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Institute for Software Integrated Systems Vanderbilt University  
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## Employment

### Vanderbilt University

*Research Scientist*, Institute for Software Integrated Systems, April. 2021 - pres.

*Adjunct Professor*, Computer Science, Dec. 2022 - pres.

*Visiting Professor*, Computer Science, Dec. 2020 - April. 2021

### Technological University of Havana

*Associate Professor*, Department of Automation and Computing (tenured), Dec. 2017-Dec. 2020.

*Assistant Professor*, Department of Automation and Computing, Sept. 2013-Dec. 2017.

## Education

### Technological University of Havana, 2018

PhD in *Technical Sciences*, Department of *Automation and Computing*

### Technological University of Havana, 2017

MS in *Industrial Informatics*, Department of Automation and Computing

### Technological University of Havana, 2012

BS in *Automation Engineering*, Department of Automation and Computing

## Summary

87 peer-reviewed publications (1 Book, 16 journal articles, 61 conference articles, 9 book chapters).

## **Research Interests**

### **Intelligent cyber-physical systems**

Machine learning for control, planning, monitoring, and fault adaptivity of non-linear systems

Applied deep reinforcement learning

Data-driven modeling and anomaly detection

### **Data analytics for aerospace, energy, and transportation systems**

Non-linear system identification, modeling, and state estimation

Understanding the effect of varying operating conditions on systems' resilience

Analytics for mobility networks

## **Research projects with funding**

7. Multimodal Analytics for Learner Modeling and After-Action Review in Synthetic Training Environments, 2021-Ongoing

Funding agency: US Army, USA

Role: Research Scientist.

P.I. Gautam Biswas.

6. Artificial Intelligence-powered decision support tools for Integrated Corridor Management, 2021-Ongoing

Funding agency: Tennessee Department of Transportation, USA

Role: Research Scientist.

P.I. Dan Work.

5. In-Time Learning-Based Safety Management for Scalable Heterogeneous AAM Operations, 2021-2024

Funding agency: NASA, USA

Role: Research Scientist.

P.I. Peng Wei.

4. Combatant Craft Health Monitoring System, 2019-2021.

Funding agency: Department of the Navy, USA.

Role: Research Scientist.

P.I. Gautam Biswas

3. Combining Real-time & Offline Decision Making for Urban Air Mobility Systems, 2019-2021.

Funding agency: NASA, USA.

Role: Research Scientist.

P.I. Gautam Biswas

2. Monitoring Stations for Water Distribution Networks with Internet Interconnection, 2019-2020.

Funding agency: Conacyt, Mexico.

Role: External advisor.

P.I. F.L. Torres Ortiz

1. Fault diagnosis in Thermal Power Plants, Ministry of Science, Technology and Environment of Cuba, 2016-2019.

Funding agency: Ministry of Science, Technology and Environment of Cuba, Cuba.

Role: Co-PI.

P.I. A Prieto-Moreno

## 1. Publications.

### 1.1 Journal articles in preparation and under review

[1] M. Ares-Milian, G. Provan, **M. Quinones-Grueiro**. "Improving Computational Cost of Bayesian Optimization for Controller Tuning with a Multi-stage Tuning Framework", in preparation, 2024.

[2] A. Coursey, **M. Quinones-Grueiro**, L. Alvarez, G. Biswas. "Combing Reinforcement Learning with Cascade PID for UAV Disturbance Rejection", in preparation, 2024.

[3] Y. Zhang, **M. Quinones-Grueiro**, Z. Zhang, Y. Wang, W. Barbour, G. Biswas, D. Work. "MARVEL: Multi-Agent Reinforcement-Learning for Large-Scale Variable Speed Limits", under review, 2023.

### 1.2 Journal articles

[16] C. Rodríguez Martínez, **M. Quinones-Grueiro**, and O. Llanes-Santiago, "Cyberattack Diagnosis in Water Distribution Networks Combining Data-Driven and Structural Analysis Methods," Journal of Water Resources Planning and Management, vol. 149, no. 5, pp. 04023013, ASCE, 2023.

[15] A. Naug, **M. Quinones-Grueiro**, and G. Biswas, "Deep Reinforcement Learning Control for Non-stationary Building Energy Management," Energy & Buildings, vol. 277, Elsevier, pp. 112584, 2022.

[14] T. Darrah, G. Biswas, J. Frank, **M. Quinones-Grueiro**, and C. Teubert, "A data-centric approach to the study of system-level prognostics for cyber physical systems: application to safe UAV operations," Journal of Surveillance, Security and Safety, vol. 3, no. 2, pp. 55-87, 2022.

[13] A. Villalón-Falcón, A. Prieto-Moreno, **M. Quinones-Grueiro**, and O. Llanes-Santiago, "Computational adaptive multivariable degradation model for improving the remaining useful life prediction in industrial systems," Computational and Applied Mathematics, vol. 41, no. 1, pp. 1-28, 2022.

[12] M. Ares-Milián, **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "A Leak Zone Location Approach in Water Distribution Networks Combining Data-Driven and Model-Based Methods," Water, vol. 13, no. 20, 2021.

