Luke Otieno

Designation: Post-doc associate

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Date of Birth: 23 May 1985

ACADEMIC BACKGROUND

Qualification	Institution	Country	Year
PhD. Mechanical Engineering	Kyungpook National University	South Korea	2023
MSc. Mechanical Engineering	Kyungpook National University	South Korea	2020
BSc. Electrical and Electronic Engineering (First Class Hons.)	Jomo Kenyatta University of Agriculture and Technology	Kenya	2009

AREAS OF EXPERTISE

- Atomic force microscopy
- Nano-instrumentation

WORK EXPERIENCE

Position	Department/Institution	Year
Teaching Assistant	Electrical and Electronic Engineering Department, Dedan Kimathi University of Technology	2010-2016
Post-doc associate	Institute of Nanophotonics Application, Kyungpook National University	2023 September - present

OTHER UNIVERSITY AND NATIONAL RESPONSIBILITIES

- Industrial visits coordinator, Electrical & Electronic Engineering Dept. (2015-2016).
- Examinations coordinator, Electrical & Electronic Engineering Dept. (2011-2013).
- Central Kenya Institution of Engineers of Kenya (IEK) branch coordinator (2011-2014).

PUBLICATIONS

T. N. Nguyen, **L. O. Otieno,** T. T. Nguyen, O. M. Juma, Y. J. Lee, J. S. Park and H. Lee, "LEGO® Education SPIKE™ Prime-based Atomic Force Microscope for Science Education," *New Phys.:Sae Mulli*, vol. 73, pp. 992-1000, 2023. https://doi.org/10.1007/s40042-023-00911-w

L. O. Otieno, T. T. Nguyen, O. M. Juma, T. N. Nguyen, Y. J. Lee, J. S. Park, H. Lee and B. O. Alunda, "A high bandwidth, high voltage amplifier for driving fast piezoelectric actuator based nanopositioners used in atomic force microscopes," *Journal of the Korean Physical Society*, vol. 83, pp. 795-806, 2023. https://doi.org/10.1007/s40042-023-00911-w

L. O. Otieno, T. T. Nguyen**,** S. J. Park**,** Y. J. Lee, and B. O. Alunda, "Feedforward compensation for hysteresis and dynamic behaviors of a high-speed atomic force microscope scanner," *Journal of the Korean Physical Society*, vol. 80, no. 3, pp. 325–336, 2022. https://doi.org/10.1007/s40042-021-00376-9

L. O. Otieno, B. O. Alunda, J. H. Kim, Y. J. Lee, "Design and Fabrication of a High-Speed Atomic Force Microscope Scan-Head," *Sensors*, vol. 21, no. 2, p. 362, 2021. https://doi.org/10.3390/s21020362

B. O. Alunda, D. O. Agumba, I. O. Ondicho, **L. O. Otieno**, M. Chepkoech, N. A. Mutua, J. S. Hawong, "Investigating the performance of square ring under uniform squeeze rate and internal pressure," *Materialwissenschaft und Werkstofftechnik*, vol. 51, no. 12, p. 1653, 2020. https://doi.org/10.1002/mawe.201900236

L. O. Otieno, Y. J. Lee, and B. O. Alunda, "Implementation of a sinusoidal raster scan for high-speed atomic force microscopy," *Journal of the Korean Physical Society*, vol. 77, no. 7, pp. 605–612, 2020. https://doi.org/10.3938/jkps.77.605

I. Ondicho, B. Alunda, D. Owino, **L. Otieno**, and M. Chepkoech, "Revealing a transformation-induced plasticity (TRIP) phenomenon in a medium-entropy alloy," *Acta Metallurgica Sinica (English Letters)*, vol. 33, p. 1159, 2020. https://doi.org/10.1007/s40195-020-01088-y

B. O. Alunda, **L. O. Otieno**, S. J. Park, S. G. Choi, J. H. Kim, and Y. J. Lee, "Development of a photo-thermal scan head for high-speed atomic force microscope," *Measurement Science and Technology*, vol. 31, no. 4, p. 047003, 2020. https://doi.org/10.1088/1361-6501/ab5292

B. O. Alunda, **L. O. Otieno**, M. Chepkoech, C. C. Byeon, and Y. J. Lee, "Comparative study of trans-linear and trans-impedance readout circuits for optical beam deflection sensors in atomic force microscopy," *Journal of the Korean Physical Society*, vol. 74, no. 2, pp. 88–93, 2019. https://doi.org/10.3938/jkps.74.88

M. Chepkoech, B. O. Alunda, **L. O. Otieno**, S. J. Park, C. C. Byeon, and Y. J. Lee, "Design and Fabrication of a Low-Cost Teaching Atomic Force Microscope with 3D Printed Parts", *New Phys.: Sae Mulli*, vol. 69, p. 128, 2019. https://doi.org/10.3938/NPSM.69.128

PATENTS

M. Chepkoech, B. O. Alunda, **L. O. Otieno**, S. J. Park, Y. J. Lee, "Educational Atomic Force Microscope," Korean Patent 3010331290000, Nov. 14, 2019.

