

Kinyua Wachira

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CV: Full (Feb/2024)

DOB: 05/Mar/1988

Marital Status: Single

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Google Scholar: Kinyua Wachira

Staff Profile Website: Kinyua F. Wachira

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[A] Work Experience

Tutorial Fellow, University of Nairobi

July 2022 – Date

Roles Course Lecturer and Final Year Projects Coordinator
Academic Meetings Secretary
Examinations Officer
Third (3rd) year Departmental Student Mentor

Duties Teach core units in Electronics to 3rd year EEE students
Teach various elective and service units to 2nd & 4th year ME & RECM students
Coordinate balloting and submission of 5th year EEE undergraduate projects
Supervise and assess 5th year EEE undergraduate projects
Process examination results for 1st year EEE students
Present consolidated results data in Departmental, Faculty Academic Committee meetings
Take minutes in Departmental, Faculty Committee of Examiners meetings
Design, supervise, conduct and grade laboratories for 5th year EEE students
Create technical training documents for staff and write departmental grants

Graduate/Research Assistant, University of Nairobi

May 2018 – June 2022

Roles Academic Meetings Secretary
Examinations Officer
Third (3rd) year Departmental Student Mentor

Duties Teach core units in Circuit Theory, Electric Machines to 3rd year EEE students
Teach various elective and service units to 2nd & 4th year ME, PE, EBE & RECM students
Process examination results for 1st year EEE students
Supervise and assess 5th year EEE undergraduate projects
Design, supervise, conduct and grade laboratories for 5th year EEE students
Design, supervise and conduct Fourth Term activities for 2nd & 3rd year EEE students
Write departmental grants

Teaching Assistant & Laboratory Supervisor, University of Nairobi

July 2012 – April 2018

Duties Coordinate 4th Term activities for 2nd & 3rd year EEE students
Design, supervise and conduct various laboratories for 2nd, 4th & 5th year EEE students
Provide associative laboratory lectures in Computer Science, Controls Theory
Supervise laboratory sessions, workshops for visiting universities & tertiary institutions
Overhaul equipment and experiments for various 2nd & 4th laboratory units

Founder & Research Lead, Trend12 Collective

October 2016 – Date

Duties Provide specialised training in Machine Learning, Internet of Things, Image Processing
Author learning materials licensed by a Creative Commons 4.0 or equivalent copyright

Part Time Lecturer, Dedan Kimathi University of Technology

June 2015 – February 2016

Duties Teach core units in Controls Theory to 3rd year ME & 4th year TIE & EEE students
Supervise and assess 5th year TIE & EEE undergraduate student projects

Radio Planning & Optimization Engineer Trainee, Zonta Technologies Limited

August 2011 – January 2012

Duties Design, implement radio frequency planning solutions for local telco firms (ex: *Airtel* Kenya)

Key:

EBE Environmental and Biosystems Engineering
EEE Electrical and Electronics Engineering
ME Mechanical Engineering
PE Petroleum Engineering
RECM Real Estate and Construction Management
TIE Telecommunications and Instrumentation Engineering

[B] Education

Tertiary **University of Nairobi, 2006-2011/2012-2018/2022-Date**
PhD. Electrical and Electronic Engineering, current
M.Sc. Electrical and Electronic Engineering, 2018
B.Sc. Electrical and Electronic Engineering, 2011 (Second Class, Upper Division)

Secondary **Strathmore School, 2002-2005**
A-, Kenya Certificate of Secondary Education (O-Levels)

Primary **Consolata School, 1994-2001**
425/500, Kenya Certificate of Primary Education

[C] Dissertations, Proposals & Concept Notes

- Tertiary **PhD. Proposal**
“*A Colourisation Inference Engine for Historical Metamorphosed Archived Images of an Imperfect or Fauxtographical Persuasion*” (2021/22, defended 2023)
Supervisor(s): Prof. Elijah Mwangi & Prof. Heywood Ouma Absaloms, University of Nairobi & Prof. Gwanggil Jeon, Incheon National University
- PhD. Concept Note**
“*A Composite & Hierarchical Machine-Driven Colourisation Process for Use on Noisy Grayscale, Pseudo-Grayscale and Sub-par Colour Images Captured in Imperfect Conditions*” (2019)
- M.Sc. Thesis**
“*A Hybrid Heuristic-Based Localised Area Demosaicking Technique for Panchromatic Colour Filter Arrays*” (2018)
Supervisor(s): Prof. Elijah Mwangi, University of Nairobi & Prof. Gwanggil Jeon, Incheon National University
- B.Sc. Project**
“*Design of a UHF-aerial for Optimal Reception with Varied Lengths of Elements (Directors) and Distances of Separation*” (2011)
Supervisor(s): Mr. Savero L.D. Ogaba, University of Nairobi
- Secondary **Computer Science O-Level Project**
“*Bus-ticketing Transport Management System*” (2005)
Supervisor(s): Mr. Aaron Mbowa, Strathmore School

