Tommaso **Menara**

Postdoctoral Scholar · University of California, San Diego

San Diego, CA, USA, 92093

+1 (951) 425-8895 | tmenara@ucsd.edu | tommasomenara.com | tommasomenara | tommasomenara

Research Interest

- Cyber-Physical Systems Theory and Control
- Systems and Network Neuroscience
- Synchronization Phenomena
- Network Control Theory
- Machine Learning

Education

University of California, Riverside — *Riverside, CA, USA*

Ph.D. in Mechanical Engineering — *2016 - 2021*

Thesis: *Reverse Engineering Synchronization of Brain Network Dynamics: Controllability Properties and Functional Patterns*

University of Pisa — *Pisa, Italy*

Laurea Magistrale (M.Sc. equivalent) in Robotics and Automation Engineering — *2013 - 2016*

Thesis: *A Novel Characterization of Strong Structural Controllability: Sparsity Conditions and Control Paths*

University of Padova — *Padova, Italy*

Laurea (B.Sc. equivalent) in Mechatronics Engineering — *2010 - 2013*

Thesis: *Linear Vision Sensors and Their Usage in the Control a Smart Car*

Honors & Awards

2020	**IEEE CSS 2020 Roberto Tempo Best Paper Award**, IEEE Conference on Decision and Control	*Jeju Island, S. Korea*
2020	**Dissertation Year Program Award**, University of California, Riverside	*Riverside, USA*
2019	**Best Student Paper Award**, American Control Conference	*Philadelphia, USA*
2016	**Dean's Distinguished Fellowship**, University of California, Riverside	*Riverside, USA*

Publications

Preprints

[P1] **T. Menara**, G. Baggio, D. S. Bassett, and F. Pasqualetti. Functional control of oscillator networks. *arXiv:2012.04217*, 2021. Submitted.

[P2] X. He, L. Caciagli, L. Parkes, J. Stiso, T. M. Karrer, J. Z. Kim, Z. Lu, **T. Menara**., F. Pasqualetti, M. R. Sperling, J. I. Tracy, and D. S. Bassett. Pathological and metabolic underpinnings of energetic inefficiency in temporal lobe epilepsy. *bioRxiv*, 2021.

Journal Articles

[J1] **T. Menara**, Y. Qin, D. S. Bassett, and F. Pasqualetti. Relay interactions enable remote synchronization in networks of phase oscillators. *IEEE Control Systems Letters*, 6:500–505, 2022.

[J2] Y. Qin, **T. Menara**, D. S. Bassett, and F. Pasqualetti. Phase-amplitude coupling in neuronal oscillator networks. *Physical Review Research*, 3(2):023218, 2021.

[J3] U. Braun, A. Harneit, G. Pergola, **T. Menara**, A. Schaefer, R. F. Betzel, Z. Zang, J. I. Schweiger, K. Schwarz, J. Chen, G. Blasi, A. Bertolino, D. Durstewitz, F. Pasqualetti, E. Schwarz, A. Meyer-Lindenberg, D. S. Bassett, and H. Tost. Brain network dynamics during working memory are modulated by dopamine and diminished in schizophrenia. *Nature Communications*, 12(1):3478, 2021.

[J4] **T. Menara**, G. Lisi, F. Pasqualetti, and A. Cortese. Brain network dynamics fingerprints are resilient to data heterogeneity. *Journal of Neural Engineering*, 18(2):026004, 2021.

[J5] **T. Menara**, G. Baggio, D. S. Bassett, and F. Pasqualetti. Conditions for feedback linearization of network systems. *IEEE Control Systems Letters*, 4(3):578–583, 2020.

[J6] **T. Menara**, G. Baggio, D. S. Bassett, and F. Pasqualetti. Stability conditions for cluster synchronization in networks of heterogeneous Kuramoto oscillators. *IEEE Transactions on Control of Network Systems*, 7(1):302 – 314, 2020.

[J7] J. Stiso, A. N. Khambhati, **T. Menara**, A. E. Kahn, J. M. Stein, S. R. Das, R. Gorniak, J. Tracy, B. Litt, K. A. Davis, F. Pasqualetti, T. H. Lucas, and D. S. Bassett. White matter network architecture guides direct electrical stimulation through optimal state transitions. *Cell Reports*, 28(10):2554 – 2566.e7, 2019.

