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UCT trio wins international award for innovative engineering toolkit for students



(From left) Sampson Nwachukwu, Kai Goodall and Pitambar Jankee

Photo: Candice Lowin

NextGen Engineers, a team of three students from the University of Cape Town (UCT), have won an international award for their affordable engineering essentials toolkit tailored to students' needs.

The winners of the RS Components Grass Roots Engineering Essentials Kit international design competition are [Kai Goodall](#), [Pitambar Jankee](#) and [Sampson Nwachukwu](#). The NextGen Engineers trio are all postgraduate students from UCT's Department of Electrical Engineering.

Their toolkit, its catchy name is CirKit, took the honours in a competition contested by other top young international innovators. The runners-up are the University of

Loughborough and the Engineering & Design Institute London (TEDI-London) in the United Kingdom.

Freedom to innovate

Weighing in at around 2 kg, CirKit gives students the freedom to build their practical and problem-solving skills outside the university laboratory – and without specialist equipment. It has been designed for student use from first year through to the early-career stage. CirKit is also suitable for students from multiple engineering disciplines and can be used for a wide range of engineering projects.

Priced at R6 000, the toolkit comes with an array of versatile essentials selected based on a survey of students' needs and wish lists. UCT academics and laboratory technical staff were also consulted to make an optimal selection of components. Senior lecturer Dr David Oyedokun supervised the design project.

"CirKit is a well-designed engineering kit for home and campus use," said Dr Oyedokun, who is the chairperson of the Institute of Electrical and Electronics Engineers (IEEE) South Africa Section.

"It puts reasonable laboratory resources in the hands of students to foster creativity and innovation."

Goodall is doing his master's in electrical engineering, specialising in mechatronics. He has a strong history of social innovation, having designed a [Pedal n Spin](#) foot-cranked washing machine, which won an international award in 2021, and a Tap and Door Opener [Multi-tool](#) for COVID-19 spread prevention. Goodall's research interests include automation through artificial intelligence and computer vision as well as renewable energy technologies.

Jankee is a Mauritian doing his PhD in electrical engineering. His research is funded by the Open Philanthropy Project and the UCT Innovation Builder Fund. His research interests include geomagnetically induced currents, power system stability and control, protection and automation, power theory and converter-interfaced generation.

Nwachukwu is a Mastercard Foundation scholar from Nigeria doing his master's in electrical engineering. Nwachukwu's main interests are in renewable energy, microgrids, and power systems stability, covering concepts such as the use of machine learning to predict energy outputs and flow analysis of current and emerging energy technologies.

Affordability

Cost was high on the designers' priority list to ensure the base kit is affordable for all students and in line with the United Nations Sustainable Development Goals (SDGs) particularly SDG 4 (Quality Education) and SDG 9 (Industry, innovation and infrastructure). As one of the students surveyed said, "I have a lot of innovative ideas and projects in mind, but I cannot afford a toolkit to allow me to make my ideas a reality."

The designers are looking at other ways to make their toolkit affordable. But as most bursaries don't cover toolkits, they are proposing two alternatives to solve this problem. The first is to create a course that introduces students to the toolkit with the intention of bursaries covering both the course and the toolkit. The second solution proposes that

funds for the toolkit are embedded in curriculum-approved courses, which are covered by bursaries.

The trio's win brings a prize of R100 000 to the university and R20 000 to UCT's IEEE Student Branch. The funds will be used to improve students' practical learning environment, spark innovative thinking in these budding electrical engineers and contribute towards STEM outreach programmes. And in terms of innovative thinking, they have more in the pipeline. They're now developing CirKitV2, which will be optimised in terms of tools, component selection, the cost of each item, and overall weight.

As Nwachukwu concluded, "Winning this award is a great recognition of the team's hard work and belief in our motto: 'Empowering young engineers; drive innovation'."

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