- [11] **M. Quinones-Grueiro**, G. Biswas, I. Ahmed, T. Darrah, and C. Kulkarni, "Online decision making and path planning framework for safe operation of unmanned aerial vehicles in urban scenarios," *International Journal of Prognostics and Health Management*, vol. 12, no. 3, 2021.
- [10] **M. Quinones-Grueiro**, M. Ares Milián, M. Sánchez Rivero, A. J. Silva Neto, and O. Llanes-Santiago, "Robust Leak Localization in Water Distribution Networks Using Computational Intelligence," *Neurocomputing*, vol. 438, pp. 195-208, 2021.
- [9] **M. Quinones-Grueiro**, A. Prieto-Moreno, C. Verde, and O. Llanes-Santiago, "Data-Driven Monitoring of Multimode Continuous Processes: A Review," *Chemometrics and Intelligent Laboratory Systems*, vol. 189, pp. 56-71, 2019.
- [8] **M. Quinones-Grueiro**, A. Prieto-Moreno, C. Verde, and O. Llanes-Santiago, "Decision Support System for Cyber Attack Diagnosis in Smart Water Networks," *IFAC-PapersOnLine*, vol. 51, no. 34, pp. 329-334, 2018.
- [7] **M. Quinones-Grueiro**, C. Verde, A. Prieto-Moreno, and O. Llanes-Santiago, "Unsupervised Approach For Leak Detection And Location In Water Distribution Networks," *International Journal of Applied Mathematics & Computer Science*, vol. 28, no. 2, pp. 283-295, 2018.
- [6] **M. Quinones-Grueiro**, J. M. Bernal-de Lázaro, C. Verde, A. Prieto-Moreno, and O. Llanes-Santiago, "Comparison of Classifiers for Leak Location in Water Distribution Networks," *IFAC-PapersOnLine*, vol. 51, no. 24, pp. 407-413, 2018.
- [5] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Demand Model in Water Distribution Networks for Fault Detection," *IFAC-PapersOnLine*, vol. 50, no. 1, pp. 3263-3268, 2017.
- [4] **M. Quinones-Grueiro** and C. Verde, "Comments on the applicability of 'An improved weighted recursive PCA algorithm for adaptive fault detection'," *Control Engineering Practice*, vol. 58, pp. 254-255, 2017.
- [3] **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "Modeling and Monitoring for Transitions Based on Local Kernel Density Estimation and Process Pattern Construction," *Industrial & Engineering Chemistry Research*, vol. 55, no. 3, pp. 692-702, 2016.
- [2] **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "Detección de fallos de pequeña magnitud en sistemas industriales multimodo," *Revista Iberoamericana de Automática e Informática industrial RIAI*, vol. 36, no. 2, pp. 29-39, May-Aug 2015.
- [1] **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "Una propuesta para configurar el algoritmo FastICA en el diagnóstico de fallos en sistemas industriales," *Revista Iberoamericana de Automática e Informática industrial RIAI*, vol. 35, no. 2, pp. 73-89, May-Aug 2014.

### 1.3 Books

- [1] **M. Quinones-Grueiro**, A.J. Silva Neto, and O. Llanes-Santiago, *Monitoring Multimode Continuous Processes: A Data-Driven Approach. Studies in Systems, Decision and Control*, vol. 309, Springer Nature Switzerland AG, 2020. ISBN: 978-3-030-54737-0.

## 1.4 Chapters in books

- [10] A. Villalón-Falcón, A. Prieto-Moreno, **M. Quinones-Grueiro**, and O. Llanes-Santiago, "Adaptive multivariate degradation model for remaining useful life prediction," in *Fault Diagnosis and Tolerant Control: Applications*, Universidad Nacional Autonoma de México, 2023, ISBN: 978-607-30-7359-2, pp. 85-114.
- [9] A. Villalón-Falcón, A. Prieto-Moreno, **M. Quinones-Grueiro**, and O. Llanes-Santiago, "A Proposal for Improving Remaining Useful Life Prediction in Industrial Systems: A Deep Learning Approach," in *Complex Systems: Spanning Control and Computational Cybernetics: Applications*, Springer, Cham, 2022, pp. 91-105.
- [8] D. Jiménez Sánchez, **M. Quinones-Grueiro**, A.J. Silva Neto, and O. Llanes-Santiago, "A Regularized Inverse Problem Approach for Robust Condition Monitoring in Industrial Systems," in *Complex Systems: Spanning Control and Computational Cybernetics: Applications*, Springer, Cham, 2022, pp. 177-188.
- [7] M. Ares-Milian, **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Pressure Sensor Placement for Leak Location in Zones of a Water Distribution Network," in *Computational Intelligence Methodologies Applied to Sustainable Development Goals*, Springer, Cham, 2022, pp. 143-158.
- [6] **M. Quinones-Grueiro**, L. Torres, and C. Verde, "Off-Line Data Validation for Water Network Modeling Studies," *Proceedings (MDPI)*, vol. 48, no. 13, 2020.
- [5] M. Sánchez-Rivero, **M. Quinones-Grueiro**, A. Rosete Suárez, and O. Llanes-Santiago, "A Novel Approach for Leak Localization in Water Distribution Networks Using Computational Intelligence," in *Computational Intelligence in Emerging Technologies for Engineering Applications*, Springer, Cham, vol. 872, 2020. ISBN: 978-3-030-34409-2.
- [4] M. Sánchez-Rivero, **M. Quinones-Grueiro**, C. Cruz Corona, A.J. Silva Neto, and O. Llanes-Santiago, "A Proposal of Robust Leak Localization in Water Distribution Networks using Differential Evolution," in *14th International Conference on Soft Computing Models in Industrial and Environmental Applications (SOCO 2019)*, Springer, Cham, vol. 950, 2019. ISBN: 978-3-030-20055-8.
- [3] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Novel leak location approach in water distribution networks with zone clustering and classification," in *Pattern Recognition*, Springer Cham, vol. 11524, 2019. ISBN: 978-3-030-21077-9.
- [2] D. L. Acevedo-Galán, **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "A New Approach for Fault Diagnosis of Industrial Processes during Transitions," in *Progress in Artificial Intelligence and Pattern Recognition*, Springer International Publishing, vol. 11047, 2018. ISBN: 978-3-030-01132-1.
- [1] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Features of demand patterns for leak detection in water distribution networks," in *Modeling and Monitoring of Pipeline and Networks. Applied Condition Monitoring*, Springer, 2017. ISBN: 978-3-319-55943-8.

