Benoit L. Marteau

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PROFESSIONAL SUMMARY

Passionate, motivated, and results-driven Electrical and Computer Engineering (ECE) Ph.D. student with expertise in Artificial Intelligence (AI), AI Implementation Science within healthcare, medical data harmonization, eXtended Reality (XR), digital signal processing, and clinical decision support systems. Proven track record in leadership, lab organization and management, mentoring students, writing grants, and securing funding for innovative healthcare technologies.

EDUCATION

GEORGIA INSTITUTE OF TECHNOLOGY **Atlanta, GA**
Doctor of Philosophy (Ph.D) in Electrical and Computer Engineering (E.C.E) Spring 2022 – *Expected Spring 2026*
- AI implementation sciences, XR implementation within healthcare, Data harmonization GPA: 4.0
- Award: National Science Foundation (N.S.F.) Travel Award

GEORGIA INSTITUTE OF TECHNOLOGY **Atlanta, GA**
Master of Science (M.S.) in Electrical and Computer Engineering (E.C.E) August 2018 - *December 2019*
- Digital Signal Processing, Computer Vision
- Award: ECE – Coulter Shenzhen M.S. Fellowship

ARTS ET METIERS – PARISTECH **Cluny and Paris, France**
Diplôme d'Ingénieur (equivalent to M.S. in Industrial and Mechanical Engineering) *September 2016 - December 2020*
- Mechanical, industrial, and energy engineering
- Leader for the Arts et Métiers team in the Dassault U.A.V. Challenge (2017-2018)
- Dual Degree Program with Georgia Institute of Technology

EXPERIENCE

GEORGIA INSTITUTE OF TECHNOLOGY **Atlanta, GA**
Graduate Research Assistant/ Bio-MIBLab, Advisor: Dr. May D. Wang *Spring 2022-Present*
- **Lab Manager**:
  - Managed laboratory with over 50 graduate and undergraduate students
  - Scheduled and organized lab meetings and retreats. Managed lab computational server and Azure cloud environment. Coordinate lab equipment and space renovation or upgrade.
  - Major contribution to the organization of the Symposium centered around Safe, Trustworthy, Actionable, and Responsible AI within healthcare.
- **AI-Based Clinical Systems**:
  - Designed Artificial Intelligence (AI)-based clinical decision support systems using image generative models, improving diagnostic precision with limited datasets.
  - Trained Generative Adversarial Networks (GANs) and Diffusion Models to augment a limited pediatric heart-transplant histopathology imaging dataset with synthetic data.
  - Showed improvement using Diffusion Models compared with GANs.
- **Multimodal Imaging Data Harmonization**:
  - Developed a novel approach using Generative AI to use one data modality to reconstruct others
  - Evaluated feasibility of approach on highly multiplexed immunofluorescence and histopathology data
  - Implemented various explainable AI techniques, such as ablation study, GradCAM, Bayesian-UNet
- **AI Implementation Science**:
  - Collaborated with Shriners' Children on AI Implementation Sciences to harmonize and improve the quality of real-world hospital medical data.
  - Evaluated data quality on Shriners' research data warehouse, which follows the OMOP Common Data Model (CDM) standard.
  - Implemented and improved open-source tools within Shriners' Microsoft cloud environment.
- **Digital Twin (D.T.) and eXtended Reality (X.R.) within healthcare:**
  - Research and explore the implementation of DT and XR technologies within healthcare, developing an XR-based Upper Limb Rehabilitation Assessment Tool and a Brain Digital Twin within a cloud environment, integrating an AI Analysis pipeline and XR visualization capabilities.

- Developed VR-based Digital Twin prototype application for at-home upper extremity rehabilitation assessment within a one-to-one scale apartment. Developed cloud-based infrastructure to display real-time data in VR applications.
- Developed prototype XR-based Brain Digital Twin cloud infrastructure to enable clinicians and researchers to store, analyze, and visualize data in 2D and 3D.
- Led XR and DT-related projects in the lab

- **Technology Innovation: Generating Economic Results (TI:GER) Program**:
  - Successfully completed the TI:GER Program, a 3-semester program including an entrepreneurship course and hands-on experience
  - Put into practice what I learned by shadowing a startup, GATE Space, performing regulatory framework analysis
- **Funding and Grants**:
  - Assisted with three successful grant proposal writing, leading to over $700,000 in research funding.

