Gerald Nathan Balekaki

Curriculum Vitae

Stuart Building, Room 206C
Computer Science Department
☎ *(312) 567 5176*
✉ *gbalekaki@iit.edu*
⌂ *https://www.iit.edu/directory/people/~gerald-balekaki*
Illinois Institute of Technology,
10 W 31st St, Chicago, IL 60616

"The World is a book, and those who do not travel read
only one page" - St. Augustine.

Profile

I am an Assistant Teaching Professor of Computer Science at IIT. My primary teaching and research focus is on advanced database systems, particularly those designed for very large datasets. I am also deeply passionate about data science, specifically in integrating AI/ML models into very large databases (VLDBs) to simplify complex real-world data applications.

Education

2024 - 2025	**Professional Education**, *UC Berkeley Executive Education*, California, USA., Machine Learning and Artificial Intelligence.
2016 - 2023	**PhD in Computer Science**, *University of Cape Town*, South Africa, Research in Computational Radio Astronomy (Modelling scientific databases).
2020–2021	**Course in Data Science with Python**, *University of Cape*, South Africa, applied statistical learning to solve real-world research and business problems..
2009–2013	**MSc in Data Communication and Software Engineering**, *Makerere University*, Uganda, Research in Communication Networks and Software Engineering.
2004–2007	**Bachelor of Statistics**, *Makerere University*, Uganda, Specialized in Statistical Computing.

PhD Thesis

Title	*A scalable database model for radio frequency interference data (RFI): A case of MeerKAT radio telescope.*
Supervisor(s)	Associate Professor Michelle Kuttel & Associate Professor Sarah Blyth & Dr. Anja C. Schroder

Description	The research investigated novel and scalable database models that quickly retrieve scientific data, particularly RFI data at MeerkMAT/SKA telescope data. The study consisted of user's requirements gathering for RFI database from radio astonomers, computer scientists and engineers as provided in the preliminary investigation. We designed and developed logical and physical models suitable to store and quickly retrieve large and diverse RFI datasets. Our model is tuned to work efficient with machine learning alogrithms to support accurate predictions. The model is implemented under intensive RFI monitoring environment and its performance is evaluated using modern database benchmarking standards. See results in research publications that add contribution to scientific data/database research.

Masters Thesis

Title	*Impact of High TCP's Initial window in Congested Network links*
Supervisor(s)	Professor Idris A. Rai
Description	The research investigated the outcomes if IETF standardised the TCP initial window to a higher value of 10 packets as opposed to the current 3. We observe that the engineering move would exacerbate performance of congested links in Sub-saharan networks

Bachelors Dissertation

Title	*A new computerised multi-variant loan recovery software*
Supervisor(s)	Dr. Peter Jehopio PhD
Description	This dissertation mainly focused on developing a new statistical software that explored statistical multi-variant techniques used by banks during loan recovery process. A case for DFCU bank in Uganda

Work Experience

2023 (Jan) – Present	**Assistant Teaching Professor**, Computer Science Dept, Illinois Institute of Technology, Chicago, IL, United States.
	My roles involve teaching courses in my areas of expertise, perform research, advise graduate students, perform professional service (both internal and external to the university), and seek funding to support my research activities.
2016 (June) – 2022 (Nov)	**PhD Researcher**, Computer Science Dept, University of Cape Town, South Africa.
	The research combined a multidisciplinary in computing and radio astronomy. Ideally, looking at designing and developing scalable database models to handle large and diverse RFI data at MeerKAT/SKA radio telescope.
2017 (Feb) – 2022 (Dec)	**Lecturer**, Vega School, Cape Town Campus, South Africa.
	Develop computer students to be better game developers by equiping them with adequate mathematics coupled with good database modelling techniques. Offer remote classes to distant students registered with VEGA ONLINE programmes

