Leandro Iannacone, Ph.D.

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EDUCATION

PhD, Societal Risk Management, 2022
GPA: 4.00/4.00
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign, USA
Dissertation: "Modeling of Aging Infrastructure Components and Application to Life-Cycle Analysis of Engineering Systems"
Advisor: Prof. Paolo Gardoni

MSc, Applied Statistics, 2019
GPA: 4.00/4.00
Department of Statistics, University of Illinois Urbana-Champaign, USA

MSc, Structural Engineering, 2016
Grade: 110/110 Magna cum Laude
Department of Civil and Environmental Engineering, University of Pisa, Italy
Thesis: "Probabilistic Capacity Models for Masonry Walls Subjected to In-Plane Forces"
Advisor: Prof. Mauro Sassu

BSc, Civil and Environmental Engineering, 2012
Grade: 110/110 Magna cum Laude
Department of Civil and Environmental Engineering, University of Pisa, Italy

RESEARCH EXPERIENCE

Postdoctoral Researcher, 2022 - Date
Department of Civil, Environmental and Geomatic Engineering, University College London
Research Group of Prof. Carmine Galasso

Project: *Tomorrow's Cities*
Funded by: UK Research and Innovation
Work focused on the development of metrics to quantify the resilience of vulnerable communities, with direct involvement of the stakeholders.
Development of a framework for multihazard analysis accounting for interactions among the hazard occurrences and their consequences. Development of a methodology for flood vulnerability assessment of typical households of the global south.

Postdoctoral Researcher, 2022
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign
Research Group of Prof. Paolo Gardoni

Project: *Installation Technology Transition Program*
Funded by: US Army Corps of Engineers
Work focused on developing a framework for quantifying the reliability and resilience of infrastructure over time.

Research Assistant, 2016-2022
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign
Advisor: Prof. Paolo Gardoni

Projects:
NIST-Funded Community Resilience Center of Excellence
Funded by: National Institute for Standards and Technology
Work focused on developing metrics and tools to help local governments decide how to invest resources intended to lessen the impact of hazards on buildings and infrastructure systems and how to recover rapidly and minimise community disruption.

TWP-11 Project on Train Derailment
Funded by: Association of American Railroads and Railway Supply Institute
Work investigating the release of hazardous materials following the derailment of cargo trains, using advanced Finite Element Models to simulate derailments.

ACADEMIC EXCHANGES AND VISITING RESEARCH EXPERIENCE

- 6-month Exchange Program at University of Illinois Urbana-Champaign, Champaign IL, USA, 2015
- 10-month Exchange Program at San Diego State University, San Diego, CA, USA, 2012-2013

TEACHING EXPERIENCE

Alfredo H. Ang Teaching Assistant for CEE598 Reliability Analysis, Spring 2022
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign (USA)

Teaching Assistant and co-instructor for CEE598 Stochastic Processes and Random Vibrations, Spring 2020
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign (USA)
Acted as co-instructor, prepared class/homework material and delivered several lectures

Teaching Assistant for CEE491 Decision and Risk Analysis, Fall 2019
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign (USA)

Among the teaching assistants ranked as excellent by the students (Fall 2019)

Teaching Assistant for CEE461 Reinforced Concrete, Spring 2019
Department of Civil and Environmental Engineering, University of Illinois Urbana-Champaign (USA)

Mentor for several courses in decision and risk analysis, 2020-Date
GEC Academy, Beijing (China)

GRANTS – MONETARY AWARDS

Team
- XSEDE research request for computational resources to run "advanced simulations of train derailments" (value: $38031)
- XSEDE Startup allocation for computational resources to run "advanced simulations of train derailments" (value: $2830)

Personal
- Grant agreement n. 101101690 with Consorzio Interuniversitario ReLUIS for "Definition of multi-risk scenarios to assess good practices for civil protection" (value: €12000)
- Erasmus+ mobility for teaching and training (value: €2464)
- Grant agreement "bando n.22 del 20.01.2023" with University of Naples Federico II for "Support to vulnerability modelling for risk and resilience analysis of engineering systems" (value: €5000)
- Fellowship "Mavis Future Faculty Academy" for the "training of the next generation of great engineering faculty" (value: $2000)
- Conference fellowship for participation in the 2017 Engineering Mechanics Institute Conference (value: $700)

