

NSANZIMFURA JEAN D'AMOUR

Climate & Health Researcher · Data Scientist · MSc Engineering AI, Carnegie Mellon University
Kigali, Rwanda (UTC+2), ndamour@alumni.cmu.edu, +250 798 287 664, Profile, LinkedIn, github.com/nsarob

SUMMARY

I build the evidence that health systems use to plan for climate change, and I care as much about whether a policy maker can read the result as about whether the model validates. Trained as an engineer at Carnegie Mellon, I now work where climate data, routine health information and government decision-making meet - forecasting climate-sensitive disease for national malaria programmes, publishing the methodology with its limitations written down honestly, and building the dashboards and tools that carry a finding the last mile to whoever has to act on it. Most of this happens in partnership with ministries, which means the hardest part is rarely the statistics.

EXPERIENCE

HISP Rwanda · *Climate and Health modeling*

Kigali · May 2026 – Present

- **Comoros malaria forecasting.** Lead author of the climate-informed malaria forecasting model for Ngazidja (Grande Comore) - the first operational tool of its kind in the country, published as Appendix F of the World Bank Group's Climate and Health Vulnerability Assessment for the Union of Comoros and cited in its Executive Summary as evidence that anticipatory surveillance is achievable there.
- Built weekly probabilistic forecasts for all five health districts of Ngazidja: a SARIMAX(1,0,1) with engineered climate covariates blended with a calibrated multi-quantile XGBoost, using thirteen features that encode how rainfall, temperature and humidity move through the Anopheles lifecycle. Rainfall lagged two to four weeks came out as the strongest predictor - biologically coherent, which mattered more to the programme than the metrics did.
- Benchmarked seven configurations on an identical 26-week hold-out using CRPS, RMSE, MAE, MAPE, R^2 and prediction-interval coverage, with a graded perturbation analysis for robustness to noisy climate inputs. Wrote the limitations section myself; the code ships as a version-controlled, CHAP-compatible package.
- Ran the in-country mission while the data-sharing MoU was still being negotiated, so I stood the pipeline up on CHIRPS and ERA5-Land satellite proxies and swapped in national ground-station records once it was signed. Before any of that, found and fixed two data-quality defects in PNL's routine surveillance line lists - a forecast built on a bad denominator is worse than no forecast at all.
- Work directly with the Programme National de Lutte contre le Paludisme and the Direction de la Météorologie Nationale of the Union of the Comoros, under the COMPASS project.
- Sit in technical and design-decision meetings with the Rwanda Ministry of Health, the Rwanda Biomedical Centre and international DHIS2 partners, including the DHIS2 Climate & Health initiative.
- Design visualisation dashboards and decision-support tools over routine HMIS data, plus offline-first tooling for community health workers; carry the data-quality, interoperability (FHIR / HL7 / ADX) and privacy-by-design brief across the product portfolio.

Cenfri · *Data Science Fellow · Technical Adviser, Government of Rwanda*

Kigali · Jul 2025 – May 2026

- Embedded inside the Ministry of Infrastructure as technical adviser; contributed analysis and evidence to amendments of Rwanda's national data and AI policy that were subsequently adopted across several line ministries.
- Designed and rolled out cross-departmental data-element standardisation, lifting the accuracy of national reporting by 35 percent and cutting data-related compliance risk by half.
- Spent most of the fellowship translating - between engineers, policy drafters and ministry leadership - which turned out to be the skill that has transferred to everything I have done since.

Upanzi Network, CyLab Africa - Carnegie Mellon University · *Research associates*

Kigali · Jul 2023 – Dec 2024

- Led HumekaFL, a multi-hospital federated-learning study on early detection of neonatal asphyxia, designed from the outset so that no patient record ever left the hospital that collected it. Published on arXiv.
- Built the end-to-end audio pipeline over the Baby Chillanto Infant Cry database (1,049 healthy / 879 deaf / 340 asphyxiated recordings) in Apache Spark and Python, with MFCC and spectral feature engineering.
- Trained a ResNet-50 classifier to 96 percent accuracy, then ONNX-quantised it - 50 percent smaller, 30 percent faster - so it would run on the phones nurses already carry rather than on hardware the partner hospitals did not have.
- Carried the work into CMU's LIONS group as a Graduate Research Assistant under Prof. Carlee Joe-Wong (Jun 2024 - May 2025), adding a Gaussian-kernel RBF to the federated SVM and serving it through AWS SageMaker for reproducible use across hospital partners.