[D] Certifications & Professional Memberships

- Certifications **Engineer’s Board of Kenya (EBK)**
Registered Graduate Engineer, **B.6995**, 2012 - Present
- Professional **The Institution of Engineers of Kenya (IEK)**
Memberships Graduate Member, **G.5108**, 2014 - Present
- The Institute of Electrical and Electronic Engineers (IEEE)**
Member, **92229379**, 2012 - Present
- Society of Photo-Optic and Instrumentation Engineers (SPIE)**
Member, **3633067**, 2014 - Present
- The Institute of Electronics, Information and Communication Engineers (IEICE)**
Overseas Member, **1586602**, 2016 - Present
- Society for Imaging Science and Technology (IS&T)**
Member, **60803**, 2015 - Present

[E] Publications

International Peer-Reviewed Journals and Conferences

- 1– K. Wachira, E. Mwangi, H.O. Absaloms and G. Jeon, “*Current Biases and Future Research Avenues for Archive Image Colourisation*”, 10.1109/AFRICON55910.2023.102934657, IEEEAFRICON2023, Nairobi, Kenya, September 2023
- 2– K. Wachira, L. N. Wachira, E. Mwangi, H.O. Absaloms and G. Jeon, “*Tertiary Education Integrity in a ChatGPT Conscious World: Preliminary Kenyan Observations*”, 10.1109/AFRICON55910.2023.10293448, IEEEAFRICON2023, Nairobi, Kenya, September 2023
- 3– K. Wachira, H.O. Absaloms and J.M. Mbuthia, “*A Triumvirate Blended Learning Method for Embedded Computational Devices used in the Internet of Things: A Case Study*”, 10.1109/ICITISEE.2017.8285557, The 2nd International Conference on Information Technology, Information Systems and Electrical Engineering (ICITISEE2017), Yogyakarta, Indonesia, November 2017
- 4– K. Wachira, E. Mwangi and G. Jeon, “*An Ordinal Direction Driven Gradient-Based RGBW CFA Demosaicking Technique using a Bayerisation Process and Polyomino Theory*”, 10.1109/AFRCON.2017.8095483, IEEEAFRICON2017, Cape Town, South Africa, September 2017
- 5– K. Wachira and H.O. Absaloms, “*A Raspberry-Pi Centred Quasi-Flipped Learning Model to Trigger Creative-Thinking in Electrical Engineering Students in Kenya*”, 10.1109/AFRCON.2017.8095566, IEEEAFRICON2017, Cape Town, South Africa, September 2017
- 6– K. Wachira, E. Mwangi and G. Jeon, “*A Pentomino-Based Path Inspired Demosaicking Technique for the Bayer Color Filter Array*”, 10.1109/AFRCON.2015.7331959, IEEEAFRICON2015, Addis Ababa, Ethiopia, September 2015
- 7– K. Wachira, “*Corrective Term Usage in the Improvement of Gradient Based Bayer CFA Demosaicking Algorithms*”, 10.1109/EUROCON.2015.7313800, IEEE EUROCON 2015, Salamanca, Spain, September 2015
- 8– K. Wachira and E. Mwangi, “*A Multi-variate Weighted Interpolation Technique with Local Polling for Bayer CFA Demosaicking*”, 10.1109/ICTRC.2015.7156425, International Conference on Information and Communication Technology Research (ICTRC2015), Abu Dhabi, United Arab Emirates, May 2015
- 9– K. Wachira and E. Mwangi, “*A Cardinal-Direction Quincunx Based Interpolation Technique with Non-Uniform Inter-Plane Weighting for Bayer CFA Demosaicking*”, 10.1109/SPICES.2015.7091363, IEEE International Conference on Signal Processing, Informatics, Communication and Energy Systems (IEEE SPICES), Kozhikode, India, February 2015

