

Fanambinantsoa Philibert ANDRINIRINIAIMALAZA

Doctor-Engineer · Postdoctoral Researcher & Lecturer

Industrial Electronics & Computing, Intelligent Control Systems & Hybrid Renewable Energy

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ACADEMIC PROFILE

Lecturer and Postdoctoral researcher with over 10 years of expertise in industrial electronics and computing, intelligent control systems, embedded electronics, and hybrid renewable energy. Specialist in adaptive control via fuzzy logic, ANFIS, PSO, and digital control techniques, applied to hybrid PV/Wind/Battery systems, MPPT optimization, and electric vehicle drive systems. Author or co-author of 24+ peer-reviewed publications and IEEE communications (incl. 2 submissions to IEEE EPEI 2026). Active international collaborator (Romania, France, Mauritius, China), with proven doctoral supervision capacity across several institutions.

Open for collaboration and seeking a position as Postdoctoral Researcher, Lecturer, Associate Professor or R&D Engineer.

RESEARCH AREAS

- Adaptive and intelligent control — Fuzzy logic, ANFIS, PSO, PID, MPPT, CNN
- Embedded and real-time systems — PMSG, microcontrollers, hybrid drives
- Renewable energy systems — PV, Wind, Diesel, Battery, Hydrokinetic turbines
- Multi-criteria optimization — energy cost, CO₂ emissions, reliability (LCOE minimization)
- Power Electronics (academic, 2011–present) — HVDC, MVDC, FACTS (SVC, STATCOM), MMC topology analysis, IGBT/IGCT high-power converter modeling, control design, and performance analysis — developed and taught in thesis, coursework, and engineering programs.
- Simulation and modeling — MATLAB/Simulink, PSIM, LTSpice, LabView, XILINX ISE
- Smart microgrid governance and autonomous energy management

EDUCATION

Postdoctoral Research Fellowship

Nov.–Dec. 2024

Gheorghe Asachi Technical University of Iași, Romania

Research on intelligent control strategies for power converters and digital twin approaches for electrical systems.

PhD in Industrial Electronics and Computer Engineering

2020

EDT-EnRE Doctoral School, University of Antsiranana, Madagascar

Thesis: Contribution to the optimization of energy efficiency of a hybrid-powered electric vehicle. Development of hybrid Fuzzy–Sliding Mode and variable-gain PI controllers for BLAC motor drive in electric vehicles.

Doctoral Mobility

May–Jul. 2016

Politehnica University of Bucharest, Romania

Doctoral research internship at the Faculty of Electrical Engineering, funded by the Eugen Ionescu programme of the AUF (Agence universitaire de la Francophonie). Research on fractional-order PI and fuzzy logic control of a PMSG/BLAC motor drive chain.

Engineering Degree in Industrial Electronics and Computer Engineering

2012

École Supérieure Polytechnique d'Antsiranana (ESPA), Madagascar

Capstone project: Design and development of a two-wheel-drive electric vehicle.

ACADEMIC EXPERIENCE

Lecturer & Postdoctoral Researcher | ISSTM – University of Mahajanga

2020 – Present

- Courses taught (undergraduate | master's): Signal Processing, Automation, Artificial Intelligence, Digital Control, Power Electronics.
- Coordinator of the Bachelor's program in Electronic and Industrial Computer Engineering.
- Supervision of more than 30 undergraduate capstone projects and Master's 2 theses.
- Head of the Student Records Office (since 2022).
- Polyvalent and laboratory technician.

Lecturer | FSTE – University of Mahajanga

2022 – Present

- Courses (undergraduate | master's): Analog and digital electronics, Advanced control techniques (State feedback, adaptive, robust, and metaheuristic control).

Lecturer in Computer Science | ESTI – Higher Institute of Information Technology

2020 – 2023

- Courses (undergraduate | master's): PowerShell, Progressive Web Applications (PWA), JAVA programming with Spring Boot and Spring MVC.

Lecturer & Master's Program Coordinator | ESPA – University of Antsiranana

2015 – 2020

- Coordinator of the Master's program in Telecommunications & Networks.
- Courses (undergraduate | master's): Analog/digital electronics, control theory, microcontroller-based systems.

- Supervision of more than 20 undergraduate capstone projects and Master's 2 theses.
- Laboratory technician.

