

Héber Hwang Arcolezi

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Postdoctoral researcher with expertise in data privacy and privacy-preserving machine learning. I am passionate about research and committed to the creation and development of high-quality solutions.

Education

- 2019 – 2022 **Ph.D. in Computer Science:** University Bourgogne Franche-Comté (UBFC), France.
Research: Production of Categorical Data Verifying Differential Privacy: Conception and Applications to Machine Learning.
Funding: CADRAN project, Region Bourgogne Franche-Comté.
Supervisors: [Jean-François Couchot](#), [Bechara Al Bouna](#), [Xiaokui Xiao](#).
Dissertation Jury: [Mathieu Cunche](#), [Benjamin Nguyen](#), [Mário S. Alvim](#), [Stéphane Chréten](#).
- 2017 – 2019 **M.Eng. in Electrical Engineering:** São Paulo State University (UNESP), Brazil.
Research: A Novel Robust and Intelligent Control Based Approach for Human Lower Limb Rehabilitation via Neuromuscular Electrical Stimulation.
Funding: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).
Supervisor: [Aparecido Augusto de Carvalho](#).
Dissertation Jury: [Marcelo A. A. Sanches](#), [Raphaël Couturier](#).
- 2012 – 2017 **B.Eng. in Electrical Engineering:** Mato Grosso State University (UNEMAT), Brazil.
Research: Um Estudo Complementar ao Projeto de Controle PID no Caso do Pêndulo Invertido.
Supervisor: [Rogério B. Quirino](#).
Dissertation Jury: [Rogério Lúcio Lima](#), [Maria Helena Vieira Kelles](#).

Research Experience

- 2022 **Postdoctoral Researcher at [Comète team](#) - [Inria](#), [LIX](#) (Current Position):** Research on local differential privacy, machine learning privacy, and machine learning fairness.
Funding: [HYPATIA Project](#).
Hosted by DR1 [Catuscia Palamidessi](#).
- 2022 **Visiting Researcher at Universidade Federal de Minas Gerais – UFMG (3 weeks):** Investigation and development of data-driven solutions based on machine learning for applications in medicine.
Hosted by Prof. [Ligia de Loiola Cisneros](#).
- 2021 **Visiting Researcher at Université du Québec à Montréal – UQAM (1 month):** Investigation of privacy risks when collecting multidimensional data with local differential privacy.
Funding: [EIPHI Graduate School](#) (Ph.D. Student Mobility Grant)
Hosted by Prof. [Sébastien Gambs](#).

Additional Training

- 2021 **Participant of the 6th Rencontre Entreprises DOctorants en Sécurité (REDOCS'21):** Research of a privacy-preserving solution for collecting user statistics by cryptographic and differential privacy means.
- 2021 **Participant and Presenter at the Data Anonymisation and Reidentification Competition (DARC), part of the 11th Atelier sur la Protection de la Vie Privée (APVP'21):** Research and development of a privacy-preserving solution for trajectory data.
- 2021 **Participant of the 1st Inria-DFKI European Summer School on AI (IDAI'21).**
- 2020 **Participant and Presenter at the 15th IFIP Summer School on Privacy and Identity Management:** Presentation of a privacy-preserving call-detail-records processing system research paper.

Teaching Experience

- 2021 **Teacher at Workshop on Privacy for IoT at UBFC (20 hours):** Theory and practical methods of anonymization for students of Master 1.
- 2020 **Teacher at Workshop on Privacy for IoT at UBFC (20 hours):** Theory and practical methods of anonymization for students of Master 2.

Work Experience

- 2017 **Electrical Engineer Intern at “Losan Engineering” (3 months):** Developing low and high-tension electrical projects.
- 2013 – 2016 **Responsible for the Development of Cooperative Groups in the FOCCO program at UNEMAT (4 years):** Plan, execute, and maintain study groups with the purpose of increasing the permanence and approval rate in undergraduate courses.
- 2016 **Co-Founder and Voluntary Member at “Energy Electrical Projects and Consulting Junior Enterprise” (1 year):** Low and high tension electrical projects; optical fibers and telecommunications projects; and consulting.
- 2014 **Voluntary Tutor on Differential and Integral Calculus at UNEMAT (6 months):** Assist students enrolled in the discipline, dedicate and plan activities to develop student learning.

