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Belona SONNA

RESEARCH FOCUS

I am broadly interested in the theory and practice of ethical AI. My current research focuses on **formal verification** of AI ethics principles. I develop **formal explanation based frameworks** to assess fairness, identify proxy discrimination, and audit and repair privacy leakage in AI driven decision making. I am open to collaborative projects in public domains where AI outputs may affect individuals, with a particular emphasis on **healthcare applications**. More information can be found on my [webpage](#).

EDUCATION

- Jan. 2022 **PhD Candidate, School of Computing, Australian National University**, Canberra, Australia, Ongoing.
Thesis: A formal framework based on abductive explanations for assessing and verifying alignment with AI ethics principles in AI driven decision making, with applications to proxy discrimination, individual fairness, and privacy leakage.
- Feb. 2020 **African Master's in Machine Intelligence (AMMI), African Institute for Mathematical Sciences (AIMS)**, Kigali, Rwanda, Grade: Good.
Thesis: Patient flow forecasting in hospitals using ensemble LSTM models.
- Oct. 2016 **Master of Computer Science, Electronics and Automation, National School of Agro Industrial Science**, Ngaoundere, Cameroon, Grade: Good.
Thesis: Identification of color image attributes for monitoring nutrient growth in algal biomass.

SELECTED PUBLICATIONS

- Jan 2026 **Sonna, B.** Bridging AI and Clinical Reasoning: Abductive Explanations for Alignment on Critical Symptoms. In 2026 Australasian Computer Science Week (ACSW 2026). (forthcoming).
- Jan 2026 **Sonna, B.**, Kouakep, K. T., Ebongue, J. L. F. K. Patient Flow and AI in the Global South: Designing Contextual, Ethical, and Efficient Health Solutions. In C. El Morr, A. Saab, E. Salem-Sokhn (Eds.), AI for Epidemic Preparedness: Innovations and Insights from the Global South. Springer International Publishing. (forthcoming).

- Dec.2025 **Sonna, B.**, Grastien, A., Benn, C. Beyond Verification: Abductive Explanations for Post-AI Assessment of Privacy Leakage, Proceedings of Workshop on Post-AI Formal Methods at AAAI-26, [DOI](#).
- Dec.2025 **Sonna, B.**, Grastien, A. On Explaining Proxy Discrimination and Unfairness in Individual Decisions Made by AI Systems, In: Liu, M., Yu, X., Xu, C., Song, Y. (eds) AI 2025: Advances in Artificial Intelligence. AI 2025. Lecture Notes in Computer Science, [DOI](#).
- Jan.2025 Marmolejo-Ramos, F., Rebecca,M., Florence ,J., **Sonna, B.**, others ; Factors Influencing Trust in Algorithmic Decision-Making: An Indirect Scenario-based Experiment,Frontiers in Artificial Intelligence (2025), [DOI](#).

Research Skills

- Skill:** **Formal Verification & Abductive Explanations**
Tools: Z3 Solver, QBF Solver
Description: Computation of abductive explanations from AI models using SMT translation and Z3 solver; formal verification of AI ethics principles.
- Skill:** **Machine Learning & AI Frameworks**
Tools: Scikit-learn, PyTorch, and Keras
Description: Training models, translation of models to SMT files for formal reasoning.
- Skill:** **Data Analysis & Programming**
Tools: Pandas, NumPy, Jupyter, Matplotlib, Python
Description: Handling tabular datasets and empirical validation on real-world datasets.
- Skill:** **AI Ethics Assessment**
Tools: Formal Abductive explanations
Description: Assessment of proxy discrimination, individual fairness, and privacy leakage in AI-driven decision making.
- Skill:** **Research Methodology**
Tools: Theorems and proofs, Experimental studies
Description: Integration of theoretical work and empirical studies.

TECHNICAL SKILLS

- O.S** WINDOWS, LINUX, MAC OS
- Database** MySQL, PostgresSQL, Oracle,XAMP , WAMP, Firebase Storage
- Tools and Environment** Android Studio, Anaconda, Eclipse, Netbeans, Matlab,Webdev, windev, Windev mobile, Spring, OpenCv, Tensorflow, Pytorch, Keras
- programming language** Python, java, C/C++, Visual Basic, Wlanguage, html/css, PHP

EMPLOYMENT HISTORY

- Feb. 2022 - Tutor of statistical machine learning course at the Australian National University, Canberra, Australia, 12 Months.
- Dec. 2020 - Manager, Ethics and Gender Issue at AfroLeadership, Yaounde, Now Cameroon, Ongoing
- Sept. 2020 - AI Instructor at Vecademy , Yaounde, Cameroon, 9 Months.
May 2021
- Oct. 2019 Research AI Intern at Future Corporation, Tokyo, Working on eye recognition and gaze tracking for early detection of Dementia, 2 Months.
-Dec.2019
- Jul. 2019 - Research Intern at Montreal AI Ethics Institute, My project is on Social impact of AI, 2 Months.
Sept.2019
- Oct. 2017 - Teaching Assistant of Computer sciences at ISSTMADD(Higher Jul.2018 Institute of Management Science and Sustainable Development),Ngaoundere,Cameroon, 10 Months.
- Jan. 2017 - Teaching Assistant at the Computer Science Department ENSAI (National Jul.2017 School of Agro-Industrial Sciences) Ngaoundere,Cameroon, 7 months.