## 1.5 Peer reviewed conference publications

- [61] Z. Zhang, G. Gunter, **M. Quinones-Grueiro**, Y. Zhang, W. Barbour, G. Biswas, and D. Work, "Phase Re-service in Reinforcement Learning Traffic Signal Control," *IEEE ITSC Conference*, Edmonton, Canada, 2024.

- [60] Y. Zhang, Z. Zhang, **M. Quinones-Grueiro**, W. Barbour, C. Weston, G. Biswas, and D. Work, "Field Deployment of Multi-Agent Reinforcement Learning Based Variable Speed Limit Controllers," IEEE ITSC Conference, Edmonton, Canada, 2024.
- [59] A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "An Experimental Framework for Evaluating the Safety and Robustness of UAV Controllers," AIAA AVIATION Conference, Vegas, NV, USA, 2024.
- [58] Y. Huang, A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "Time-Series Few-Shot Anomaly Detection for HVAC Systems," IFAC Safeprocess, Ferrara, Italy, 2024.
- [57] A. Diaz-Gonzalez, A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "A Flexible Data-Driven Prognostics Model Using System Performance Metrics," IFAC Safeprocess, Ferrara, Italy, 2024.
- [56] S. D. Sharma, A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "Comparison of Transfer Learning Techniques for Building Energy Forecasting," IFAC Safeprocess, Ferrara, Italy, 2024.
- [55] A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "Anomaly Detection for Multi-Zone Buildings using Cluster-Trained LSTM Autoencoders," IEEE CODIT Conference, Rome, Italy, 2023.
- [54] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Model-Based Adaptation for Sample Efficient Transfer in Reinforcement Learning Control of Parameter-Varying Systems," IEEE CODIT Conference, Rome, Italy, 2023.
- [53] Z. Zhang, **M. Quinones-Grueiro**, W. Barbour, Y. Zhang, G. Biswas, and D. Work, "Evaluation of Traffic Signal Control at Varying Demand Levels: A Comparative Study," IEEE ITSC Conference, Bilbao, Spain, 2023.
- [52] Y. Zhang, **M. Quinones-Grueiro**, W. Barbour, Z. Zhang, J. Scherer, G. Biswas, and D. Work, "Cooperative Multi-Agent Reinforcement Learning for Large Scale Variable Speed Limit Control," IEEE Smartcomp Conference, Nashville, TN, USA, 2023.
- [51] A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "On Learning Data-Driven Models For In-Flight Drone Battery Discharge Estimation From Real Data," IEEE Smartcomp Conference, Nashville, TN, USA, 2023.
- [50] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Robust Trajectory Planning for Multi-Rotor Aerial Vehicles Subject to Saturation Faults and Wind Disturbances," AIAA AVIATION Conference, San Diego, CA, USA, 2023.
- [49] A. Coursey, A. Diaz-Gonzalez, **M. Quinones-Grueiro**, and G. Biswas, "Enhancing Prognostics with Self-Supervised Imputation," in 34th International Workshop on Principle of Diagnosis – DX 2023 Workshop, Loma Mar, CA, USA, Sep. 11-14, 2023.
- [48] E. L. Thompson, A. Taye, J. Ashby, G. Fattah, P. Wei, T. Bonin, J. Jones, **M. Quinones-Grueiro**, and G. Biswas, "Probabilistic Evaluation for Flight Mission Feasibility of a Small Octocopter in the Presence of Wind," AIAA AVIATION Conference, San Diego, CA, USA, 2023.