Vacation Teaching | Collège Saint-François-Xavier (CSFX), Fianarantsoa

2013 – 2014

- Vacation teaching.

RESEARCH SUPERVISION

▪ Active Doctoral Co-supervision — 10 PhD Students (3 Doctoral Schools)

Thesis topic (summary)	Institution / Doctoral school
PV shading estimation using sky imagers and multimodal deep learning	Univ. La Réunion – ED-STs
Wireless power transfer control for drones	Univ. Mahajanga – EDGVM
Autonomous drone piloting via brain-computer interface	Univ. Mahajanga – EDGVM
IoT sensor networks for climate monitoring (Boeny)	Univ. Mahajanga – EDGVM
Hybrid PV/Battery system for MADARAIL level crossings	Univ. Antsiranana – EDT-EnRE
Minimizing power losses in rural electrification networks	Univ. Antsiranana – EDT-EnRE
Integration of smart microgrids in urban environments	Univ. Antsiranana – EDT-EnRE
Grid-connected current-source inverter without storage — modeling and control	Univ. Antsiranana – EDT-EnRE
Intelligent fault detection and production forecasting in solar power plants	Univ. Antsiranana – EDT-EnRE
Energy management of a grid-connected PV/Battery system (ANFIS)	Univ. Antsiranana – EDT-EnRE

▪ Active Master's Co-supervision — 3+ Students (specialties: ISEA | GEI | GBM)

Research topic	Co-supervisor
Design, simulation, and implementation of an AI-based intelligent system for fault monitoring and diagnosis in an electrical network	Prof. Nour M. Murad, PIMENT Laboratory, Univ. La Réunion and Prof. MANASINA Ruffin, ISSTM Univ. Mahajanga
Optimal sizing and intelligent energy management of a 100% autonomous residential DC nanogrid: application to an all-DC bioclimatic house	—
Design and optimization of a self-powered, eco-designed PET-plastic Reconfigurable Intelligent Surface (RIS) for Wi-Fi networks	—

TECHNICAL SKILLS

- Simulation & Modeling: MATLAB/Simulink, PSIM, LTSpice, LabView, XILINX ISE.
- Power systems tools: PSCAD, PSS®E, PowerWorld, GE-PSLF (doctoral thesis).
- Programming: Python, C, C++, Java, VHDL, C#
- Data Analysis: Python, R, IBM SPSS Statistics
- Hardware Design: Altium Designer, Eagle, FreeCAD, KiCAD
- CAD: AutoCAD, SketchUp, Blender
- Systems: PMSG, embedded microcontrollers, real-time automation, power converters
- Languages: Malagasy (native), French (C1), English (B2 – Professional Working Proficiency)

RESPONSIBILITIES & ENGAGEMENTS

- Member of the organizing team, Symposium Maintenance 2026, 11–12 June 2026, CNARP Antananarivo, Madagascar (co-organized by ATIBM, IQLS, ISSTM, Mercy Ships).
- Member of the EA-PGE host research team (Photovoltaics and Electrical Engineering), Thematic Doctoral School on Renewable Energies and Environment (EnRE), École Supérieure Polytechnique d'Antsiranana, University of Antsiranana (since June 2026).
- Communications Officer, ISSTM (since January 2026).
- Trainer, Scientific Writing for PhD Students — University of Mahajanga (Dec. 2025).
- "Training of Trainers" Program on Scientific Writing — HayKa Erasmus+ Project, University of Mahajanga (April 2025).
- Head of the Partnership and Cooperation Office, ISSTM (2022–2025).
- Member of the Scientific Committee, Summer University v.04, University of Mahajanga, Mahajanga (2023).
- Active Contributor: JRISTs (2021, 2022), Summer University (2021, 2023), Doctoriales (2019), 40th anniversary of FSTE (2024), AESMT'25, 20th anniversary of Androna University (2026), AESMT'26.
- International Research Collaborations: Romania, France (La Réunion), Mauritius, China (NUIST).