B. O. Alunda, **L. O. Otieno**, S. J. Park, Y. J. Lee, "High-speed Atomic Force Microscope," Korean Patent 102236590, Mar. 31, 2021.

CONFERENCES (Talks and Posters)

O. M. Juma, **L. O. Otieno,** T. T. Nguyen, T. N. Nguyen, Y. J. Lee, "Linearization of atomic force microscope scans acquired using dual-stage lateral scanners," *2023 KPS Fall Meeting*, Changwon, Republic of Korea.

T. T. Nguyen, **L. O. Otieno**, O. M. Juma, T. N. Nguyen, Y. J. Lee, "Wide-area piezoelectric scanner using mechanical amplification for applications in high-speed atomic force microscopy," *2023 KPS Fall Meeting*, Changwon, Republic of Korea.

L. O. Otieno, T. T. Nguyen, M. Juma, T. N. Nguyen, Y. J. Lee, "Detecting the amplitude squared signal for dynamic imaging in atomic force microscopes," *2023 KPS Spring Meeting*, Daejeon, Republic of Korea.

L. O. Otieno, Nguyen Thi Thu, and Y. J. Lee, "Open-loop non-raster scanning in high-speed atomic force microscope," *2022 KPS Spring Meeting*, Virtual Conference.

L. O. Otieno, Nguyen Thi Thu, and Y. J. Lee, "Offline correction of hysteresis and mirroring artifacts in high-speed atomic force microscopy images," *2021 KPS Fall Meeting*, Virtual Conference.

L. O. Otieno and Y. J. Lee, "Feedforward compensation for hysteresis and dynamic behaviors of a high-speed atomic force microscope scanner," *2020 KPS Fall Meeting*, Virtual Conference.

L. O. Otieno and Y. J. Lee, "Hysteresis compensation for a high-speed atomic force microscopy scanner," *2020 KPS Spring Meeting*, Virtual Conference.

L. O. Otieno, S. J. Park, B. O. Alunda, and Y. J. Lee, "Design and Fabrication of a High-Speed Atomic Force Microscope Scan-head," *32nd International Microprocesses and Nanotechnology Conference*, International Conference Centre Hiroshima, Hiroshima, Japan, 2019.

L. O. Otieno, S. J. Park, B. O. Alunda, and Y. J. Lee, "Implementation of a sinusoidal raster scan signal for high-speed atomic force microscopy," *2019 KPS Fall Meeting*, Gwangju, Republic of Korea.

L. O. Otieno, S. J. Park, B. O. Alunda, and Y. J. Lee, "Design and Fabrication of an Atomic Force Microscope Scan Head with Photothermal Excitation," *2019 KPS Spring Meeting*, Daejeon, Republic of Korea.

L. O. Otieno, S. J. Park, B. O. Alunda, and Y. J. Lee, "LabVIEW-based Atomic Force Microscopy Control Software," *2018 KPS Fall Meeting*, Gumi, Republic of Korea.

M. Chepkoech, B. O. Alunda, **L. O. Otieno**, S. J. Park and Y. J. Lee, "Design and fabrication of a low-cost teaching atomic force microscope with 3D printed parts," *2018 KPS Fall Meeting*, Gumi, Republic of Korea.

B. O. Alunda, **L. O. Otieno**, C. C. Byeon, and Y. J. Lee, "Comparative study of translinear and trans-impedance circuits in optical beam deflection scheme for high-speed atomic force microscopy," *ISPSA 2018*, Jeju, Republic of Korea.

WORKSHOPS

2019 NanoScientific Symposium Korea (Scanning Probe Microscopy), Suwon, Republic of Korea, August 28-29, 2019.

TECHNICAL SKILLS

Circuits and systems	Design of analogue and digital circuits, PCB design (EAGLE), programming of FPGAs (LabVIEW-based) and microcontrollers, sensor interfacing, signal processing, image processing (basic), modelling and simulation
Mechanical design	Inventor (intermediate)
Atomic force microscopy	Design and development (conventional and high-speed), operation (basic and advanced modes), analysis of AFM data
Programming languages	MATLAB, LabVIEW, R (basic), Python, Pascal, C/C++, Assembly language (Z80, 8086)
Other software	EAGLE, COMSOL, Igor (basic), LaTeX, Gwyddion, Inkscape

SCHOLARSHIPS/AWARDS

- 2001 National Physics Olympiads Team (Kenya) – 1st position in selection test.
- Kyungpook National University (KNU) International Graduate Scholarship (KINGS) – March 2018 to February 2022.
- Brain Korea (BK21) Scholarship (2018-2020).

RESEARCH INTERESTS

- Development of nano-instrumentation and their applications
- Optics and photonics

- Machine learning in microscopy
- Control systems in microscopy

AFFILIATIONS

- Korean Physical Society – Student Member
- Engineers Board of Kenya – Graduate Member
- Institution of Engineers of Kenya – Graduate Member

REFEREES

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