- [47] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Adaptive Fault-Tolerant Control of Octo-Rotor UAV Under Motor Faults in Adverse Wind Conditions," AIAA SciTech Conference, National Harbor, MD, USA, 2023.
- [46] G. Provan, **M. Quinones-Grueiro**, and Y. Sohege, "Generating Minimal Controller Sets for Mixing MMAC," IEEE Conference on Decision and Control, Cancun, Mexico, 2022.
- [45] Y. Zhang, **M. Quinones-Grueiro**, W. Barbour, C. Weston, G. Biswas, and D. Work, "Quantifying the impact of driver compliance on the effectiveness of variable speed limits and lane control systems," IEEE International Conference on Intelligent Transportation Systems, China, 2022.
- [44] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "A high-fidelity simulation test-bed for fault-tolerant octo-rotor control using reinforcement learning," Digital Avionics Systems Conference, Portsmouth, Virginia, 2022 (Best paper of the Session Swarms).
- [43] T. Darrah, **M. Quinones-Grueiro**, G. Biswas, and A. Lovberg, "Developing Deep Learning Models for System-Level Remaining Useful Life Predictions: Application to Aircraft Engines," Annual Conference of the PHM Society, Nashville, USA, 2022.
- [42] A. Naug, **M. Quinones-Grueiro**, G. Biswas, "Reinforcement learning-based HVAC supervisory control of a multi-zone building- A real case study," IEEE Conference on Control Technology and Applications, Trieste, Italy, 2022.
- [41] E. Thompson, A. Taye, W. Guo, P. Wei, **M. Quinones-Grueiro**, I. Ahmed, G. Biswas, J. Quattrocchi, S. Carr, U. Topcu, J. Jones, and M. Brittain, "A Survey of eVTOL Aircraft and AAM Operation Hazards," AIAA Forum, Chicago, USA, 2022.
- [40] A. Naug, **M. Quinones-Grueiro**, G. Biswas, "Data-Driven Learning Control for Building Energy Management," IEEE American Control Conference, Atlanta, USA, 2022.
- [39] G. Provan, **M. Quinones-Grueiro**, and Y. Sohege, "Towards Real-Time Robust Adaptive Control for Non-Stationary Environments," IFAC Safeprocess, Cyprus, 2022.
- [38] L. Bhan, **M. Quinones-Grueiro**, and G. Biswas, "Concurrent Policy Blending and System Identification for Generalized Assistive Control," IEEE International Conference on Robotics and Automation (ICRA), Philadelphia, 2022.
- [37] L. Bhan, **M. Quinones-Grueiro**, and G. Biswas, "Fault Tolerant Control Combining Reinforcement Learning and Model-Based Control," In 2021 5th International Conference on Control and Fault-Tolerant Systems (SysTol), pp. 31-36, IEEE, Saint Raphael, France, 2021.
- [36] M. Ares-Milián, **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Leak Zone Localization in Water Distribution Networks using a Topology-based Differential Evolution Algorithm," In 2021 5th International Conference on Control and Fault-Tolerant Systems (SysTol), pp. 175-180, IEEE, Saint Raphael, France, 2021.

- [35] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Transfer Reinforcement Learning for Fault-Tolerant Control by Re-using Optimal Policies," In 2021 5th International Conference on Control and Fault-Tolerant Systems (SysTol), pp. 25-30, IEEE, Saint Raphael, France, 2021.
- [34] L. Bhan, **M. Quinones-Grueiro**, and G. Biswas, "Adaptive Model-based Control with Reinforcement Learning for Fault Tolerance," in 32nd International Workshop on Principle of Diagnosis – DX 2021 Workshop, Hamburg, Germany, Sep. 13-15, 2021.
- [33] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Policy Reuse for Transfer Reinforcement Learning in Fault-Tolerant Control," in 32nd International Workshop on Principle of Diagnosis – DX 2021 Workshop, Hamburg, Germany, Sep. 13-15, 2021.
- [32] L. Bhan, **M. Quinones-Grueiro**, and G. Biswas, "Deep Reinforcement Learning for Fault Adaptive Control," in International Workshop on AI for Spacecraft Longevity, IJCAI 2021 (Virtual) Workshop, Aug. 21, 2021.
- [31] C. Rodríguez Martínez, **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "A Novel Approach for Detection and Location of Cyber-Attacks in Water Distribution Networks," In International Workshop on Artificial Intelligence and Pattern Recognition, pp. 79-90, Springer, Cham, Havana, Cuba, October, 2021.
- [30] A. Villalón-Falcón, A. Prieto-Moreno, **M. Quinones-Grueiro**, and O. Llanes-Santiago, "A Proposal of Metric for Improving Remaining Useful Life Prediction in Industrial Systems," In International Workshop on Artificial Intelligence and Pattern Recognition, pp. 177-186, Springer, Cham, Havana, Cuba, October, 2021.
- [29] A. Naug, **M. Quinones-Grueiro**, and G. Biswas, "Sensitivity and Robustness of End-to-End Data-Driven Approach for Building Performance Optimization," In Proceedings of the 8th ACM International Conference on Systems for Energy-Efficient Buildings, Cities, and Transportation, pp. 314-318, Online Conference, November 2021.
- [28] T. Darrah, J. Frank, **M. Quinones-Grueiro**, and G. Biswas, "A Data Management Framework & UAV Simulation Testbed for the Study of System-level Prognostics Technologies," In Annual Conference of the PHM Society, Vol. 13, No. 1, Online Conference, November 2021.
- [27] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Analysis of the Deployment Strategies of Reinforcement Learning Controllers for Complex Dynamic Systems," In Annual Conference of the PHM Society, Vol. 13, No. 1, Online Conference, November 2021.
- [26] Y. Sohege, **M. Quinones-Grueiro**, and G. Provan, "A Novel Hybrid Approach for Fault-Tolerant Control of UAVs Based on Robust Reinforcement Learning," IEEE ICRA 2021, Xi'an China, June 2021.
- [25] M. Ares Milián, **M. Quinones-Grueiro**, C. Cruz Corona, A.J. Silva Neto, and O. Llanes-Santiago, "Clustering-based Partitioning of Water Distribution Networks for Leak Zone Location," 25th Iberoamerican Congress on Pattern Recognition, Porto Portugal, May 2021.
- [24] T. Darrah, **M. Quinones-Grueiro**, G. Biswas, and C. Kulkarni, "Prognostics Based Decision Making for Safe and Optimal UAV Operations," AIAA Scitech 2021 Forum, Virtual Conference, January 2021.



