Belona SONNA

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belsonna

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
programmimg language	Python, java, C/C++, Visual Basic, Wlanguage, html/css, PHP

EMPLOYMENT HISTORY

Feb. 2022 - 2023	Tutor of statistical machine learning course at the Australian National University, Canberra, Australia, Ongoing
Dec. 2020 - Now	Manager, Ethics and Gender Issue at AfroLeadership, Yaounde, Cameroon, Ongoing
Sept. 2020 - May 2021	AI Instructor at Vecademy , Yaounde, Cameroon, 9 Months
Oct. 2019 -Dec.2019	Research AI Intern at Future Corporation, Tokyo, Working on eye recognition and gaze tracking for early detection of Dementia, 2 Months
Jul. 2019 - Sept.2019	Research Intern at Montreal AI Ethics Institute, My project is on Social impact of AI, 2 Months
Oct. 2017 - Jul.2018	Teaching Assistant of Computer sciences at ISSTMADD(Higher Institute of Management Science and Sustainable Development),Ngaoundere,Cameroon, 10 Months
Jan. 2017 - Jul.2017	Teaching Assistant at the Computer Science Department ENSAI (National 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 Medecine, University of Cambridge, Online

Jul. 2020 Attended the Machine Learning Summer School 2020,Virtual, Max Planck Institute for Intelligent systems, Tubingen, 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