Academic Community Services

External Reviewer

- 2021 Proceedings on Privacy Enhancing Technologies Symposium (PoPETS)
- 2020 Security and Communication Networks Journal

Conference Organization

- 2017 II Semana da Animação, Modelagem e Automação at UNEMAT.
- 2014 I Semana da Faculdade de Ciencias Exatas at UNEMAT.

Peer-Reviewed Publications: The superscript * indicates equal contributions to the paper.

Journal Articles (6): Classified according to four JCR ([SCImago Journal Rank](#)) quartiles (Q1, Q2, Q3, and Q4) and its Impact Factor (IF), retrieved in the year of publication.

Summary of Journal Article Publications by JCR quartiles.

Q1	Q2	Q3	Q4	Unranked
4	0	0	1	1

- 2021 **Privacy-Preserving Prediction of Victim's Mortality and Their Need for Transportation to Health Facilities**
 *Arcolezi, H. H.; *Cerna, S.; Couchot, J.-F.; Guyeux, C.; Makhoul, A.
 IEEE Transactions on Industrial Informatics, Early Access. JCR: **Q1**, IF: **10.215**.
<https://doi.org/10.1109/tii.2021.3123588>
- 2021 **Machine learning-based forecasting of firemen ambulances' turnaround time in hospitals, considering the COVID-19 impact**
 Cerna, S.; Arcolezi, H. H.; Guyeux, C.; Royer-Fey, G.; Chevallier, C.
 Applied Soft Computing, vol. 109, p.107561. JCR: **Q1**, IF: **6.725**.
<https://doi.org/10.1016/j.asoc.2021.107561>
- 2021 **RISE Controller Tuning and System Identification Through Machine Learning for Human Lower Limb Rehabilitation via Neuromuscular Electrical Stimulation**
 Arcolezi, H. H.; Nunes, W. R. B. M.; de Araujo, R. A.; Cerna, S.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
 Eng. Applications of Artificial Intelligence, vol. 102, p.104294. JCR: **Q1**, IF: **6.212**.
<https://doi.org/10.1016/j.engappai.2021.104294>
- 2021 **Preserving Geo-Indistinguishability of the Emergency Scene to Predict Ambulance Response Time**
 Arcolezi, H. H.; Cerna, S.; Guyeux, C.; Couchot, J.-F.
 Mathematical and Computational Applications, vol. 26(3), p.56. JCR: —, IF: —.
<https://doi.org/10.3390/mca26030056>
- 2020 **Forecasting the Number of Firefighter Interventions per Region with Local-Differential-Privacy-Based Data**
 Arcolezi, H. H.; Couchot, J.-F.; Cerna, S.; Guyeux, C.; Royer, G.; Al Bouna, B.; Xiao, X.
 Computers & Security, vol. 96, p.101888. JCR: **Q1**, IF: **3.579**.
<https://doi.org/10.1016/j.cose.2020.101888>
- 2020 **Identifying the knee joint angular position under neuromuscular electrical stimulation via long short-term memory neural networks**
 Arcolezi, H. H.; Nunes, W. R. B. M.; Cerna, S.; de Araujo, R. A.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
 Research on Biomedical Engineering, vol. 36(4), p.511-526. JCR: **Q4**, IF: —.
<https://doi.org/10.1007/s42600-020-00089-1>

International Conference Proceedings (7): Classified according to four CORE ([Computing Research and Education](#)) rankings (A*, A, B, and C).

Summary of International Conference Papers by CORE ranks.