GEORGIA INSTITUTE OF TECHNOLOGY **Atlanta, GA**
Research Assistant/ Coskun Lab *Spring 2021 - September 2021*

- **Immunofluorescence single-cell imaging analysis**
  - Used various computer vision techniques to register multiple channels, as well as explore multiple cell-type clustering approaches
- **Developed urinalysis strip test detection algorithm**

CISCO **Lyon, France**
Intern, Machine Learning *March 2020-July 2020*

- Developed time-series anomaly detection algorithms, improving system monitoring capabilities

ARTS ET METIERS – PARISTECH – DASSAULT UAV CHALLENGE **Paris, France**
Project Leader *September 2017 - June 2018*

- Project leader for the Arts & Métiers team in the Competition
- Led a team to develop an Autonomous Drone and was a finalist, securing third place in the competition.
- Developed a target detection system using Convolutional Neural Networks, the first in the competition's history.
- Co-designed the autonomous algorithm using the DroneKit Python library.

PUBLICATIONS

- **Marteau, B.*,** Vhashista S.*, Chen M., Geng W., Hornback A., Nnamdi M.C., Tan S., Zhong Y., Okada N. Acerbo E., Dickey A.S., Drane D.L. & Wang, M. D. (2024). Brain Digital Twin Combining Artificial Intelligence and Extended Reality. 2024 IEEE International Conference on Inteligent Reality (ICIR) (TBD). IEEE. [**In press**]
- **Marteau, B.,** Hornback A., Zhong, Y., Lawson, C. Woloff, J., Smith, B. M., Hilton, C. & Wang, M. D. (2024). Improving A Large Healthcare System Research Data Warehouse Using OHDSI's Data Quality Dashboard. 2024 IEEE EMBS International Conference on Biomedical and Health Informatics (BHI) (TBD). IEEE. [**In press**]
- Shi, W.*, **Marteau, B. L.*,** & Wang, M. D. Mapping and Diagnosing Augmented Whole Slide Image Datasets with Training Dynamics. Deep Generative Models for Health Workshop NeurIPS 2023.
- Shi, W.*, **Marteau, B. L.*,** Giuste, F., & Wang, M. D. (2023). Choice over effort: Mapping and diagnosing augmented whole slide image datasets with training dynamics. Proceedings of the 14th ACM International Conference on Bioinformatics, Computational Biology, and Health Informatics, 1–6.
- Zhong, Y.*, **Marteau, B.*,** Hornback, A., Zhu, Y., Shi, W., Giuste, F., … Wang, M. D. (2022). IDTVR: a novel cloud framework for an interactive digital twin in virtual reality. 2022 IEEE 2nd International Conference on Intelligent Reality (ICIR), 21–26. IEEE. – **Best Paper Award**
- **Marteau, B.** L., Zhu, Y., Giuste, F., Shi, W., Carpenter, A., Hilton, C., & Wang, M. D. (2022). Accelerating multi-site health informatics with streamlined data infrastructure using OMOP-on-FHIR. 2022 44th Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC), 4687–4690. IEEE.

ADDITIONAL INFORMATION

Technical Skills: Python (and Pytorch), C#, SQL, R, Unity, Microsoft Azure, Docker
Research Skills: Machine learning, Generative Adversarial Networks, Image processing, AI-based decision support systems
Certifications: Coursera: Deep Learning Specialization and Generative Adversarial Networks (GANs) Specialization
Skills: Project Management, Lab Management, Collaboration and Communication
Languages: Native: French, Fluent: English

Affiliations: Soce: Arts & Metiers Alumni
Awards: ECE - Coulter Shenzhen MS Fellowship
Interests: Astrophysics, Aerospace and Model trains