain: Visiting researcher/lecturer at the Department of Electronics, invited by Prof. Espinosa.

- Fall 2009 (one quarter), MIT: Visiting student at the Laboratory for Information and Decision Systems, under the auspices of Prof. Emilio Frazzoli.

Thesis

1. **PhD Thesis:** "Contributions to the Control of Networked Cyber-Physical Systems', July 2010. UCLA, United States of America.

2. **MSc Thesis:**"Robust Area Covering using Hybrid Control", March 2003. KTH, Sweden

Articles in Journals

1. "A Formal Traffic Characterization of LTI Event-triggered Control Systems."
A. Sharifi-Kolarijani, and M. Mazo Jr.
To appear. IEEE Transactions on Control of Network Systems, (2016)

2. "Synthesis of Robust Piecewise Affine Output-Feedback Strategies."
E. J. Trottemant, M. Mazo Jr, and C. W. Scherer.
Journal of Guidance, Control, and Dynamics, Vol. 39, No. 7 (2016), pp. 1461-1469.

3. "Optimality of robust disturbance-feedback strategies."
E. J. Trottemant, C. W. Scherer, and M. Mazo Jr.
International Journal of Robust and Nonlinear Control, Vol. 26, (2015) pp. 1475–1488.

4. "Aperiodic Linear Networked Control Considering Variable Channel Delays: Application to Robots Coordination".
C. Santos, F. Espinosa, E. Santiso and M. Mazo Jr.
Sensors, Vol.15 No.6 (2015) pp. 12454–12473.

5. "Asynchronous decentralized event-triggered control.",
M. Mazo Jr. and M. Cao.
Automatica, Volume 50, Issue 12, pp. 3197-3203, December 2014.

6. "Adaptive self-triggered control of a remotely operated P3-DX robot: Simulation and experimentation",
C. Santos, M. Mazo Jr. and F. Espinosa.
Robotics and Autonomous Systems, Volume 62, Issue 6, 847-854, June 2014.

7. "System Architectures, Protocols and Algorithms for Aperiodic Wireless Control Systems.",
J. Araujo, M. Mazo Jr, A. Anta, P. Tabuada and K. H. Johansson.
IEEE Transactions on Industrial Informatics, Volume 10, Issue 1, 175-184, February 2014.

8. "Symbolic models for nonlinear control systems without stability assumptions.",
M. Zamani, G. Pola, M. Mazo Jr and P. Tabuada.
IEEE Transactions on Automatic Control. Volume 57, Issue 7, pp. 1804-1809, July 2012.

9. "Decentralized event-triggered control over wireless sensor/actuator networks."
Manuel Mazo Jr., and Paulo Tabuada.
IEEE Transactions on Automatic Control, Special Issue on Wireless Sensor/Actuator Networks. Volume 56, Issue 10, pp.1310-1314, October 2011.

10. "Symbolic approximate time-optimal control.",
M. Mazo Jr and P. Tabuada.
Systems and Control Letters. Volume 60, Issue 4, pp. 256-263, February 2011.

11. "An ISS event-triggered implementation for linear controllers.",
M. Mazo Jr, A. Anta and P. Tabuada.
Automatica, Volume 46, Issue 8, pp.1310-1314, August 2010.

Submitted/under review:

1. "Symbolic Models for Networked Control Systems.",
M. Zamani, M. Mazo Jr. and A. Abate.

2. "Scheduling of Event-Triggered Networked Control Systems using Timed Game Automata",
D. Adzkiya and M. Mazo Jr.

Book Chapters

1. "Decentralized Event-triggered Controller Implementations".
A. Fu and M. Mazo Jr.
In "Event-Based Control and Signal Processing". CRC Press 2016

2. "Adaptive Self-triggered Control of a Remotely Operated Robot.",
   C. Santos, M. Mazo Jr. and F. Espinosa.
   Advances in Autonomous Robotics.
   Lecture Notes in Computer Science, Springer, Volume 7429, pp. 61-72, August 2012

3. "PESSOA: A tool for embedded controller synthesis.",
   M. Mazo Jr, A. Davitian and P. Tabuada.
   22nd International Conference on Computer Aided Verification.
   Lecture Notes in Computer Science, Springer, Volume 6174, pp. 566-569, July 2010.

Articles in Peer Reviewed Conferences

1. "Periodic Asynchronous Event-triggered Control",
   A. Fu and Manuel Mazo Jr.
   Accepted. Proceedings of the 55th EEE Conference on Decision and Control 2016.

2. 'Timing Abstraction of Perturbed LTI systems with L2-based Event-Triggering Mechanism",
   A. Sharifi-Kolarijani, M. Mazo Jr. and T. Keviczky *Accepted*. Proceedings of the 55th EEE Conference on Decision and Control 2016.