Local Journals and Conferences

- 1– K. Wachira, “*Use of Emergent Mid-Level Computational Devices in the Creation of Robust and Affordable Auxiliary Infrastructure Subsystems - An Updated Review*”, AEC2019, University of Nairobi, Kenya, October 2019
- 2– K. Wachira, “*A Quasi-Flipped Learning Model For Teaching the Raspberry Pi*”, AEC2019, University of Nairobi, Kenya, October 2019
- 3– K. Wachira, E. Mwangi and G. Jeon, “*A Hexomino Multi-path Generation Gradient-Based Debayering Technique for Low Resolution Cameras*”, AEC2018, University of Nairobi, Kenya, September 2018
- 4– K. Wachira and H.O. Absaloms, “*Enhancing STEM Education in Kenyan Tertiary Institutions through the Use of Single Board/Single Chip Devices and a Robust Sympathetic Blended Learning Model*”, AEC2018, University of Nairobi, Kenya, September 2018

- 5- **K. Wachira**, “*A Simple Blended Learning Model for Teaching the Raspberry Pi,*”, 24th Institution of Engineers of Kenya International Conference, Intercontinental Hotel, Nairobi, Kenya, May 2017
- 6- **K. Wachira** and H.O. Absaloms, “*Raspberry Pi (RasPi) as a Driver Of Creative-Thinking For Electrical Engineering Students: The UoN Case,*”, 10.13140/RG.2.2.16213.22243, 23rd Institution of Engineers of Kenya International Conference, Diani Leisure Lodge Resort, Ukunda, Kenya, April 2016
- 7- **K. Wachira**, “*Advancing Science Technology Education Using Midrange Single-chip and Single-board Emergent Computational Devices,*”, 2nd African Research In Comparative Education International Conference (AFRICE 2015), Kenya Science Campus (UoN), Nairobi, Kenya, June 2015
- 8- **K. Wachira**, “*Use of Emergent Mid-Level Computational Devices in the Creation of Robust and Affordable Auxiliary Infrastructure Subsystems,*”, 10.13140/RG.2.1.4510.6722, 22nd Institution of Engineers of Kenya International Conference, Intercontinental Hotel, Nairobi, Kenya, May 2015

Seminars

- 1- **K. Wachira**, “*Where to Start on Completion of Your Degree,*”, Work In The Present, Preparing For The Future Series (IEEE UoN Seminar), University of Nairobi, Kenya, March 2021
- 2- **K. Wachira**, “*Engineering Registration Bodies in Kenya,*”, Work In The Present, Preparing For The Future Series (IEEE UoN Seminar), University of Nairobi, Kenya, March 2021
- 3- **K. Wachira**, “*Data: A ‘Less Alice, More Dorothy’ Approach to Curation,*”, AEC2019 Keynote Session, University of Nairobi, Kenya, October 2019
- 4- I.W. Maranga and **K. Wachira**, “*Comparison between Power Line Carrier Communication Based Metering, GSM Based Metering & Keypad Operated Metering in Kenya,*”, The International Triple Helix Summit, Nairobi, Kenya, April 2017

Tertiary Level Manuscripts and Monographs

- 1- **K. Wachira**, “*Exam Upload & Offline Marking for e-Class Monograph (2020)*” available under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International license
- 2- **K. Wachira**, “*BCM 208: Building Science III - Electrical Technology (2019)*”, available under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International license
- 3- **K. Wachira**, “*FEE 321: Electrical Circuit Theory IIA (2018)*”, available under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International license
- 4- **K. Wachira**, “*Effective Laboratory Report Writing for Electrical Engineering Students (2017)*”, available under a Creative Commons Attribution-NonCommercial-Share Alike 4.0 International license

Online Class Modules

- 1- FEE (3)331, (3)332: Digital Electronics A,B - Google Classroom (2021 - present)
- 2- FEE 591, 592: Laboratory VA, VB (Controls Option) - Google Classroom (2020, 2021)
- 3- FME 291 / FPE 292: Electrical Engineering I / Electric Circuits - Google Classroom (2021)
- 4- FEE 560: Projects - Google Classroom (2020 - present)

- 5- FEE 342: Electrical Machines IA - Google Classroom (2020)
- 6- BCM 208: Building Science III (Electrical Technology) - Google Classroom (2020)
- 7- Introduction to Microcontrollers and Embedded Programming - Google Drive (2019)

[F] Research Grants

USD \$ 15,000 (KES 1.5 Million) KENET Education Technology Mini Grant

Title: “A Student-Driven, Quasi-Flipped Learning Program for Embedded Design and Machine Learning Using the Raspberry-Pi Platform” University of Nairobi

Brief: Kenya Education Network Trust (KENET) invited proposals from faculty members in Kenyan tertiary institutions on Innovations in the Use of Education Technology in Engineering and Computer Science. The grant offer was announced in February 2020; a grant proposal using the Raspberry-Pi platform was submitted for review and presented on 12th March, 2020. The award was granted on 24th July, 2020. The funding received is for purchase of laboratory equipment and development of learning materials.

