Emmanuel Tuyishimire
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SUMMARY

Degrees: PhD and MSc in Computer Science, MSc in Mathematical Sciences, BSc in Mathematics.
Academic coordination experience: 9 years
Main-Supervisions: 4 masters to completion, 5 masters yet to be completed.
Co-supervisions: 1 PhD, 3 Masters.
Mentor cases: diverse 20^{+} undergraduate, 3^{+} masters, 2 PhD (one of them completed).
Accredited publications: 6 Journals, 13 Conferences, 6 currently accepted conferences, 2 archived jounals.
Skills: Programming, Computation (Mathematical), Research, Modeling, Lecturing/Teaching.

EDUCATION

2015-2019: **Ph.D.** degree from University of the Western Cape (UWC), South Africa.
Specialisation: Computer Science.

2013-2014: Research **master's** degree from University of Cape Town (UCT).
Specialisation: Computer Science.

2012- 2013: **Master's** degree from UCT.
Specialisation: Mathematical Sciences.

2008-2012: **Honours's degree** in Pure Mathematics at Kigali Institute of Science and Technology (KIST- Rwanda) .
Grade: **Upper Second honours**

WORK EXPERIENCE

06/2022-present: Research associate at Carnegie Mellon University Africa (Co-PI)

Research Projects: Digital heart and malaria treatment
Job: Supervising masters students, research.
Statistics: three Master students completed, seven current master students, one conference publication, one conference accepted paper, one journal paper under review, several workshops presentations and seven conference papers under preparation.

05/2022- Present External moderator at University of Mpumalanga
Course: Mathematics for ICT

09/2022- 6/2023 Assistant professor at Dakar American University of Science and Technology (Computer Science department)
Teaching: Advanced Machine Learning, Human Computer Interaction, Database management and Problem solving with C++.
Research: Cyber medical systems: treating Malaria and Tuberculosis using a central digital system.

09/2020- 04/2022 Lecturer at UCT (Department of Knowledge and Information Stewardship)

Teaching: Masters courses

Research interests: Data Sensing Models, Information Diffusion, and Knowledge Management, all converging in the field of Human-Centered Artificial Intelligence.

2019-present: Data Science freelancer at Development Action Group.

I, occasionally, get contacted to assist in data collection, cleaning and visualization and reporting.

Skills: Python packages, KoBo toolbox and Google data (for dashbords).

02/2019- 09/2020: Senior scientific officer at UCT (Computer Science department)

Duties: Implementation of software components required for practicals, creation of test data sets, databases, etc. required by practicals, programming model solutions, documenting departmental systems, reviewing and updating practical manuals setting up marking scripts on the computer based marking system for practical work, setting up and running practical test, assisting with computer lab tutorials and practical queries, tutor and teaching assistant training and management of scheduling and co-ordination of lab use.

Courses: All UCT undergraduate and honors courses (1st, 2nd, 3rd and 4th), masters, PhD in the department.

2013-2018: Research assistant (UCT-UWC).

Assisting members of my research group (honours, masters and doctoral) in Mathematical problem solving and solutions (algorithms) implementation/simulations together with Data management mostly using Python.

02/2019 – 12/2019: Part-time Lecturer of Machine Learning at UWC

Level: Masters

06/2018 -12/2018: Part-time Lecturer of Computer Science modules at UWC

courses: **Machine Learning**: Introduction to Jupyter, Linear Algebra, K-means algorithms
E-logistics: Introduction to Jupyter, Linear Algebra, Logistic Regression
P**rogramming with Python and Java**: Conduct all practicals and marking processes
Algorithms and complexity: Covering 50% of the topics.

2017: Teaching assistant at UWC.

Course: Calculus.
Duties: Being a tutor, I also assisted tutors for assisting students to do exercises and practical works. I was also involved in marking and invigilation.

2016: Tutor in Computer Science at UWC.

Course: Problem Solving Algorithms and Programming (Python and Java).
Level: 1st year.
Duties: Being a tutor, I also assisted tutors for assisting students to do exercises and practical works.

2015: Tutor of Mathematics UWC

Course: Calculus.
Level: 1st year.
Duties: Assisting students to do exercises, invigilating and marking tests and exams.

2014- 2015: Tutor of Mathematics at UCT

Courses: Linear algebra (MAM2084), Vector calculus (MAM2083 and MAM2085), Calculus (MAM1005), Statistics and Real analysis.
Levels: 2nd and 1st year
Duties: Assisting students to do exercises, and marking their tests and exams.

WORKSHOPS

September, 2017: New Trainers workshop
Job: Getting trained and practice fundamental techniques of lecturing/moderating.
Organiser: General Electrict, Johannesburg
Skills: techniques for introducing or strengthening learning materials, managing small or big classes.