PUBLICATIONS IN PROGRESS & SELECTED PUBLICATIONS (24+ IN TOTAL)

Papers in preparation (2026)

Andriniriniimalaza, F.P.; Murad, N.M.; Rhevihaja, S.N.; Andrinirintsoa, J.M.; Balan, G.; Manasina, R.; Lucache, D.D. (2026). Marine and Hydraulic Energy Systems for Madagascar: Design, Optimization, and Prototyping. Submitted to IEEE EPEI 2026, Iași, Romania.

Andriniriniimalaza, F.P.; Murad, N.M.; Randriamanafana, A.; Andrinirintsoa, J.M.; Balan, G.; Manasina, R.; Andrianirina, C.B.; Lucache, D.D. (2026). Towards Low-Cost AI-Based Fault Monitoring and Diagnosis in Electrical Power Networks. Submitted to IEEE EPEI 2026, Iași, Romania.

Rakotomahefasoa, S.D.; Rhevihaja, S.N.; Andriniriniimalaza, F.P.; Murad, N.M.; Andrinirintsoa, J.M.; Ravohitra, J.; Randriatefison, N.; Manasina, R. (2026). Internal-pendulum wave energy converter: design, modeling, and experimental validation in Mahajanga. Submitted to the Scientific Day, ESPA, University of Antananarivo.

- Rheviha, S.N.; Randrianasolo, G.A.; Andriniriniamalaza, F.P.; Murad, N.M.; Andrinirintsoa, J.M.; Ravohitra, J.; Randriatefison, N.; Manasina, R. (2026). Numerical simulation optimization of a low-head Archimedes screw turbine: case study of a micro-hydropower plant in Madagascar. Submitted to the Scientific Day, ESPA, University of Antananarivo (abstract accepted).
- Soumah, D.; Murad, N.M.; Andriniriniamalaza, P.; Rabearivony, A.F.; Georgiev, A.; Menard, S.G. (2026). Predictive Design and Layer-by-Layer Characterization of 3D-Printed Multi-Layer Micro-Perforated Panels for Broadband Sound Absorption. Extended version of the AESMT'26 paper; under preliminary review for journal publication (RENE / EGY / ATE). Co-author.

Preprints

- [1] Andriniriniamalaza, F.P.; Randriamaitso, T.; Balan, G.; Rheviha, S.N.; Rakotomalala, L.; Lucache, D. (2025). Hybrid Neuro-PSO MPPT control to improve the performance of vertical-axis hydrokinetic turbine columns. SSRN Preprint. doi: 10.2139/ssrn.5856521
- [2] Andriniriniamalaza, F.P.; Murad, N.M.; Bilal, H.; Khooaruth, A.; Randriatefison, N.; Ravelo, B. (2025). Optimization of PV systems under shading faults using zone-based dynamic fuzzy logic and adaptive PSO. SSRN Preprint. doi: 10.2139/ssrn.5229767

2026

- [3] Soumah, D.; Murad, N.M.; Andriniriniamalaza, F.P.; Georgiev, A.G.; Mesnard, S.G. (2026). Towards Broadband Acoustic Metamaterials for Tropical Noise Control: Design, Simulation and Experimental Characterization of FDM-Printed Micro-Perforated Panel Absorbers. AESMT'26 (2 pages), Sofia, Bulgaria, 12–13 May 2026.

2025

- [4] Andriniriniamalaza, F.P. et al. (2025). Improvement and stabilization of the output voltages of a vertical-axis hydrokinetic turbine using intelligent control strategies. IEEE ICECER 2025, Antananarivo, pp. 1–6. doi: 10.1109/ICECER65523.2025.11401321
- [5] Andriniriniamalaza, F.P. et al. (2025). Hybrid fuzzy logic and shading-adaptive PSO for the dynamic mitigation of PV shading faults. IEEE SIELMEN 2025, Iași, pp. 633–638. doi: 10.1109/SIELMEN67352.2025.11260746
- [6] Rakotomalala, L.F.F.; Andriniriniamalaza, F.P. et al. (2025). Classification of daily load profiles for 20 kV distribution networks in Mahajanga, Madagascar. IRJAES, Vol. 10, No. 3, pp. 86–92.
- [7] Balan, G.; Serea, E.; Andriniriniamalaza, F.P.; Lucache, D.D.; Sălceanu, A.; Nenninger, P. (2025). Digital twin approach for testing and control of automotive headlights. ACEMP & OPTIM, Timișoara, pp. 1–7. doi: 10.1109/OPTIM-ACEMP62776.2025.11075229
- [8] Andriniriniamalaza, F.P. et al. (2025). Intelligent MPPT strategies for vertical-axis hydrokinetic turbines: comparative performance of Neuro-Fuzzy and Neuro-PSO controllers. AESMT'25, Sofia, Bulgaria, 15–17 May 2025.