[J8] **T. Menara**, D. S. Bassett, and F. Pasqualetti. Structural controllability of symmetric networks. *IEEE Transactions on Automatic Control*, 64(9):3740–3747, 2019.

Conference Proceedings

[C1] **T. Menara**, G. Baggio, D. S. Bassett, and F. Pasqualetti. A framework to control functional connectivity in the human brain. In *IEEE Conf. on Decision and Control*, pages 4697–4704, Nice, France, Dec 2019. ***Roberto Tempo Best Paper Award***.

[C2] **T. Menara**, G. Baggio, D. S. Bassett, and F. Pasqualetti. Exact and approximate stability conditions for cluster synchronization of Kuramoto oscillators. In *American Control Conference*, pages 205 – 210, Philadelphia, PA, USA, Jul 2019. ***Best Student Paper Award***.

[C3] **T. Menara**, V. Katewa, D. S. Bassett, and F. Pasqualetti. The structured controllability radius of symmetric (brain) networks. In *American Control Conference*, pages 2802–2807, Milwaukee, WI, USA, Jun 2018.

[C4] **T. Menara**, G. Bianchin, M. Innocenti, and F. Pasqualetti. On the number of strongly structurally controllable networks. In *American Control Conference*, pages 340–345, Seattle, WA, USA, 2017.

[C5] M. Laurino, **T. Menara**, A. Stella, M. Betta, and A. Landi. Procoagulant control strategies for the human blood clotting process. In *2015 37th Annual International Conference of the IEEE Engineering in Medicine and Biology Society*, pages 4439–4442, Aug 2015.

Peer-Reviewed Workshop Proceedings

[W1] Y. Qin, **T. Menara**, S. Ching, S. Oymak, and F. Pasqualetti. Non-stationary representation learning in sequential multi-armed bandits. In *International Conference on Machine Learning (ICML) Workshop on Representation Learning Theory*, Virtual, Jul 2021.

Teaching

2021	**ME223,** Teaching assistant for the class *Secure and Reliable Control Systems*	*UCR*
2019	**ME121,** Teaching assistant for the class *Feedback Control*	*UCR*

Presentations

2021 Dec	**Talk,** IEEE Conference on Decision and Control – "*Relay Interactions Enable Remote Synchronization of Phase Oscillators*"	*Virtual*

2021 Apr	**Talk,** Brain Networks and Behavior Lab – "*Reverse Engineering Neural Synchronization: Top-down and Bottom-up Approaches*"	*Indiana University Bloomington*
2020 Dec	**Talk,** IEEE Conference on Decision and Control – "*Conditions for Feedback Linearization of Network Systems*"	*Virtual*
2020 July	**E-Poster,** International Conference on Mathematical Neuroscience – "*Analysis and Control of Collective Dynamics in Oscillatory Brain Networks*"	*Virtual*
2020 May	**Talk,** Mechanical Engineering Symposium – "*Cluster Synchronization in Networks of Kuramoto Oscillators*"	*UCR*
2019 Dec	**Talk,** IEEE Conference on Decision and Control – "*A Framework to Control Functional Connectivity in the Human Brain*"	*Nice, France*
2019 Sep	**Talk,** Kokusaino meeting. Advanced Telecommunications Research Institute International – "*Data-driven Models of Brain Network Dynamics*"	*Kyoto, Japan*
2019 June	**Talk,** American Control Conference – "*Cluster Synchronization of Kuramoto Oscillators for the Analysis and Control of Neurological Disorders*"	*Philadelphia, PA*
2019 May	**Talk,** SoCal Control Workshop. University of Southern California – "*Cluster Synchronization of Kuramoto Oscillators for the Analysis and Control of Functional Connectivity in the Human Brain*"	*USC*
2018 Nov	**Poster,** Computational Neuroimaging and Neuroengineering Symposium. University of California, Riverside – "*From Cluster Synchronization of Oscillators to Functional Connectivity*"	*UCR*
2018 June	**Talk,** American Control Conference – "*Controllability of Symmetric Brain Networks*"	*Milwaukee, WI*
2018 Apr	**Talk,** Mechanical Engineering Symposium. University of California, Riverside – "*Cluster Synchronization in Networks of Kuramoto Oscillators*"	*UCR*
2017 June	**Talk,** American Control Conference – "*On the Number of Strongly Structurally Controllable Networks*"	*Seattle, WA*
2016 Jun	**Poster,** Workshop on Brain Dynamics and Neurocontrol Engineering. Washington University in St. Louis – "*Structural Controllability of Symmetric Brain Networks*"	*WashU, St. Louis*