JOURNALS REVIEW

Active reviewer for:

- MDPI-remote sensing (impact factor: 4.118)
- IEEE access (impact factor: 4.098)
- MDPI-robotics (impact factor: 2.690)
- MDPI- Applied Sciences (Impact factor: 2.217)
- Natural Science Publishing (impact factor: 1.232)
- Etc.

SKILLS

Language: fluent in English and basic usage of French and native Kinyarwanda speaker.

Computational skills: excellent in Python programming (Skitlearn, Keras, Tensorfloa, Numpy, Pandas, Matplotlib, etc.), good in Visual Basic, SQL and some basics in R studio, on either Windows, Linux (my favorite) or Mac operating systems.

Other skills: Good in Mathematical and Algorithmic problem solving, skilled in Django framework, excellent in Latex editing, a speedy typper and I am a quick learner**.**

ACCREDITED PUBLICATIONS

2024

[c_{19}] Philbert Norimana, Didaciene Mukanyirigira, **Emmanuel Tuyishimire.** Improving Voronoi scoping with Ant Colony Optimization Algorithm for efficient energy consumption in Multi-hop Wireless Sensor Network of Tin Mining tunnel. In 13th International Conference on Software and Computer Applications (ICSCA 2024) **[in press]**

[c_{18}] Emmanuel Tuyishimire. Carine Pierrette Mukamakuza . A Formal Specification of a Data Model for Malaria Surveillance in the Developing World. 2024 International Congress on Information and Communication Technology. ICICT 2024. USA **[Accepted]**

[c_{17}] Alain Destin Nishimwe Karasira, Carine Pierrette Mukamakuza, and **Emmanuel Tuyishimire.** The Use of YOLOv5 as a Malaria Detection Model for the Developing World. 2024 International Congress on Information and Communication Technology. ICICT 2024. USA **[Accepted]**

[c_{16}] Yamlak Bogale}, Carine P. Mukamakuza and **Emmanuel Tuyishimire.** Intelligent Malaria Detection and Species Classification: a Case of Rwanda. The 9th International Congress on Information and Communication Technology. London, United Kingdom, 19 - 22 February 2024. **[Accepted]**

[c_{15}] C. M. Ugwu, C. Pierrette Mukamakuza and **E. Tuyishimire,** "ECG-Signals-based Heartbeat Classification: A Comparative Study of Artificial Neural Network and Support Vector Machine Classifiers," *2024 IEEE 22nd World Symposium on Applied Machine Intelligence and Informatics (SAMI)*, Stará Lesná, Slovakia, 2024, pp. 000217-000222, doi: 10.1109/SAMI60510.2024.10432834

[c_{14}] Eugenia M. Akpo, Carine P. Mukamakuza and **Emmanuel Tuyishimire**. Binary Segmentation of Malaria Parasites Using UNET Segmentation Approach: A Case of Rwanda. The 9th International Congress on Information and Communication Technology. London, United Kingdom, 19 - 22 February 2024 **[Accepted]**

2023

[c_{13}] Happiness Rose Mary, Carine Pierrette Mukamakuza, **and Emmanuel Tuyishimire.** A Data Management Model for Malaria Control: a Case of Rwanda. In AFRICON 2023 IEEE proceedings.

[c_{12}] Hope Mauwa, Antoine Bagula, **Emmanuel Tuyishimire**, Hloniphani Maluleke. An Economically Feasible TV White Space Detection Model for Fog Connectivity In Low-Income Countries. In Satnac. George - South Africa, 2023.

[c_{11}] Emmanuel Tuyishimire, Mukamakuza C.P , Mbituyumuremyi, A., Brown, T.X., Iradukunda, D., Phuti, O. and Happiness. A Malarial Digital Diagnosis System for the Developing World. In 2023 Conference on Information Communications Technology and Society (ICTAS) 2023. IEEE.

2022

[J8] Emmanuel Tuyishimire, Wadzanai Mabuto, Paul Gatabazi, Sylvie Bayisingize. "Detecting learning patterns in tertiary education using K-means clustering" MDPI-Information (2022).

[J7] Emmanuel Tuyishimire, Antoine Bagula , Slim Rekhis , Noureddine Boudriga. "Trajectory planing for cooperating unmanned aerial vehicles in the IoT" MDPI-IoT (2022)

[J6] Fuseini Jibreel, **Emmanuel Tuyishimire**, I M Daabo . "An Enhanced Heterogeneous Gateway-Based Energy-Aware Multi-hop Routing Protocol for Wireless Sensor Networks " MDPI-Information (2022) .

[J5] Emmanuel Tuyishimire, Jean de Dieu Niyigena, Fidèle Mweruli Tubanambazi, Justin Ushize Rutikanga, Paul Gatabazi, Antoine Bagula . "A novel epidemic model for the interference spread in the internet of things" MDPI-Information (2022)

2020

[J_4] Emmanuel Tuyishimire, Bigomokero Antoine Bagula, Slim Rekhis, Noureddine Boudriga. Real-Time Data Muling using a team of heterogeneous unmanned aerial vehicles. Cornell University-arXiv. 2020. **[Archived]**.