- [23] A. Naug, **M. Quinones-Grueiro**, and G. Biswas, "Continual Adaptation in Deep Reinforcement Learning-Based Control Applied to Non-Stationary Building Environments," RLEM'20: Proceedings of the 1st International Workshop on Reinforcement Learning for Energy Management in Buildings & Cities, pp. 24–28, <https://doi.org/10.1145/3427773.3427867>, November 2020.
- [22] A. Naug, **M. Quinones-Grueiro**, and G. Biswas, "A Relearning Approach to Reinforcement Learning for Control of Smart Buildings," Annual Conference of the PHM Society, Vol. 12, No. 1, Online Conference, 2020.
- [21] **M. Quinones-Grueiro**, T. Darrah, G. Biswas, and C. Kulkarni, "A Decision-Making Framework for Safe Operations of Unmanned Aerial Vehicles in Urban Scenarios," Annual Conference of the PHM Society, Vol. 12, No. 1, Online Conference, 2020.
- [20] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Complementary Meta-Reinforcement Learning for Fault-Adaptive Control," Annual Conference of the PHM Society, Vol. 12, No. 1, Online Conference, 2020.
- [19] Y. Sohege, G. Provan, **M. Quinones-Grueiro**, and G. Biswas, "Deep Reinforcement Learning and Randomized Blending for Control under Novel Disturbances," 21st IFAC World Congress, Berlin, Germany, 2020.
- [18] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Fault-Tolerant Control of Degrading Systems with On-Policy Reinforcement Learning," 21st IFAC World Congress, Berlin, Germany, 2020.
- [17] **M. Quinones-Grueiro**, L. Torres, and C. Verde, "Off-Line Data Validation for Water Network Modeling Studies," 4th International Electronic Conference on Water Sciences (Sciforum), Online Conference, November 2019.
- [16] **M. Quinones-Grueiro**, C. Verde, and R. Carrera, "Multi-objective Optimization of Pressure Sensor Placement for Leak Diagnosis in Water Distribution Networks," CNCA AMCA, Puebla, Mexico, October 2019.
- [15] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Multi-objective Sensor Placement for Leakage Detection and Localization in Water Distribution Networks," in IEEE SysTol'2019: 4th International Conference on Control and Fault-Tolerant Systems, Casablanca, Morocco, Sep. 18-20, 2019.
- [14] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Novel Leak Location Approach in Water Distribution Networks with Zone Clustering and Classification," in Mexican Conference on Pattern Recognition (MCPR), Querétaro, Mexico, June 2019.
- [13] M. Sanchez-Rivero, **M. Quinones-Grueiro**, C. Cruz Corona, A.J. Silva Neto, and O. Llanes-Santiago, "A Proposal of Robust Leak Localization in Water Distribution Networks using Differential Evolution," in 14th International Conference on Soft Computing Models in Industrial and Environmental Applications, Seville, Spain, May 2019.

- [12] **M. Quinones-Grueiro**, A. Prieto-Moreno, C. Verde, and O. Llanes-Santiago, "Decision Support System for Cyber Attack Diagnosis in Smart Water Networks," in Second IFAC Conference on Cyber-Physical & Human Systems (CPHS), Miami, USA, 2018.
- [11] D. L. Acevedo-Galán, **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "A New Approach for Fault Diagnosis of Industrial Processes during Transitions," in VI International Workshop on Artificial Intelligence and Pattern Recognition, Havana, Cuba, 2018.
- [10] **M. Quinones-Grueiro**, J.M. Bernal de Lazaro, C. Verde, A. Prieto-Moreno, and O. Llanes-Santiago, "Comparison of Classifiers for Leak Location in Water Distribution Networks," in IFAC-Symposium SafeProcess, Warsaw, Poland, 2018.
- [9] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Demand Model in Water Distribution Networks for Fault Detection," in 20th IFAC World Congress, Toulouse, France, 2017.
- [8] M. Sanchez Rivero, **M. Quinones-Grueiro**, and O. Llanes-Santiago, "Leak Localization in Water Distribution Networks Using Differential Evolution," in 4th International Conference on Optimization Methods and Software, Havana, Cuba, 2017.
- [7] **M. Quinones-Grueiro**, C. Verde, A. Prieto-Moreno, and O. Llanes-Santiago, "Detection of Leaks in Water Distribution Networks Using Principal Component Analysis," in CNCA AMCA, Querétaro, Mexico, 2016.
- [6] M. Sanchez Rivero, C. Haug Ramirez, **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "Electric Energy Logbook for Bravo S.A.," in Industry in Cuba, Havana, Cuba, 2016.
- [5] **M. Quinones-Grueiro**, C. Verde, and A. Prieto-Moreno, "Leak Detection in Water Distribution Networks with Demand Patterns," in IEEE SysTol'2016: 3rd International Conference on Control and Fault-Tolerant Systems, Barcelona, Spain, Sep. 6-9, 2016.
- [4] M. Sanchez Rivero, C. Haug Ramirez, **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "Website for Monitoring and Analysis of Process Parameters at Bravo S.A. Meat Company," in the 7th International Congress on Technologies and Content Multimedia, 16th International Convention of Informatics, Havana, Cuba, 2016.
- [3] **M. Quinones-Grueiro** and C. Verde, "Leak Detection in Water Distribution Networks with a Demand Pattern," in 4th Workshop on Monitoring, Diagnosis and Control Tolerant Faults, Michoacán, Mexico, 2016.
- [2] **M. Quinones-Grueiro**, A. Prieto-Moreno, and O. Llanes-Santiago, "Fault Detection in Multimode Processes Based on Clustering with KNN-DENCLUE," in XVI Electrical Engineering Convention (CIE-2015), Santa Clara, Cuba, 2015.
- [1] **M. Quinones-Grueiro**, C. Haug Ramirez, A. Prieto-Moreno, and O. Llanes-Santiago, "Desarrollo de una aplicación para el diagnóstico de fallos en la empresa cárnicos Bravo S.A.," Industry in Cuba, Havana, Cuba, 2014.