Wekraft Ltd · *AI Engineer*

Kigali · Jul 2024 – Apr 2026

- Led SkillSeed - a learning platform for young people aged 6 to 18 - from scoping through to go-live, including iterative user-validation rounds with learners, teachers and MINEDUC stakeholders. Building it with young people rather than for them changed the product more than any technical decision did.
- Architected the delivery stack (NestJS, MongoDB, React, OpenAI-driven recommendations) on AWS with Docker and CI/CD.

- Led weekly sections for 50+ graduate students, held office hours and graded project work - a great deal of technical writing reviewed and returned, at volume, on a deadline.

- Selected for a competitive eight-week research programme; worked with researchers from across the EU on synthetic data generation for privacy-preserving healthcare applications.

RESEARCH & PUBLICATIONS

- Nsanzimfura, J. D., Hategekimana, J. P., Mutali, J. P., & Mulisa, J. M. (2026). *Climate-Informed Malaria Forecasting Model for Ngazidja*. Appendix F in *Climate and Health Vulnerability Assessment: Union of Comoros*. World Bank Group Health Directorate. Forthcoming - draft not yet circulated.
- Nsanzimfura, D., et al. (2024). *HumekaFL: Automated Detection of Neonatal Asphyxia Using Federated Learning*. arXiv:2412.01167.
- Nsanzimfura, D., et al. (2021). *Development of a Laboratory Stand for a Three-Coordinate CNC Machine*. Vladimir State University.
- **Edge LLM Framework for Secure EHR Interaction (pat-ai)** - a privacy-preserving retrieval framework that lets clinicians query electronic health records on-device, built for low-connectivity clinical settings. github.com/nsarob/pat-ai

EDUCATION

- QPA 3.37 / 4.0 across 163 units; awarded 11 May 2025. Coursework closest to this work: Project in AI for Healthcare (A), AI System Design (A), Application of AI in Africa (A), Data Inference & Applied Machine Learning (A-), Mobile Data Analysis (A-), Planning for Digital Transformation (A), Human–Robot Interaction & Cognition.

- First Class Honours, 3.7 / 4.0, on a full-ride Rwanda–Russia bilateral scholarship awarded to five students nationally. Thesis ranked best final-year project in the Robotics Department. Taught and examined entirely in Russian, which I learned to academic level in a year.

SKILLS

Research & analysis Time-series forecasting and probabilistic modelling (SARIMAX, multi-quantile gradient boosting); model validation and benchmarking (CRPS, RMSE, MAE, MAPE, R^2 , prediction-interval coverage); feature engineering for lagged climate–health relationships; perturbation and robustness testing; literature and policy review; semi-structured stakeholder interviews and iterative user validation.

Tools Python (pandas, statsmodels, scikit-learn, XGBoost, PyTorch), SQL, Apache Spark, Jupyter, Git, Google Earth Engine, LangChain.

Health data & systems DHIS2 (Apps, Tracker, Web API, Data Visualiser), HMIS design, routine surveillance data quality, FHIR / HL7 / ADX, WHO SMART Guidelines, CHAP-compatible model packaging.

Climate data CHIRPS, ERA5-Land, STORM v4 cyclone projections, national meteorological station records, SSP scenario framing.

Writing Technical appendices and methodology sections, executive summaries and policy briefs, reference management, editorial review and fact-checking before anything goes external.

Engineering FastAPI, NestJS, React, PostgreSQL, MongoDB, Docker, AWS (SageMaker, Lambda, S3, EC2), CI/CD with GitHub Actions.

LANGUAGES & RECOGNITION

Languages English - fluent (MSc delivered fully in English). Kinyarwanda - native. French - working proficiency. Russian - working proficiency.

- AWS All Builders Welcome Grant recipient, AWS re:Invent 2025, Las Vegas; 8+ AWS cloud certifications on Credly.
- First-Class Honorary Award, Vladimir State University - best final-year project in Robotics, 2023.
- National Physics Olympics, second place in two consecutive years (King’s College Buddo, Uganda); 2nd Runner-Up, Rwanda CyberStars Capture-the-Flag, 2020.

Away from the desk: behavioural psychology, anything at the edge of new technology, and a slightly unreasonable amount of Formula 1.