Duration: *Aug 2020 - Date*

Role: *Investigator & Technical Advisor*

Duties:

- (i) develop and curate online theory content and lab exercises
- (ii) determine the appropriate targets to be met by students
- (iii) present findings, outcomes at performance schedule meetings
- (iv) prepare manuscripts for publication and knowledge dissemination

GBP £1,170 (KES 170,000) Energy Savings Trust/Engineers Without Borders (UK) & IKEA Foundation Prototyping Grant

Title: “Efficiency for Access (EfA) Design Challenge” University of Nairobi

Brief: Successfully lobbied for the Department of Electrical & Information Engineering to field three (3) student teams to participate in the annual Efficiency for Access (EfA) Design Challenge addressing climate change response. The competition was supported by a prototyping grant of GBP £300-600 per team, pursuant to a successful pitch for funding.

Duration: *Sep 2020 - Jun 2021*

Role: *Team Lead, Faculty Coordinator*

Duties:

- (i) assist student teams in preparing for their design pitches
- (ii) facilitate funds transfer from competition organisers to individual student teams
- (iii) track spending and report on fund usage

USD \$ 10,000 (KES 1 Million) Raspberry-Pi Mini Grant

Title: “Integration of the Raspberry Pi or Equivalent Low Cost Computers as Student-owned Teaching Labs for Engineering” University of Nairobi

Brief: Kenya Education Network Trust (KENET) invited proposals from Engineering and ICT faculty members in Kenyan tertiary institutions to experiment on the use of the Raspberry Pi or equivalent low-cost computers as student-owned teaching laboratories for Engineering, Computer Science or Physics courses. The grant was limited to US \$10,000 and would pay for the time and equipment required to develop appropriate laboratory exercises based on the Raspberry Pi. The grant offer was announced in September 25, 2014; the grant proposal was submitted to KENET for review on the 29th October 2014 and announcement of the award was made on the 27th November 2014. The University of Nairobi began the execution of the project on 4th May 2015 and was completed on the 5th July 2015.

Duration: *Sep 2014 - Oct 2015*

Role: *Investigator & Technical Advisor*

Duties:

- (i) advise team members on the capabilities and innovative uses of the platform
- (ii) develop detailed lab exercises and determine the appropriate targets to be met by students
- (iii) record and collate decisions arrived to at team project meetings
- (iv) work with students daily during the learning phase ensuring maximum knowledge transfer
- (v) prepare manuscripts for publication in local and international fora

[G] Academic & Professional Awards

- 2022 **Vice Chancellor's Award of Excellence:** collaborative invention & patent of low-cost Critical Care Ventilator (*u-V 3D-40*) with remote communication, data analytics feature
- 2015 **Top 5 finalist and sole African finalist:** IEEE Region 8 (Europe, Middle East and Africa) Student Research Paper Competition - under PhD. level
- 2011 **1st Runner-up, Final Year Project:** 5th year, Dept. Electrical & Information Engineering, University of Nairobi
- 2010 **Top Academic Student:** 4th year, Dept. Electrical & Information Engineering, University of Nairobi
- 2003 **Quarter finalist:** Nationwide Blueband Quiz Show
- 2002 **Top 5 Student:** Form 1, Strathmore School
- 2001 **Best Overall KCPE Performance:** Consolata School

[H] Travel Grants Received

- Sep 2023 AFRICON 2023 Internal Grant (Nairobi, Kenya)
- Nov 2017 ICITISEE 2017 Foreign Student Travel Grant (Yogyakarta, Indonesia)
- Sep 2017 KENET Trust Student Travel Grant (Cape Town, South Africa)
- Sep 2015 KENET Trust Student Travel Grant (Addis Ababa, Ethiopia)
- IEEE Region 8 Student Travel Grant (Salamanca, Spain)
- May 2015 KENET Trust Student Travel Grant (Abu Dhabi, United Arab Emirates)

[I] Workshops, Training Attended

- Sep 2024 10th Africa Engineering Week - High Level Workshop: Engineering & Sustainable Development in Kenya (Sep 12, Nairobi, Kenya)
- Feb 2024 Gender in STEM Workshop (Feb 19-21, Kigali, Rwanda)
- Nov 2023 Public Sector End-User Cybersecurity Training Awareness (Nov 14-16, Nairobi, Kenya)

