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UCT researcher awarded first African Google PhD fellowship for his 5G in healthcare research

Humphrey Owuor Otieno with his supervisors, Dr Bessie Malila and Dr Joyce Mwangama.

Photo: Supplied

University of Cape Town (UCT) electrical engineering student Humphrey Owuor Otieno has been awarded the first African Google PhD Fellowship under the Systems and Networking subcategory.

The fellowship programme, which recognises outstanding graduates doing exceptional and innovative research in areas relevant to computer science and related fields, supports PhD candidates who seek to influence the future of technology.

Kenyan-born Otieno graduated with a BSc Telecommunications and an MSc Information Technology at Strathmore University in Nairobi and was an MSc exchange student at the Royal Institute of Technology in Stockholm, Sweden, before enrolling for a PhD at UCT. His research is part of an ongoing collaboration between researchers in the Department of Electrical Engineering's communications research group led by senior lecturer Dr Joyce Mwangama, and the Telemedicine research group in the division of Biomedical Engineering, led by junior research fellow Dr Bessie Malila.

Under the supervision of Dr Mwangama and Dr Malila, Otieno's research is a key contribution towards the development of a digital health testbed in the Human Anatomy Building and Menzies Building at UCT. The project is a first in Africa and will provide a platform for the accelerated translation of research ideas into commercial products and services that can be adopted into African health systems, in line with UCT's Vision 2030 for research.

5G healthcare in Africa

"Delivery of healthcare services through digital health applications, and e-health services with support from m-health applications, means narrowing the divide to access to quality healthcare services," explained Otieno. "Our work aims to achieve this by setting up a 5G Digital Health Testbed that will allow the coexistence of these digital health applications and services over the network.

"Through intelligent network slicing – a new concept introduced in 5G networks – with the help of machine learning techniques, we aim to ensure that we dynamically guarantee the best performance for each digital health application on the 5G network. These include, but are not limited to, a tele-audiology use case, a virtual clinic use case, and latent tuberculosis diagnosis using hyperspectral images. All these applications are being developed at UCT."

Mwangama said that this work is driven by recent evidence on the effectiveness of digital health interventions in Africa, as supported by the proliferation of mobile communication technologies pre- and during the COVID-19 pandemic.

"Digital technologies and their application to healthcare have the potential to improve health-system efficiency, lower overall costs, streamline the workload of health facility staff, and improve public health outcomes. However, innovation is required in both the infrastructure and the development and deployment of specific low-cost digital applications for health. Mr Otieno's work will go a long way in ensuring the success of this project, and I am very proud of his achievement," she said.

Motivated and proud

Otieno said that being awarded the Google PhD fellowship means a lot to him and is a motivating factor which he needed as a young researcher. "This fellowship opens up opportunities to bring the research into reality, because of the potential collaborations we will pursue at Google and beyond," he said.

"Getting access to a mentor from a tech giant like Google means that I can learn from them and exchange ideas. As it is one of the best fellowships among many in the world. I am immensely proud that Google supports my research and has acknowledged its

quality." Otieno extended his sincere gratitude to his supervisors who helped him conceptualise this research, saying that they have been "the best so far; incredibly supportive and understanding".

He also acknowledged the blessing of his family, friends and colleagues who have been with him throughout his journey.

Young African scientists

"Mr Otieno's fellowship will enable him to focus on his research without having to worry about funding his studies, and a focused student has the potential to have outstanding research outputs," said Malila.

She added that Otieno's achievement should encourage other researchers on the continent. "African challenges are unique and require homegrown solutions that are appropriate to solve them. Digital technologies, supported by mobile communication technologies, present opportunities for young scientists to develop novel solutions that can help address problems in key sectors such as health, education, agriculture and energy. Sharing these ideas can help them secure funding for prototyping their solutions," she noted.

Otieno sees his fellowship award as a rallying call to researchers, especially in Africa, to believe in themselves and seek to contribute to the future of technology. "Systems and networking form the backbone of digital innovation, and the potential exists for most African countries and economies to build platforms that can help provide solutions to various wicked problems. Vertical services like access to quality education, and food security with the help of modernised agriculture, are areas which are open for African researchers to explore, for the betterment of our continent," he concluded.

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