OTHER AWARDS AND MEMBERSHIPS

- Editor's choice for the paper "Probabilistic Models and Fragility Estimates for Hollow Clay Bricks' URM Walls Subject to In-plane Horizontal Forces", published in the Journal of Structural Engineering
- Among the Teaching Assistants ranked as excellent for the Academic Year 2019-2020
- Percorso d'Eccellenza ("Excellence Path"), a Special Program for students with the top performance from the University of Pisa
- Honorable Mention in the Graduate and Post-Doctoral Poster Competition for the Center of Excellence for Risk-Based Community Resilience Planning (2017)
- Member of Honor Society Tau Beta Pi
- Outstanding Member Award for engineering honor society Tau Beta Pi (Fall 2018)
- Third place campus-wide competition AXIS-ORMIR student challenge for the development of a curve-fitting utility for reinsurance data (2018)

ACTIVITY AS A REVIEWER

Contributed to peer reviews for multiple journals, including:

- Reliability Engineering and System Safety
- Disaster and Risk Reduction
- Sustainable and Resilient Infrastructure
- Structural Engineering
- Engineering Structures
- Frontiers in Earth Science
- Mechanical Systems and Signal Processing
- Bulletin of Earthquake Engineering

ORGANISATION OF SCIENTIFIC EVENTS

- Organised and co-chaired the session "Structural Deterioration and Value of Information" at the 1st Conference of the European Association on Quality Control of Bridges and Structures (EUROSTRUCT2021).
- Organised the session "System identification for infrastructure components subject to deterioration" at the 10th International Conference on Experimental Vibration Analysis for Civil Engineering Structures (EVACES2023).
- Organised the session "Stochastic models for deteriorating infrastructure and calibration based on field data" at the Engineering Mechanics Institute 2023 International Conference (EMI2023IC).

COMMUNITY OUTREACH

- Volunteered for the Grad Academy for College Teaching, preparing TAs for classroom teaching responsibilities by engaging them in interactive sessions about teaching strategies and resources
- Volunteered at the Engineering Open House, an annual event organised entirely by engineering students at the University of Illinois at Urbana-Champaign
- Activities Chair for the Students Leadership Council of the NIST Center of Excellence for Community Resilience
- Student's representative for the master course in Structural Engineering at the University of Pisa
- Volunteered at the FIRST LEGO League as a photographer, an international competition organised by FIRST for elementary and middle school students

PUBLICATIONS

1. **Iannacone L.**, Gardoni P. (2023) "Modeling Deterioration and Predicting Remaining Useful Life using Stochastic Differential Equations and Limited Data" *Reliability Engineering and System Safety (submitted)*

2. **Iannacone L.**, Sharma N., Tabandeh A., Gardoni P. (2022) "Modeling Time-varying Reliability and Resilience of Deteriorating Infrastructure" *Reliability Engineering and System Safety*, 108074

3. **Iannacone L.**, Gardoni P. (2022) "Physics-based Repair Rate Curves for Segmented Pipelines subject to Seismic Excitation" *Journal of Sustainable and Resilient Infrastructure* DOI: 10.1080/23789689.2021.2000146

4. Tabandeh A., Sharma N., **Iannacone L.**, Gardoni P. (2022) "Numerical Solution of the Fokker-Planck Equation using Physics-based Mixture Models" *Computer Methods in Applied Mechanics and Engineering*, 399, 115424.

5. Kirkpatrick S.W., Lin C.Y., **Iannacone L.**, Gharzouzi P., Treichel T., Barkan C.P.L., Gardoni P. (2022) "Derailment simulation analysis of the relationship between railroad tank car structural modeling, physical testing, and the probability of damage and release" *Transportation Research Record: Journal of the Transportation Research Board,* DOI: 10.1177/0361198122113758

6. **Iannacone L.**, Andreini, M., Gardoni P., Sassu M. (2021) "Probabilistic Models and Fragility Estimate for Hollow Clay Bricks' URM Walls subject to In-plane Horizontal Forces" *Journal of Structural Engineering* 147(6), DOI: 10.1061/(ASCE)ST.1943-541X.0003006

7. **Iannacone L.**, Giordano P.F., Gardoni P., Limongelli, M.P. (2021) "Quantifying the Value of Information of Multiple Inspection Methods for Degrading Engineering Systems" *Structural Health Monitoring*, DOI: 10.1177/1475921720981869

PUBLICATIONS IN PREPARATION

1. **Iannacone L.**, Gardoni P. (2022) "Real-time Deterioration of Engineering Systems during Shocks using a Stochastic Differential Equation Formulation"

2. **Iannacone L.**, Tabandeh A., Gardoni P. (2022) "Markov-Transformable Processes: Formulation of Governing Differential Equations and Their Numerical Solutions"