HONOURS AND AWARDS

- Nov.2025 Africa Top 40 under 40 AI Achievers 2025 by Society for AI as Promoter of BEL'S AI Initiative.
- Sep.2025 Best Paper award at the Empowering Women of Colour in AI-Driven Mental Health Research workshop at IJCAI 2025.
- Dec.2021 100 Brilliant women in AI Ethics-2022 list by Women in AI Ethics, as Promoter of the Be Educated and Learn Skills in AI Initiative (BEL'S AI Initiative).
- Oct.2021 80 African women advancing AI in Africa and around the world list by African Shapers, as Promoter of BEL'S AI Initiative.
- Feb.2019 Best project in Building a machine learning-based system for breast cancer prognosis from gene expression data, discerned by Dr.Jean-Philippe Vert,MINES ParisTech and Google AI, during African Master of Machine Intelligence Program.
- Dec.2018 Certificate of Excellence for Best Debate Questions, discerned by Marc Deisenroth, Imperial College UK, during African Master of Machine Intelligence Program.
- Feb.2018 Youth Excellence Award for Technological Innovation by Ministry of Youth and Civic Education of Cameroon.

Dec.2017 Laureate of the 2nd Edition of the Nanas Awards (first prize): National Competition for the Promotion of Entrepreneurship and Leadership of the Girl, Edition 2017, My project was to build a Mobile App to help people suffering to malnutrition to easily follow their diets.

WORKSHOP AND SEMINARS

- Feb. 2026 Oral presentation at the Adaptive Learning and Intelligent Systems, as part of the Australasian Computer Science Week (ACSW) 2026, Melbourne, Australia.
- Jan. 2026 Oral presentation at the Workshop on Post-AI Formal Methods at AAAI-26, Singapore, Singapore.
- Dec. 2025 Oral presentation at Australasian Joint Conference In Artificial Intelligence 2025, Canberra, Australia.
- Dec. 2025 Poster Presentation Next Generation Responsible AI Symposium 2025, Adelaide, Australia.
- Aug. 2025 Oral Presentation the Empowering Women of Colour in AI-Driven Mental Health Research workshop at IJCAI 2025, Montreal, Online.
- Aug. 2024 Oral presentation Workshop on AI Explainability, Virtual, International Joint Conference on Artificial Intelligence 2024, Jeju, Online.
- Sep. 2023 AI and Machine Learning Summer School 2023, Virtual, Cambridge Centre for AI in Medicine, University of Cambridge, Online.
- Jul. 2020 Attended the Machine Learning Summer School 2020, Virtual, Max Planck Institute for Intelligent systems, Tübingen, Online.
- Dec. 2019 Poster Presentation at Women in Machine Learning Workshop at NeurIPS Conference in Vancouver, Canada.
- August. 2019 DEEP LEARNING INDABA in Kenya
- Apr. 2019 Teaching Assistant in Computer vision Tutorial during INDABA X RWANDA.
- Nov. 2018 Seminar presented by me on Image segmentation at African Master's in Machine Intelligence - AIMS.

CIVIC ENGAGEMENT

- Jul. 2021 Founder of the [BEL'S AI Initiative](#)
- Fev. 2021 Co-organizer of the [WiMLDS Yaounde chapter](#)
- Dec. 2020 Manager, Ethics and Gender Issue at [AfroLeadership](#)
- Jun. 2020 Member of the [Deep Decisions](#)
- Dec. 2019 Member of the [Kmer AI](#)

■ REFERENCES

- Name: *Dr. Alban Grastien*
Relationship: Primary supervisor of my PhD at the Australian National University.
Contact: ban@grastien.net
- Name: *Dr. Michael Norrish*
Relationship: Chair of my PhD supervisory panel at the Australian National University.
Contact: Michael.Norrish@anu.edu.au
- Name: *Prof. Lexing Xie*
Relationship: Member of my PhD supervisory panel at the Australian National University.
Contact: lexing.xie@anu.edu.au
- Name: *Dr. Jean-Louis Kedieng Ebongue Fendji*
Relationship: Former Computer Science lecturer at the University of Ngaoundere.
Contact: lfendji@gmail.com

■ LANGUAGES

- French: Native
English: Professional