[c_{10}] Emmanuel Tuyishimire, Antoine Bagula. A Formal Model for Efficient and Persistent Traffic Engineering for Internet of Things. In 2020 Conference on Information Communications Technology and Society (ICTAS) 2020. IEEE.

[c_9] Emmanuel Tuyishimire, Antoine Bagula. Modelling and analysis of interference diffusion in the internet of things: an epidemic model. In 2020 Conference on Information Communications Technology and Society (ICTAS) 2020. IEEE.

[c_8] Emmanuel Tuyishimire, Antoine Bagula. A Novel Management Model for Dynamic Sensor Networks Using Diffusion Sets. In 2020 Conference on Information Communications Technology and Society (ICTAS) 2020. IEEE.

2019

[J_3] Bigomokero Antoine Bagula, **Emmanuel Tuyishimire,** Olasupo Ajayi, 2019. Cyber Physical Systems (CPS) Surveillance Using An Epidemic Model. *arXiv*, pp.arXiv-1912. **[Archived]**.

[c_7] Hope Mauwa, Antoine Bagula, **Emmanuel Tuyishimire**, Tembisa Ngqondi. *Community Healthcare Mesh Network Engineering in White Space Frequencies*. In 5th IEEE International Workshop on Smart Spec- trum (IWSS 2019). IEEE.

[c_6] Mauwa H, Bagula A, **Emmanuel Tuyishimire**. An Optimal Spectrum Allocation Strategy for Dynamic Spectrum Markets. In2019 IEEE Wireless Communications and Networking Conference Workshop (WC- NCW) 2019 Apr 15 (pp. 1-8). IEEE. [B ranked conference].

[J_2] Emmanuel Tuyishimire, Antoine Bagula, and Adiel Ismail. "Clustered Data Muling in the Internet of Things in Motion." MDPI-*Sensors* 19, no. 3 (2019): 484. [2019 impact factor: 3.031]

2018

[J_1] Adiel Ismail, Bigomokero Antoine Bagula, **Emmanuel Tuyishimire.** Internet-of-Things in Motion: A UAV Coalition Model for Remote Sensing in Smart Cities. MDPI-Sensors, 2018. [2019 impact factor: 3.031]

[c_5] Emmanuel Tuyishimire, Bagula B.A., Ismail A. (2018) Optimal Clustering for Efficient Data Mul- ing in the Internet-of-Things in Motion. In: Boudriga N., Alouini MS., Rekhis S., Sabir E., Pollin S. (eds) Ubiquitous Networking. UNet 2018. Lecture Notes in Computer Science, vol 11277. Springer, Cham.

[c_4] Ismail A., **Emmanuel Tuyishimire**, Bagula A. (2018) Generating Dubins Path for Fixed Wing UAVs in Search Missions. In: Boudriga N., Alouini MS., Rekhis S., Sabir E., Pollin S. (eds) Ubiquitous Networking. UNet 2018. Lecture Notes in Computer Science, vol 11277. Springer, Cham.

2017

[c_3] **Emmanuel Tuyishimire**, Antoine Bagula, Rekhis Slim, Boudriga Nouleddine. Cooperative data muling from ground sensors to base stations using UAVs. In Computers and Communications (ISCC), 2017 IEEE Symposium on 2017 Jul 3 (pp. 35-41). IEEE. [B ranked conference].

2016

[c_2] **Emmanuel Tuyishimire**, Adiel Idiel, Rekhis Slime, Antoine Bagula , Boudriga Nouleddine. Internet of Things in Motion: A Cooperative Data Muling Model Under Revisit Constraints. In Ubiquitous Intelligence & Computing, Advanced and Trusted Computing, Scalable Computing and Communications, Cloud and Big Data Computing, Internet of People, and Smart World Congress (UIC/ATC/ScalCom/CBDCom/IoP/SmartWorld), 2016 Intl IEEE Conferences 2016 Jul 18 (pp. 1123-1130). IEEE. [B ranked conference].

[c_1] Bagula Antoine, **Emmanuel Tuyishimire**, Wadepoel J, Boudriga Nouleddine, Rekhis Slim. Internet-of- Things in Motion: A Cooperative Data Muling Model for Public Safety. InUbiquitous Intelligence & Computing, Advanced and Trusted Computing, Scalable Computing and Communications, Cloud and Big Data Computing, Internet of People, and Smart World Congress (UIC/ATC/ScalCom/CBDCom/IoP/SmartWorld), 2016 Intl IEEE Conferences 2016 Jul 18 (pp. 17-24). IEEE. [B ranked conference].