2021 (Aug) – 2022 (Dec)	**CS Lecturer**, Varsity College - School of IT, Cape Town Campus, South Africa.
	Teaching core computer science courses in the School of IT. Developing students' academic and research knowledge in the fields of Computer architecture, Computer Networks, Mobile Application Development and Databases
2021 (Nov) – 2022 (Dec)	**Guest Lecturer and External Assessor**, AFDA Postgraduate Diploma in Innovation, Cape Town Campus, South Africa.
	Lecture content on new and emerging technologies models, frameworks and their application to new business ventures. Assess and provide detailed feedback on end of year PGDI projects before brought to fruition.
2018 (Apr) – 2021 (Jul)	**Teaching Assistant in VLDBs (Very Large Databases), Msc. Data Science**, Computer Science Dep, University of Cape Town, South Africa.
	Provide a series of tutorials in NoSQLs (particularly MongoDB, Cassandra, Accumulo etc). Assistance in VLDB designs and implementation both on local and over distributed clusters, as well as setting and marking final exams for Honors and MSc students
2018 (Summer School)	**Research Assistant**, Summer Institute in Computational Social Science, Centre for Actuarial Research (CARe) University of Cape Town, South Africa.
	Assisted participants to apply Data science tools to social science research problems. Extensively explored R programming using Twitter data and National Health Statistics (NHS) in South Africa to uncover social problems
2017 (Mar)–2018 (Aug)	**Web Developer**, Varsity Newspaper, UCT's official students newspaper, South Africa.
	Develop a dynamic and modern state of the art website. In charge of setting up, maintain and secure online account of individuals; liaised with web hosting company; and recommend new technologies to the organisation.
2010 (Feb)– 2015(Dec)	**Head IT/IS Lecturer**, Career Institute , Uganda.
	Rated Exceptional in Computing and IT training skills of programming, databases and computer networking (CISCO). Produced best students nationwide in computing and information systems consectively for 3 years
2009 (Jan)– 2009(Dec)	**Assistant Academic Researcher**, Makerere University, FCIT, Uganda.
	Worked at the Directorate of ICTS to investigate performance of the University Congested Network under different workloads. The project was successfully funded by Google Inc. under Principal Investigator Prof. Idris Rai
2007 (Jun)– 2008(Dec)	**Software Developer/Tester**, Crystal Clear Softwares, Uganda.
	80% Tested company code and 20% developed new code. Provided product support and customer training.

Publications

2012	**Gerald N. Balekaki and Idris A. Rai**, *Impact of High TCP Initial congestion Window Highly Congested Networks*, AFRICOMM, YaoundÈ Cameroon.
2019	**Gerald N. Balekaki and M. Kuttel**, *A Scalable Database Model of RFI Data for the MeerKAT Radio Telescope*, SAICSIT '19, Skukuza, South Africa.
2020	**Gerald N. Balekaki and M. Kuttel**, *Performance evaluation of an integrated RFI database at MeerKAT Radio Telescope*, SAICSIT '20, Cape Town, South Africa.

2023 **Gerald N. Balekaki and Sadanand Kolhe** , *Cross Island Join Query and Optimization* , unpublished.

2024 **Gerald N. Balekaki and Arup Chauhan** , *Query Optimizations at Systems Level on Specialized Scientific Database Systems* , unpublished.

Research Interests & Expertise

Research Interests	COMPUTATIONAL SCIENCE, DATABASES, COMPUTER NETWORKS AND SOFTWARE ENGINEERING.
Expertise	My research focuses on modeling scalable databases for large and diverse scientific datasets, with an emphasis on real-time support, data visualization, and in-depth analytics. I have collaborated with scientists worldwide on the international Square Kilometre Array telescope project to address storage challenges in the RFI mitigation pipeline in South Africa. I am particularly interested in developing scalable tools and models for handling complex and massive datasets. I'm passionate about data science, particularly integrating intelligent models into very large databases (VLDBs).

Professional Memberships

ACM	**Active Member**	*since 2019*
IEEE	**Active Member**	*since 2010*
IITPSA	**Active Western Cape Chapter Member**	*since 2016*
ISOC	**Active South African Chapter**	*since 2016*
ICT4D	**Active UCT Chapter Member**	*since 2017*
SKA RFI	**Active Working Group Member**	*since 2017*

Other Interests

- Cricket	- Chess
- Hiking	- Football
- Music	- Travel

Awards

Expertise	I'm a recipient of the NRF-SARAO Doctoral scholarships at the University of Cape Town (2017).
Expertise	I'm a recipient of the Hasso Plattner Fellowship from Germany at the University of Cape Town (2019).

References

Associate Professor	**Michelle Kuttel**, *Department of Computer Science*, University of Cape Town, South Africa. Room 317 Computer Science Building 18 University Avenue, Tel. +27 (21)-650 5107, Email: mkuttel@cs.uct.ac.za

Associate **Yousef Elmehdwi**, *Department of Computer Science*, Illinois Institute of Technology,
Chair Chicago, IL, United States.
Room 206B Stuart Building, Tel. 312.567.5150,
Email: yelmehdwi@iit.edu