3. Giordano P.F., **Iannacone L.**, Limongelli, M.P., Gardoni P. (2022) "Value of Information Analysis for Degrading infrastructure Networks and Optimization of Monitoring Placement"

4. **Iannacone L.**, Giordano P.F., Gardoni P., Limongelli, M.P. (2022) "A Renewal-Theory Formulation for Calculating Life-Cycle Value of Information"

5. Pandey A., **Iannacone L.**, Gardoni P. (2022) "Surrogate Model to Estimate Commodity Flow for Evolving Infrastructure"

CONFERENCE PROCEEDINGS

1. **Iannacone L.**, Gardoni P. (2023) "Improved Euler-Maruyama Scheme for the Calibration of Deterioration Models" *Proceedings of the 10th International Conference on Experimental Vibration Analysis for Civil Engineering Structures (EVACES2023), Milan, Italy (submitted)*

2. **Iannacone L.**, Manandhar V., Gyawali J., Malla P., Gentile R., Creed R., Guragain R., Galasso C. (2023) "Simulation-based Flood Fragility and Vulnerability Analysis for Expanding Cities"

Proceedings of the 14th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP14), Dublin, Ireland

3. **Iannacone L.**, Gentile R., Galasso C. (2023) "Simulating Interacting Multiple Natural-hazard Events for Lifecycle Consequence Analysis" *Proceedings of the 14th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP14), Dublin, Ireland*

4. Otárola K., **Iannacone L.**, Gentile R., Galasso C. (2023) "A Markovian Framework for Multi-Hazard Life-Cycle Consequence Analysis of Deteriorating Structural Systems" *Proceedings of the 14th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP14), Dublin, Ireland*

5. Otárola K., **Iannacone L.**, Gentile R., Galasso C. (2023) "Seismic Fragility Analysis of Deteriorating Reinforced Concrete Buildings from a Life-Cycle Perspective" *Proceedings of the 14th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP14), Dublin, Ireland*

6. Otárola K., **Iannacone L.**, Gentile R., Galasso C. (2023) "A Markovian Modelling Framework for Life-Cycle Consequences of Infrastructure Systems in a Multi-Hazard Environment" *Proceedings of 8th International Symposium on Life-Cycle Civil Engineering (IALCCE 2023), Milan, Italy*

7. Kirkpatrick S.W., Treichel T.T., Barkan C.P.L., Lin C., **Iannacone L.**, Gharzouzi P., Gardoni P. (2022) "Improving Understanding of Railroad Tank Wagon Performance in Accidents Through Simulation-Based Derailment Analyses" *Proceedings of the 13th World Congress on Railway Research (WCRR2022), Birmingham, UK*

8. Giordano P.F., **Iannacone L.**, Limongelli M.P., Gardoni, P. (2022) "Effects of Network Connectivity on the Value of Information" *Proceedings of the 13th International Conference on Structural Safety and Reliability (ICOSSAR2021-2022), Shanghai, China*

9. **Iannacone L.**, Tabandeh A., Gardoni P. (2022) "Markov-transformable Processes: Formulation of Governing Differential Equations and Their Numerical Solutions" *Proceedings of the 13th International Conference on Structural Safety and Reliability (ICOSSAR2021-2022), Shanghai, China*

10. Kirkpatrick S.W., Treichel T.T., Barkan C.P.L., Lin C., **Iannacone L.**, Gharzouzi P., Gardoni P. (2022) "Derailment Simulation Analysis of the Relationship between Railroad Tank Car Structural Modeling, Physical Testing, and the Probability of Damage and Release" *Proceedings of the 101st Transportation Research Board Annual Meeting (TRB), Washington DC, USA*

11. **Iannacone L.**, Giordano P.F., Gardoni P., Limongelli, M.P. (2021) "A Renewal Theory Formulation for the Quantification of the Benefits of Structural Health Monitoring. Value of Information Analysis for Degrading Engineering Systems" *Proceedings of the 1st Conference of the European Association on Quality Control of Bridges and Structures (EUROSTRUCT2021), Padova, Italy*

12. **Iannacone L.**, Gardoni P. (2021) "Time-varying Fragility Functions for Bridges subject to Main Shock-Aftershock Sequences Including Damage Accumulation during the Events and Calibration based on Available Data" *Proceedings of the 10th International Conference on Bridge Maintenance, Safety and Management (IABMAS2020), Sapporo, Japan*