A*	A	B	C	Unranked
0	1	1	3	2

- 2021 **Random Sampling Plus Fake Data: Multidimensional Frequency Estimates With Local Differential Privacy**

Arcolezi, H. H.; Couchot, J.-F.; Al Bouna, B.; Xiao, X.
International Conference on Information and Knowledge Management. CORE: **A**
(Acceptance rate: 21.7%).
<https://doi.org/10.1145/3459637.3482467>

2020 **Mobility modeling through mobile data: generating an optimized and open dataset respecting privacy**

Arcolezi, H. H.; Couchot, J.-F.; Baala, O.; Contet, J.-M.; Al Bouna, B.; Xiao, X.
International Wireless Communications and Mobile Computing. CORE: **B** (Acceptance rate: 38%).
<https://doi.org/10.1109/iwcmc48107.2020.9148138>

2020 **A Comparison of LSTM and XGBoost for Predicting Firemen Interventions**

Cerna, S.; Guyeux, C.; Arcolezi, H. H.; Couturier, R.; Royer, G.
World Conference on Information Systems and Technologies. CORE: **C**.
https://doi.org/10.1007/978-3-030-45691-7_39

2020 Longitudinal Collection and Analysis of Mobile Phone Data with Local Differential Privacy

Arcolezi, H. H.; Couchot, J.-F.; Al Bouna, B.; Xiao, X.
IFIP International Summer School on Privacy and Identity Management.
https://doi.org/10.1007/978-3-030-72465-8_3

2020 **Boosting Methods for Predicting Firemen Interventions**

Cerna, S.; Guyeux, C.; Arcolezi, H. H.; Couturier, R.; Royer, G.
International Conference on Information and Communication Systems.
<https://doi.org/10.1109/icics49469.2020.239488>

2019 **Long Short-Term Memory for Predicting Firemen Interventions**

Ñahuis, S. L. C.; Guyeux, C.; Arcolezi, H. H.; Couturier, R.; Royer, G.; Lotufo, A. D. P.
International Conference on Control, Decision and Information Technologies. CORE: **C**.
<https://doi.org/10.1109/codit.2019.8820671>

2019 **A RISE-based Controller Fine-tuned by an Improved Genetic Algorithm for Human Lower Limb Rehabilitation via Neuromuscular Electrical Stimulation**

Arcolezi, H. H.; Nunes, W. R. B. M.; Nahuis, S. L. C.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
International Conference on Control, Decision and Information Technologies. CORE: **C**.
<https://doi.org/10.1109/codit.2019.8820357>

National Conference Proceedings (5).

2020 **Prévisions géographiques du nombre d'interventions des pompiers respectant la confidentialité différentielle locale**

Arcolezi, H. H.; Couchot, J.-F.; Cerna, S.; Guyeux, C.; Royer, G.; Al Bouna, B.; Xiao, X.
Conférence Nationale sur les Applications Pratiques de l'Intelligence Artificielle.
http://pfia2020.fr/wp-content/uploads/2020/08/Actes_CH_PFIA2020_V3.pdf

2019 **On the Ability to Identify the Knee Joint Position Under Neuromuscular Electrical Stimulation Using Long Short-Term Memory Neural Networks**

Arcolezi, H. H.; Nunes, W. R. B. M.; de Araujo, R. A.; Cerna, S.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
Conferência Brasileira de Dinâmica, Controle e Aplicações.
<http://soac.eesc.usp.br/index.php/dincon/xivdincon/paper/view/1685/1153>