## 1.5 Presentations and Talks

- [15] Y. Huang, A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "Time-Series Few-Shot Anomaly Detection for HVAC Systems," IFAC Safeprocess, Ferrara, Italy, 2024.
- [14] A. Diaz-Gonzalez, A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "A Flexible Data-Driven Prognostics Model Using System Performance Metrics," IFAC Safeprocess, Ferrara, Italy, 2024.
- [13] S. D. Sharma, A. Coursey, **M. Quinones-Grueiro**, and G. Biswas, "Comparison of Transfer Learning Techniques for Building Energy Forecasting," IFAC Safeprocess, Ferrara, Italy, 2024.
- [12] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Robust Trajectory Planning for Multi-Rotor Aerial Vehicles Subject to Saturation Faults and Wind Disturbances," AIAA AVIATION Conference, San Diego, CA, USA, 2023.
- [11] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "Adaptive Fault-Tolerant Control of Octo-Rotor UAV Under Motor Faults in Adverse Wind Conditions," AIAA SciTech Conference, National Harbor, MD, USA, 2023.
- [10] I. Ahmed, **M. Quinones-Grueiro**, and G. Biswas, "A high-fidelity simulation test-bed for fault-tolerant octo-rotor control using reinforcement learning," Digital Avionics Systems Conference, Portsmouth, Virginia, 2022 (**Best paper of Session**).
- [9] A. Naug, **M. Quinones-Grueiro**, G. Biswas, "Reinforcement learning-based HVAC supervisory control of a multi-zone building- A real case study," IEEE Conference on Control Technology and Applications, Trieste, Italy, 2022. (Virtual)
- [8] A. Naug, **M. Quinones-Grueiro**, G. Biswas, "Data-Driven Learning Control for Building Energy Management," IEEE American Control Conference, Atlanta, USA, 2022.
- [7] **M. Quinones-Grueiro**, "Approaches to fault diagnosis based on historical data," Virtual Workshop on Fault Diagnosis and Tolerant Control, Universidad Nacional Autonoma de México, May 2021. (Virtual)
- [6] M. Ares Milián, **M. Quinones-Grueiro**, C. Cruz Corona, A.J. Silva Neto, and O. Llanes-Santiago, "Clustering-based Partitioning of Water Distribution Networks for Leak Zone Location," 25th Iberoamerican Congress on Pattern Recognition, Porto Portugal, May 2021. (Virtual)
- [5] T. Darrah, **M. Quinones-Grueiro**, G. Biswas, and C. Kulkarni, "Prognostics Based Decision Making for Safe and Optimal UAV Operations," AIAA Scitech 2021 Forum, January 2021. (Virtual)
- [4] **M. Quinones-Grueiro**, T. Darrah, G. Biswas, and C. Kulkarni, "A Decision-Making Framework for Safe Operations of Unmanned Aerial Vehicles in Urban Scenarios," Annual Conference of the PHM Society, Vol. 12, No. 1, Online Conference, 2020. (Virtual)
- [3] **M. Quinones-Grueiro**, L. Torres, and C. Verde, "Off-Line Data Validation for Water Network Modeling Studies," 4th International Electronic Conference on Water Sciences (Sciforum), Online Conference, November 2019. (Virtual)

[2] **M. Quinones-Grueiro**, C. Verde, and O. Llanes-Santiago, "Novel Leak Location Approach in Water Distribution Networks with Zone Clustering and Classification," in Mexican Conference on Pattern Recognition (MCPR), Querétaro, Mexico, June 2019.

[1] **M. Quinones-Grueiro**, A. Prieto-Moreno, C. Verde, and O. Llanes-Santiago, "Decision Support System for Cyber Attack Diagnosis in Smart Water Networks," in Second IFAC Conference on Cyber-Physical & Human Systems (CPHS), Miami, USA, 2018.

## 2. Teaching experience

### *Vanderbilt University*

#### **Special Topics- Reinforcement Learning**

**CS 3-5891** Department of Computer Science, Vanderbilt University.

##### **-Instructor**

**-Description** This course introduces students to the theory and practice of Reinforcement Learning (RL). RL problems involve learning what to do, i.e., how to map situations to actions to maximize a numerical reward signal. The course covers model-based and model-free reinforcement learning methods, especially those based on temporal difference learning and policy gradient algorithms. This will include the essentials of RL theory, and its applications to real-world sequential decision problems. RL is an essential part of fields ranging from modern robotics to game playing (e.g. Poker, Go, and Starcraft), and RL applications are now being extended to the control of complex cyber physical systems (CPS) that operate in continuous time. The material covered in this class will provide an understanding of the core fundamentals of reinforcement learning, preparing students to apply it to problems of their choosing, as well as allowing them to understand modern RL research.