13. Giordano P.F., **Iannacone L.**, Limongelli M.P., Gardoni, P. (2020) "Value of Information Analysis for Degrading Engineering Systems" *Proceedings of the 7th International Symposium on Life-Cycle Civil Engineering (IALCCE 2020), Shanghai, China*

14. **Iannacone L.**, Giordano P.F., Gardoni P., Limongelli, M.P. (2019) "Decision Making based on the Value of Information of Different Inspection Methods" *Proceedings of the 12th International Workshop on Structural Health Monitoring (IWSHM 2019), Stanford CA, USA*

15. **Iannacone L.**, Gardoni P. (2019) "Stochastic Differential Equations for the Deterioration Processes of Engineering Systems" *Proceedings of the 13th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP13), Seoul, South Korea*

16. **Iannacone L.**, Gardoni P. (2018) "Stochastic differential equations for modeling deterioration of engineering systems and calibration based on Structural Health Monitoring" *Proceedings of 6th International Symposium on Life-Cycle Civil Engineering (IALCCE 2018), Ghent, Belgium*

17. **Iannacone L.**, Gardoni P. (2018) "Reliability of Engineering Systems Combining Structural Health Monitoring with State-of-the-Art Deterioration Models" *Proceedings of 11th National Conference on Earthquake Engineering (11NCEE), Los Angeles CA, USA*

18. **Iannacone L.**, Gardoni P. (2018) "Physics-based Repair Rates for Pipelines subject to Seismic Excitations" *Proceedings of 16th European Conference on Earthquake Engineering (16ECEE), Thessaloniki, Greece*

CONFERENCE PRESENTATIONS

1. Markov-transformable Processes: Formulation of Governing Differential Equations and Their Numerical Solutions. *13th International Conference on Structural Safety and Reliability (ICOSSAR2021-2022), Shanghai, China - Online*

2. Markov-transformable Processes to Model Deteriorating Engineering Systems. *EMI Conference, Baltimore MD, USA, May 31-June 3, 2022*

3. Calibration of Stochastic Differential Equations to Model Deterioration based on Available Data. *EMI Conference, Baltimore MD, USA, May 31-June 3, 2022*

4. Life-Cycle Analysis of Water Infrastructure Incorporating Physics-Based Deterioration and Recovery Modeling. *LifeLines Conference 2021-2022, Los Angeles, USA - Online*

5. A Renewal Theory Formulation for the Quantification of the Benefits of Structural Health Monitoring. *1st Conference of the European Association on Quality Control of Bridges and Structures (EUROSTRUCT2021), Padova, Italy, August 29-September 1, 2021*

6. Time-varying Fragility Functions for Bridges subject to Main Shock-Aftershock Sequences Including Damage Accumulation during the Events and Calibration based on Available Data. *10th International Conference on Bridge Maintenance, Safety and Management (IABMAS2020), Sapporo, Japan - Online*

7. Decision Making based on the Value of Information of Different Inspection Methods. *12th International Workshop on Structural Health Monitoring (IWSHM 2019), Stanford CA, USA, September 10-12, 2019*

8. Deterioration Models Including Real-Time Damage Accumulation within Shock Occurrences. *EMI Conference, Pasadena CA, USA, June 19-21, 2019*

9. Stochastic Differential Equations for the Deterioration Processes of Engineering Systems. *13th International Conference on Applications of Statistics and Probability in Civil Engineering (ICASP13), Seoul, South Korea, May 26-30, 2019*

10. Stochastic differential equations for modeling deterioration of engineering systems and calibration based on Structural Health Monitoring. *6th International Symposium on Life-Cycle Civil Engineering (IALCCE 2018), Ghent, Belgium, 28-31 October, 2018*
11. Reliability of Engineering Systems Combining Structural Health Monitoring with State-of-the-Art Deterioration Models. *11th National Conference on Earthquake Engineering (11NCEE), Los Angeles CA, USA, June 25-29, 2018*
12. Physics-based Repair Rates for Pipelines subject to Seismic Excitations. *16th European Conference on Earthquake Engineering (16ECEE), Thessaloniki, Greece, June 18-21, 2018*
13. Updating Deterioration Models based on Data from Structural Health Monitoring and Non-Destructive Evaluation. *EMI Conference, Boston MA, USA, May 29-June 1, 2018*
14. Modeling of Pipeline Deterioration for the Reliability and Resilience Assessment of Potable Water Networks. *ASCE Congress on Technical Advancements, Duluth MN, USA, September 10-13, 2017*
15. Calibration and Updating of State-Dependent Deterioration Models based on Field Data. *EMI Conference, San Diego CA, USA, June 4-7, 2017*