- 2019 **A Robust and Intelligent RISE-based Control for Human Lower Limb Tracking via Neuromuscular Electrical Stimulation**
 Arcolezi, H. H.; Nunes, W. R. B. M.; de Araujo, R. A.; Cerna, S.; Sanches, M. A. A.; Teixeira, M. C. M.; de Carvalho, A. A.
 Conferência Brasileira de Dinâmica, Controle e Aplicações.
<http://soac.eesc.usp.br/index.php/dincon/xivdincon/paper/view/1683/1152>
- 2017 **Um Estudo Complementar do Controle PID Servo e Regulador Aplicado ao Sistema Pêndulo Invertido.**
 Arcolezi, H. H.; Quirino, R. B.
 Congresso Brasileiro de Educação em Engenharia.
http://www.abenge.org.br/sis_artigos.php
- 2017 **Um Estudo Complementar ao Projeto de Controle PID do Pêndulo Invertido.**
 Arcolezi, H. H.; Quirino, R. B.
 Congresso Nacional de Pesquisa e Ensino em Ciências.
<https://editorarealize.com.br/artigo/visualizar/28867>
- Preprint (2):** Submitted articles on peer-reviewed journals and/or conferences.
- 2021 **Improving the Utility of Locally Differentially Private Protocols for Longitudinal and Multidimensional Frequency Estimates**
 Arcolezi, H. H.; Couchot, J.-F.; Al Bouna, B.; Xiao, X.
 Submitted to: Digital Communications and Networks. JCR: **Q1**, IF: **6.797**.
<https://arxiv.org/abs/2111.04636>
- 2021 **Differentially Private Multivariate Time Series Forecasting of Aggregated Human Mobility With Deep Learning: Input or Gradient Perturbation?**
 Arcolezi, H. H.; Couchot, J.-F.; Renaud, D.; Al Bouna, B.; Xiao, X.
 Submitted to: Neural Computing and Applications. JCR: **Q1**, IF: **5.606**.

Presentations & Media

- 2022 **Invited talk:** Data anonymization and Artificial Intelligence models (in Portuguese). In: **Hospital Risoleta Tolentino Neves**. Hybrid format (in-person and online). [Press journal](#).
- 2021 **Invited talk:** Improving Utility and Privacy in Multidimensional Frequency Estimates Under Local Differential Privacy. In: **Université du Québec à Montréal**. Hybrid format (in-person and online).
- 2021 **Invited talk:** Introduction to Privacy Preservation and Machine Learning Techniques in Healthcare (in Portuguese). In: **Universidade Federal de Minas Gerais**. Online.
- 2021 **Oral presentation:** Privacy-Preserving Human Mobility Analytics Through Mobile Phone Data. In: **APVP 2021 - 11e Atelier sur la Protection de la Vie Privée**. Online.
- 2020 **Press journal:** [Mesure Informatique de Ruptures de Service](#). In: **En Direct** (Université de Franche-Comté).

Expertise

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|---------|---|
| Privacy | <ul style="list-style-type: none"> • Conception and application of global, shuffle, and local differential privacy protocols for statistical learning. • Application of syntactic anonymization methods for privacy-preserving data publishing. |
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Machine Learning	<ul style="list-style-type: none"> • Development of machine learning models with differential privacy guarantees. • Development of machine learning and deep learning methods for regression and time series forecasting tasks. • Development of machine learning and deep learning methods for classification (binary, multiclass, and multi-output) tasks.
Control System	<ul style="list-style-type: none"> • Design and implementation of closed-loop linear and nonlinear control methods. • Identification of linear and nonlinear systems with mathematical and black-box methods.
Optimization	<ul style="list-style-type: none"> • Development and utilization of linear and metaheuristic optimization methods.
Biomedical	<ul style="list-style-type: none"> • Conducting practical rehabilitation experiments on people with spinal cord injury through automatized methods.

Tools

Programming languages:	Python, Matlab & Simulink, Java, Visual Basic.
Libraries:	Keras, TensorFlow, TensorFlow Privacy, PyTorch, Scikit-Learn, Matplotlib, Pandas, Numpy, GEKKO, Scipy, Sympy, Ray, Numba, Scikit-fuzzy.
Operating Systems:	Linux (Debian and Ubuntu) and Windows 7/10.
Others:	MySQL, ARX anonymization tool, Labview, Latex, Sun Grid Engine (SGE), MS Office, AutoCAD, AltoQI Lumine, Multisim.

Languages

Portuguese	Mother Tongue
English	Advanced - C1
French	Intermediate - B2
Spanish	Intermediate - B2