Professional Service

- **Referee/Reviewer**
  - Journals: Elsevier NeuroImage, PLOS One, IEEE Transactions on Automatic Control (IEEE-TAC), IEEE Transactions on Control of Networked Systems (IEEE-TCNS), IEEE Control Systems Letters (IEEE L-CSS), IFAC Automatica, SIAM Journal on Control and Optimization (SICON). Elsevier European Journal of Control (EJCON). Springer Nonlinear Dynamics (NODY), Springer Brain Topography (BTOP)
  - Conferences: IEEE Conference on Decision and Control (CDC), American Control Conference (ACC), European Control Conference (ECC), International Conference on Control, Decision and Information Technologies (CoDIT), Conference on Control Technologies (CCTA), IFAC World Congress
- **Memberbership**: Institute of Electrical and Electronics Engineers (IEEE), IEEE Control Systems Society (CSS), IEEE Brain Community, IEEE Young Professionals, IEEE CSS Technical Committee on Healthcare and Medical Systems (TC-HCMS), Society for Industrial and Applied Mathematics (SIAM), Network Science Society (NetSci)

Volunteering

- **Engineering Fair Judge**: Judge for the 2021 annual Riverside Unified Science and Engineering Fair
- **ISO Leader**: International Student Orientation leader at University of California, Riverside, in 2018
- **Volunteer staff**: Volunteer staff for the 2016 IEEE CDC conference held in Las Vegas, NV, USA
- **Volunteer staff**: Volunteer staff for the MTS/IEEE OCEANS15 conference held in Genova, Italy

Experience

Intern

2-2-2 Hikaridai, Seika-cho, Soraku-gun, Kyoto, Japan

Advanced Telecommunications Research Institute International (ATR) *July 2019 - October 2019*

- Data-driven models for the analysis of multi-site resting-state fMRI datasets. Results published on *Journal of Neural Engineering*

Graduate Student Association

HUB 203, 900 University Ave, Riverside, CA, 92521, USA

University of California Riverside *Sep 2017 - June 2020*

- *Public Relations Officer* (2018-2020): Responsible for organizing campus-wide events (600+ attendees). Management of $20k budget for social events, memorabilia, and public lectures
- *International Student Affairs Officer* (2017-2018): Monitoring of campus issues and legislative developments that affect international graduate students. Member of the standing committee for international education of the academic senate
- *Mechanical Engineering Representative* (2016-2017): voting member and representative for the department of mechanical engineering in the general graduate student council

HUB Governing Board

900 University Ave, Riverside, CA, 92521, USA

University of California Riverside *Sep 2018 - June 2021*

- *Chair* (2019-2020) and *Vice-Chair* (2018-2019): Member of the student governing board that controls the Highlander Union, develops all facility operations and usage policies, and manages $7.5M budget. In recognition for my contributions, my signature is on the final steel beam of the newly constructed Student Success Center

References

- **Dr. Fabio Pasqualetti**, Professor
  Department of Mechanical Engineering, University of California, Riverside
  +1 (951) 827-2327 fabiopas@engr.ucr.edu homepage
- **Dr. Jorge Cortés**, Professor
  Department of Mechanical and Aerospace Engineering, University of California, San Diego
  +1 (858) 822-7930 cortes@ucsd.edu homepage
- **Dr. Aurelio Cortese**, Supervisor and Chief Researcher
  Computational Neuroscience Laboratories, ATR Institute International
  +81 (0)774 95 1218 cortese_a@atr.jp homepage