3. "Scheduling of controllers' update-rates for residual bandwidth utilization",
   M. Zamani, S. Dey, S. Mohamed, P. Dasgupta, and M. Mazo Jr.
   International Conference on Formal Modeling and Analysis of Timed Systems 2016

4. "The modeling of transfer of steering between automated vehicle and human driver using hybrid control framework",
   M. Kaustubh, D. Willemsen, and and M. Mazo Jr.
   IEEE Intelligent Vehicles Symposium 2016.

5. "Advances on asynchronous event-Triggered control",
   A. Fu and M. Mazo Jr.
   Proceedings of 1st International Conference on Event-Based Control, Communication and Signal Processing, EBCCSP 2015.

6. "Symbolic Abstractions for the Scheduling of Event-Triggered Control Systems",
   A. Sharifi-Kolarijani, D. Adzkiya and M. Mazo Jr.
   Proceedings of the 54th EEE Conference on Decision and Control 2015.

7. "Aperiodic Consensus Control for Tracking Nonlinear Trajectories of a Platoon of Vehicles",
   C. Santos, F. Espinosa, E. Santiso, M. Martinez, and Mazo Jr.,
   Proceedings of the IEEE Conference on Intelligent Transportation Systems 2015.

8. "Finite Abstractions of Networked Control Systems",
   M. Zamani, M. Mazo Jr. and A. Abate,
   Proceedings of the 53rd Conference on Decision and Control 2014.

9. On symbolic optimal control via approximate simulation relations. F.de Roo and M. Mazo Jr.. Conference on Decision and Control 2013. Proceedings of the 52nd Conference on Decision and Control 2013.

10. "Design of reward structures for sequential decision-making processes using symbolic analysis.",
    M. Mazo Jr. and M. Cao.
    American Control Conference 2013.

11. "Specification-Guided Controller Synthesis for Linear Systems and Safe Linear-Time Temporal Logic.",
M. Rungger, M. Mazo Jr. and P. Tabuada.
Hybrid Systems: Computation and Control 2013.

12. "Scaling up controller synthesis for linear systems and safety specifications.",
M. Rungger, M. Mazo Jr. and P. Tabuada.
Proceedings of the 51st Conference on Decision and Control 2012.

13. "An improved self-triggered implementation for linear controllers.",
J. Araujo, H. Fawzi, M. Mazo Jr., P. Tabuada and K.H. Johansson.
NecSys 2012.

14. "Decentralized Event-Triggered Control with One Bit Communications.",
M. Mazo Jr and M. Cao.
IFAC Analysis and Design of Hybrid Systems, 2012.

15. "Decentralized event-triggered control with asynchronous updates.",
M. Mazo Jr and M. Cao.
Proceedings of the 50th Conference on Decision and Control, 2011.

16. "Self-triggered control over wireless sensor and actuator networks",
J. Araujo, A. Anta, J. Faria, A. Hernandez, M. Mazo Jr, P. Tabuada and K. H. Johansson.
IEEE International Conference on Distributed Computing in Sensor Systems (DCOSS) 2011.

17. "Approximate time-optimal control via approximate alternating simulations.",
M. Mazo Jr and P. Tabuada.
2010 American Control Conference.

18. "Towards decentralized event-triggered implementations of centralized control laws.",
M. Mazo Jr and P. Tabuada.
CONET (part of CPSWEEK), 2010.

19. "Input-to-state stability of self-triggered control systems.",
M. Mazo Jr. and P. Tabuada.
Proceedings of the 48th Conference on Decision and Control, 2009.
Awarded the General Chair's Recognition Award for Interactive Papers

20. "On Self-Triggered Control for Linear Systems: Guarantees and Complexity.",
M. Mazo Jr., A. Anta and P. Tabuada.
European Control Conference 2009.

21. "On event-triggered and self-triggered control over sensor/actuator networks.",
M. Mazo Jr. and P. Tabuada.
Proceedings of the 47th Conference on Decision and Control, 2008.

22. "Reduction of lateral and longitudinal oscillations of vehicles platooning by means of decentralized overlapping control.",
F. Espinosa, A.M.H. Awawdeh, M. Mazo Jr, J.M. Rodriguez, A. Bocos, M. Manzano.
Proceedings of the 46th Conference on Decision and Control, 2007.

23. "Multi-Robot Tracking of a Moving Object Using Directional Sensors.",
M. Mazo Jr, A. Speranzon, K. H. Johansson, X. Hu.
Proceedings of the International Conference on Robotics and Automation 2004.

24. "Robust area coverage using hybrid control.",
    M. Mazo Jr, K. H. Johansson.
    TELEC 2004.

25. "Integrated Development Environment for Underactuated Non-Linear Control Systems.",
    F. Espinosa, F. J. Castillo, M. Mazo Jr.
    SAAEI/EPF 2004.

Software

1. **PESSOA:** A Matlab toolbox for embedded control software synthesis.
   http://www.cyphylab.ee.ucla.edu/pessoa/

2. Hardware-in-the-loop simulation of Control Systems over Wireless Sensor Networks.
   http://www.ee.ucla.edu/~mmazo/Personal_Website/Software.html