[J] Areas of Expertise

Engineering	Audio, Image & Video Signal Processing Machine, Deep, Reinforcement Learning & Artificial Intelligence Embedded Systems Modelling & Implementation HF/VHF/UHF Antenna Design & Construction Controls Systems, Electric Circuits and Digital Electronics Analysis & Design
Mathematics	Combinatorial Geometry Optimization Techniques
Programming	<i>Structured:</i> Pascal, C <i>Object-oriented:</i> C++, C#, Java <i>Interpreted:</i> Python <i>Functional:</i> Haskell (<i>provisional</i>) <i>Problem-oriented:</i> MATLAB/Octave, L ^A T _E X, GeoGebra <i>Statistics & Data Science:</i> Maple, Mathematica, R <i>Simulation, Prototyping:</i> Falstad, Eagle, Proteus, Fritzing, Multisim <i>Low-Level:</i> x85, x86 Assembly, Arduino <i>Other:</i> HTML, XML, CSS

[K] Languages Spoken

Native Proficiency	English Kiswahili
Elementary Proficiency	French Japanese

[L] Research Groups & Communities

	University of Nairobi
Jun 2020 - Date	<i>Curator:</i> Departmental Projects Online Repository
May 2020 - Date	<i>Coordinator/Staff Lead:</i> Efficiency for Access (Univ. of Nairobi) Research Group
Jun 2018 - Date	<i>Custodian:</i> Raspberry Pi Grant Equipment Repository
Jun 2015 - Date	<i>Coordinator/Staff Lead:</i> Raspberry Pi Society
Jan 2012 - Date	<i>Coordinator/Staff Lead:</i> Micro-Controller Society
Mar 2012 - Date	<i>Member:</i> Electronics and Microprocessing Research Group

[M] Volunteer Work

Dec 2022 - Oct 2023	Member, Technical Program Committee IEEE AFRICON 2023 Intl. Conference (Nairobi, Kenya)
	Technical Paper Reviewer
Jun 2023 - Jul 2023	IEEE PES/IAS PowerAfrica 2023 Intl. Conference (Marrakesh, Morocco)
Dec 2022 - May 2023	IEEE AFRICON 2023 Intl. Conference (Nairobi, Kenya)
Jan 2021 - Jul 2021	IEEE PES/IAS PowerAfrica 2020-2021 Intl. Conference (Nairobi, Kenya)
	Patron
May 2021 - Date	Robotics & Automation Society (RAS), IEEE Branch, Univ. of Nairobi
May 2021 - Date	Women in Engineering (WiE), IEEE Branch, Univ. of Nairobi
	Faculty Advisor
Sep 2023 - Jun 2024	5th Efficiency for Access (EfA) Student Design Competition
Sep 2022 - Jun 2023	4th Efficiency for Access (EfA) Student Design Competition
Aug 2020 - Jun 2021	2nd Efficiency for Access (EfA) Student Design Competition
Oct 2016 - Jul 2020	FABrication LABoratory (FABLAB), University of Nairobi
	Other
Jun 2020 - Date	<i>Member:</i> CoVID-19 u-Ventilator 3D-40 Design Team, University of Nairobi
Feb 2015 - Dec 2020	<i>Nominations Officer:</i> IEEE Kenya Section
May 2013 - May 2017	<i>Conference Rapporteur:</i> IEK 20th–24th Intl. Engineering Conferences
May 2006 - Sep 2006	<i>Data Entry Clerk:</i> AMREF Kenya
May 2004 - Oct 2004	<i>Typesetting Editor:</i> Strathmore School Yearbook “The Scroll”

[N] Personal Notes

Profile— A hard working individual pursuing an academic career in a tertiary institution. Willing and able to work alone or in small and medium sized teams to achieve set objectives within dedicated time lines

Career Aims— Equip individuals with the skills needed to become productive, technical-savvy members of society. Promote research in current areas through publication and inter-tertiary institution collaboration

Recreational Interests & Hobbies— Include but are not limited to:

- (i) reading novels, magazines
- (ii) working on puzzles (mathematical, Sudoku, crossword, jigsaw)
- (iii) listening to old radio drama programs
- (iv) curating old magazines and images through *the Internet Archive*
- (v) watching, critiquing B & Z-movies
- (vi) playing interactive games (video games, skill-based cardgames)
- (vii) assembling personal computers and testing software

[O] References

Prof Elijah Mwangi

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Prof Nicodemus Odero Abungu

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Machakos University, Kenya
nicodemus.odero@mksu.ac.ke

Prof Meoli Kashorda

Executive Director
Kenya Education Network Trust (KENET)
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Dr Peter Akuon

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Prof Heywood Ouma Absaloms

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Prof Gwang-gil Jeon

Dept. of Embedded Systems Engineering
Incheon National University, Korea Republic
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Prof George Kamucha

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Dr Abraham Nyete

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Note: Additional references can be made available upon request