**-Semester taught** Fall 2021 (24 students), Fall 2022 (20 students), Fall 2023 (22 students), Fall 2024 (27 students)

#### **Applied Machine Learning**

**CS-3262** Department of Computer Science, Vanderbilt University.

##### **-Instructor**

**-Description** Fundamentals of machine learning with emphasis on practical applications to data science problems. Supervised learning (linear and logistic regression, decision trees, support vector machines, neural networks, and deep learning), unsupervised learning (feature selection, data clustering, dimensionality reduction); ethical principles and social implications of machine learning.

**-Semester taught** Spring 2023 (37 students), Spring 2024 (54 students)

### *Technological University of Havana (before joining Vanderbilt University)*

9. Automation Systems, Faculty of Automation and Biomedical Engineering, 2018 (50 students)

8. Programming LabVIEW, Faculty of Automation and Biomedical Engineering, 2017 (60 students)

7. Industrial Measurements II, Faculty of Automation and Biomedical Engineering, 2014, 2015, 2017, 2018 (30 students)
6. Programable Logic Controllers, Faculty of Automation and Biomedical Engineering, 2015 (30 students)
5. Automation Instruments, Faculty of Automation and Biomedical Engineering, 2015 (60 students)
4. Supervisory Control and Data Acquisition Systems, Faculty of Automation and Biomedical Engineering, 2014 (60 students)
3. Industrial Measurements I, Faculty of Automation and Biomedical Engineering, 2013. (60 students)
2. Quantum Physics (III). Physics Faculty, 2013. (30 students)
1. Electromagnetism (Physics) II. Physics Faculty, 2012. (30 students)

### **3. Research Supervision**

#### **3.1 PhD students**

8. Zhiyao Zhang (Co-advised with Prof. Dan Work), Civil and Environmental Engineering, Vanderbilt 2027 (expected)
7. Yuhang Zhang (Co-advised with Prof. Dan Work), Civil and Environmental Engineering, Vanderbilt 2026 (expected)
6. Marlon Ares Milian (Co-advised with Prof. Greg Provan), Computer Science, University College Cork, 2025 (expected)
5. Abel Diaz Gonzalez (Co-advised with Prof. Gautam Biswas), Computer Science, 2026 (expected)
4. Austin Coursey (Co-advised with Prof. Gautam Biswas), Computer Science, Vanderbilt 2026 (expected)
3. Timothy Darrah (Co-advised with Prof. Gautam Biswas), A Health-Aware Replanning Framework for Unmanned Aerial Vehicles In Stochastic Environments, Computer Science, Vanderbilt 2023 (Deloitte)
2. Ibrahim Ahmed (Co-advised with Prof. Gautam Biswas), Electrical Engineering, Fault-tolerant control using reinforcement learning, Vanderbilt 2023 (Trane Technologies)
1. Avisek Naug (Co-advised with Prof. Gautam Biswas), Deep Learning Methods Applied to Modeling and Policy Optimization In Large Buildings, Computer Science, Vanderbilt 2022 (HP)

#### **3.2 MS students**

4. Luke Bhan, Deep Reinforcement Learning for Adaptive Control In Robotics, Vanderbilt University, USA, 2021.

3. Yubo Du, Progressively Stacking Differentiable Architecture Search (PS-DARTs) for Recurrent Neural Networks (RNNs), Vanderbilt University, USA, 2021.

2. Marlon Ares Milián, Combining model-based and data-driven methods for robust localization of leakages in water distribution networks, Technological University of Havana, Cuba, 2021.

1. Maibeth Sánchez Rivero, Leakage detection and location in water distribution networks, Technological University of Havana, Cuba, 2019.

### **3.3 Research interns and undergraduate students (Vanderbilt University)**

(V) indicates visiting student, (L) indicates local student, year indicates beginning period of visit, collaboration, or employment.

7. Peter Long (V), High-school student (SSMV program) (**2023-2024**)

6. Yuxin Huang (L), BS Computer Science (**2023**)

5. Shansita Das Sharma (L), BS Computer Science (**2023**)

4. Alan Zhang (L), BS Computer Science (**2023**)

3. Ethan Piper, (L), BS Computer Science (**2022**)

2. Rubin Zou, (L), BS Computer Science (**2021**)

1. Danny Myers (V), BS Computer Science (**2021**)

### **3.4 Undergraduate thesis supervised (Technological University of Havana)**

14. Marlon J. Ares Milian, Localization of leaks in water distribution networks using computational intelligence tools, Technological University of Havana, Cuba, 2020.

13. Claudia Rodríguez Martínez, Detection and localization of cyberattacks in a water distribution network., Technological University of Havana, Cuba, 2020.

12. Danyer Acevedo Galan, Identification of operating modes in multimode industrial systems, La Habana, Technological University of Havana, Cuba, 2018.

11. Juan Luis Pompa Romero, Design and development of a monitoring system for the frozen meat chambers of the Hispano-Cuban Meat Company Bravo S.A., Technological University of Havana, Cuba, 2017.