2024

- [9] Murad, N.M.; Andriniriniamalaza, F.P. et al. (2024). Study of a low-tech rainwater triboelectric generator as a renewable energy source. IEEE EPEi 2024, Iași, pp. 626–631. doi: 10.1109/EPEi63510.2024.10758060
- [10] Andriniriniamalaza, F.P.; Murad, N.M. (2024). Neuro-Fuzzy control of a PMSG for a vertical-axis hydrokinetic turbine — output voltage improvement. IEEE SESAI 2024, Mauritius, pp. 1–6. doi: 10.1109/SESAI61023.2024.10599409
- [11] Andriniriniamalaza, F.P. et al. (2024). Sizing methodology for a standalone PV/Wind/Diesel/Battery system minimizing LCOE and CO₂ emissions. IJARIE, Vol. 10, No. 4, pp. 3400–3409.
- [12] Randriamaitso, T. et al. (2024). Modeling and prediction of rainfall using the Neuro-Fuzzy method in the Marotandrano Special Reserve, Madagascar. IJARIE, Vol. 10, No. 4, pp. 2775–2785.
- [13] Randriamaitso, T. et al. (2024). Comparative study of the efficiency of optimal TSR and Neuro-Fuzzy MPPT regulation regarding torque impact on a PMSG-based VAHT. IJARIE, Vol. 10, No. 3, pp. 6146–6158.

2022–2023

- [14] Randriamaitso, T. et al. (2023). Study of the torque impact of a vertical-axis hydrokinetic turbine column on the electromechanical outputs of a PMSG. AJSER, Vol. 6, No. 6.
- [15] Andrianantenaina, T.P.; Andriniriniamalaza, F.P. et al. (2023). New direct nonlinear MPPT design for PV systems using backstepping and synergetic controllers. IJMCE, 5(5), pp. 14–25.
- [16] Andriniriniamalaza, F.P. et al. (2022). From classical control to hybrid fuzzy-logic strategies for brushless motor drives. IJEL, 11(11), pp. 60–67.
- [17] Randjaka, T. et al. (2022). ANFIS control approach for a bidirectional buck-boost converter for battery charging. IJEMR, 12(3), pp. 30–39.
- [18] Andriniriniamalaza, F.P. et al. (2022). Study of current drives applied to vehicle braking energy recovery. WAJES, 9(3), pp. 1–6.
- [19] Andriniriniamalaza, F.P. et al. (2022). Efficiency optimization approaches for hybrid electric vehicles. IJERT, 11(5), pp. 326–331.

2017–2021 (selection)

- [20] Randriamaitso, T. et al. (2021). Study of torque impact on PMSG output voltages for a vertical-axis hydrokinetic turbine. IJSET, 8(7), pp. 537–546.
- [21] Andriniriniamalaza, F.P. et al. (2019). Fuzzy variable-gain PI control applied to AC brushless motor drives. EAS, Vol. 4, No. 1, pp. 1–10.
- [22] Andriniriniamalaza, F.P. et al. (2018). New hybrid Fuzzy-Sliding Mode control approach for AC brushless motors. IJERT, 7(12), pp. 83–88.
- [23] Andriniriniamalaza, F.P. et al. (2017). Fractional-order variable-gain PI control for a DFIG in a wind conversion chain. IEEE ATEE 2017, Bucharest, pp. 740–745.
- [24] Andriniriniamalaza, F.P. et al. (2017). Parameter optimization of a fuzzy-logic control for a brushless permanent-magnet motor. IEEE ATEE 2017, Bucharest, pp. 211–216.

REFERENCES

Prof. Dr. Ing. Dorin-Dumitru LUCACHE — Dean, Faculty of Electrical Engineering, Gheorghe Asachi Technical University of Iași, Romania — Contact available on demand

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Prof. Blaise RAVELO — NUIST University, China — Contact available on demand