10. Carlos René Mederos Arias, Imputation of missing data using Artificial Neural Networks for fault diagnosis in industrial processes, Technological University of Havana, Cuba, 2017.

9. Daniel Armando Vidal Soroa, Application for the configuration of diagnostics based on statistical analysis, Technological University of Havana, Cuba, 2017.

8. Lázaro F. Sansón Fariñas, Application for online fault diagnosis of industrial systems, Technological University of Havana, Cuba, 2017.
7. Orlando Manuel Vento Rivera, Design of a monitoring system for the production process of carbonated beverages and soft drinks in the soft drink factory “Ciego Montero, Los Portales SA”, Technological University of Havana, Cuba, 2016.
6. Carlos Alberto Oropesa Serrano, Design of an automation system for the filtering process of filter cake in the “Mario Muñoz Monroy” sugar mill, Technological University of Havana, Cuba, 2016.
5. Ramses Molina Domínguez, Automation of the pumping system of the EPOVAC plant of the Center for Molecular Immunology (CIM), Technological University of Havana, Cuba, 2016.
4. Danelis Guerra Rodríguez, SCADA design for the Santa Clara Photovoltaic Park, Technological University of Havana, Cuba, 2015.
3. Rafael Sorondo Obregon, Design of an automated system for monitoring subsystems at the BRAVO S.A. Meat Company, Technological University of Havana, Cuba, 2015.
2. Osmel Prieto Teran, Communication module for fault diagnosis application at Bravo S.A., Technological University of Havana, Cuba, 2014.
1. Odaysi Rodríguez Rodríguez, Design of an Automated System for Temperature Control of the Lobby and Kitchen Extractors at the Capri Hotel, Technological University of Havana, Cuba, 2014.

#### **4. Research interchange**

2. Prof. Cristina Verde. Instituto de Ingeniería - UNAM, México, January-February 2019.
1. Prof. Cristina Verde. Instituto de Ingeniería - UNAM, México, February 2016-January 2017.

#### **5. Languages**

Spanish: native. English: speak fluently and read/write with high proficiency.

#### **6. Professional service**

##### **6.1 Activity as Reviewer**

31. Journal of Marine Science and Applications, since 2024.
30. Plos ONE, since 2024.
29. Signals, MDPI, since 2023.
28. Urban Water Journal, Taylor & Francis, since 2023.
27. IEEE Systems, IEEE, since 2023.

26. Data in brief, Elsevier, since 2023.
25. International Conference on Control, Decision and Information Technologies, IEEE, since 2023.
24. Automatica, Elsevier, since 2023.
23. IEEE American Control Conference, IEEE, since 2022.
22. IEEE Transactions on Control Systems Technology, IEEE, since 2022.
21. IEEE Access, IEEE, since 2022.
20. International Journal of Prognostics and Health Management, since 2022.
19. Control Engineering Practice, Elsevier, since 2022.
18. Applied Sciences, MDPI, since 2022.
17. Conference on Control Technology and Applications, IEEE, since 2022.
16. Machines, MDPI, since 2022.
15. Sensors, MDPI, since 2021.
14. Symmetry, MDPI, since 2021.
13. Mechanical Systems and Signal Processing, Elsevier, since 2021.
12. Congreso Nacional de Control Automático, México, since 2020.
11. Annual Conference of the PHM Society, since 2019.
10. Industrial & Engineering Chemistry Research, since 2019.
9. Revista Iberoamericana de Automática e Informática industrial, Scopus, since 2018.
8. Journal of Nuclear Engineering and Technology, Elsevier, since 2018.
7. IFAC Conference on Cyber-Physical & Human Systems, since 2018.
6. Journal Fuzzy Set and Systems, Elsevier, since 2018.
5. *Safeprocess*, IFAC since 2018.
4. IEEE Conference on Control and Fault-Tolerant Systems, since 2016.
3. Conference on Decision and Control, IEEE, since 2016.
2. IFAC World conference, Elsevier, since 2016.
1. Revista de Ingeniería Eléctrica y Telecomunicaciones (RIELAC), Scielo, since 2016.



## **6.2 Conference and workshop organization**

5. Session chair at IFAC Safeprocess, 2024.
4. Session chair at AIAA AVIATION, 2023.
4. Session chair at AIAA DASC, 2022.
3. International Program Committee at 19th Latin American Control Conference, Havana, Cuba, 2022.
2. Session chair at Annual Conference of the PHM Society, Nashville, USA, 2022.
1. Session chair at IEEE American Control Conference, IEEE, Atlanta, USA, 2022.

## **7. Honors and awards**

### **7.1 Honors**

1. Graduated Summa Cum Laude as Automation Engineer, 2012. (GPA 4.8/5)

### **7.2 Awards**

2. Author of National Award from the Academy of Sciences of Cuba with the work “New paradigms in Fault Diagnosis for Industrial Systems”, 2020.
1. Co-author of National Award from the Academy of Sciences of Cuba with the work “Applications of Artificial Intelligence and Data Mining to Fault Diagnosis and Parameter Estimation”, 2015.

### **7.3 Scholarships**

2. Scholarship from the Engineering Institute, UNAM, Mexico, September 2016 -January 2017.
1. Excellence Scholarship from Mexican Government for Foreign Students, Ministry of Foreign Affairs of the Government of Mexico, February-August 2016.