Royal Academy of Engineering

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PROFILE
Distinguished International Associate

Thematic area: Engineering education and telecommunications research

Project title: Nurturing excellence, opportunity and equity through digital education for engineering and science

Strategic goals: To create and nurture a platform for first-year engineering students, where they can receive real-time help and access a library of video on demand (VoD) lessons.

Background: After achieving a PhD in physics at NMU in 2006, I studied a post-doctorate qualification at the Technical University of Denmark in Copenhagen. I have won several awards over the last 20 years including a bronze medal from the South African Association for the Advancement of Science, and the 2020 NMU Researcher of the Year award. I lecture around 350 first-year engineering students every year, as well as mentoring over half a dozen MSc and PhD students, and I particularly enjoy developing online learning platforms for physics and engineering students.

Previous Academy involvement: I was the overseas investigator in an Industry–Academia Partnership Programme (IAPP) grant, which was recently successfully completed with City, University of London, and I intend to build on the positive outcomes from this project in future.

About my project

Objectives: The main objective is to improve the quality of education for undergraduate students. This will be done using a digital platform called Yebo Physics – the word 'yebo' is colloquial South African for a strongly affirmative 'yes'. On this YouTube-hosted platform, senior master's and PhD students are mentored and trained to create educational content for (and offer real-time assistance in support of) undergraduates.

The Yebo project aims to resolve the diverse challenges faced by engineering and STEM students in developing countries in the post-COVID-19 digital landscape, mitigating the effects among the underserved.

It will provide graduates of the South African school system (many of whom have extremely poor mathematical and problem-solving skills) with intense one-on-one guidance to sharpen their abilities. This is especially important in remote villages where students can't attend campus or meet in groups for learning; the problem is amplified in engineering and STEM classes, where one-on-one support may not be possible.

An additional benefit of this project is providing master's and PhD students with experience in digital technologies that are now in demand among employers, such as the ability to livestream.

On the UK side... Alongside the support from the DIA programme, additional funding for tutor remuneration has been leveraged from the Academy's University Partnership Development Programme. I will build on recently completed work done under the recent Royal Academy of Engineering IAPP grant, amplifying this connection to the UK and adding value to the work of UK colleagues.

Digital education techniques developed in South Africa can be implemented in the UK (and indeed globally), and I will be hosting industry-focused workshops in both the UK and South Africa.

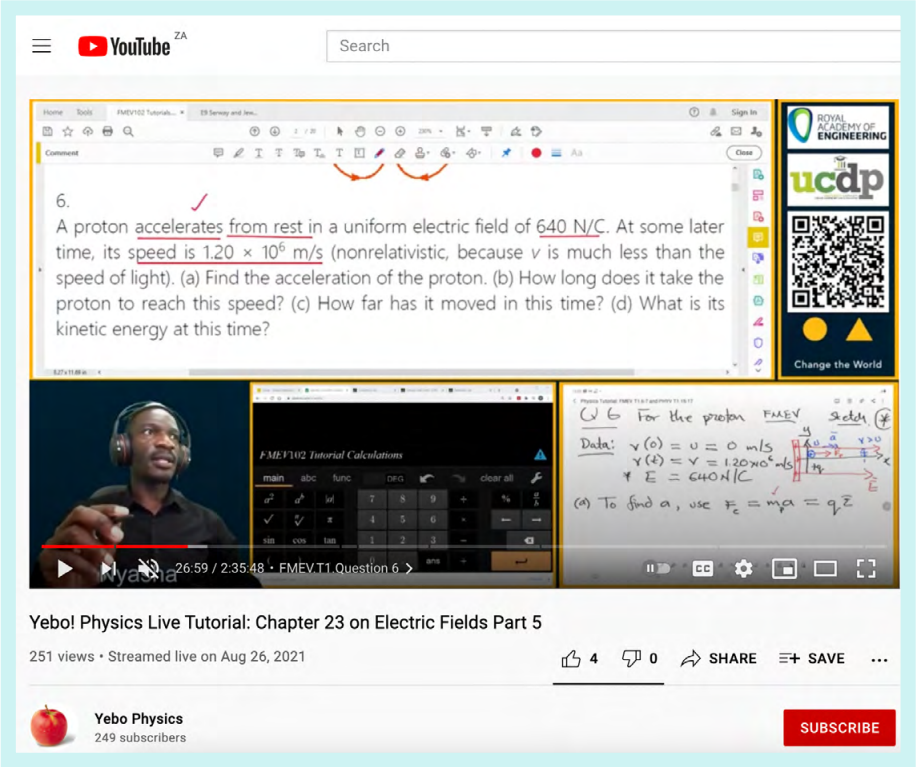
Project output: Yebo incorporates the latest livestreaming and vlogging trends, such as HD cameras and greenscreen superimposition. The primary aim is to create quality on-demand assistance for engineering students, while the secondary aim is to develop a pool of tutors adept at creating digital learning using modern technology.

Livestreams are broadcast for four hours every weekday, with students encouraged to Zoom call in with questions. Other content will be timestamped VoD footage, which can be referenced as required.

Tutors are trained on how to livestream, edit, handle technical questions from younger students, and manage this YouTube channel. I will be holding workshops in both Port Elizabeth and London with academics and professionals to expand on the potential offered by digital education.

Anticipated outcomes and impact: The Yebo online platform has already been created, and we recently held our inaugural local workshop. We have recruited four tutors, and almost 500 hours of engineering and physics educational content has already been created and archived in VoD format. We have several hundred subscribers, and this will increase significantly as the project is promoted more widely.

My own background is highly international, and I believe this project will also make teaching and training more international in emphasis and scope, particularly relating to digital innovation. Ongoing mutual cooperation in education with colleagues at City, University of London, will support the joint publishing of new research work. Through the support of the Royal Academy of Engineering, this project is genuinely changing lives.



Final thoughts on the Distinguished International Associates programme: The vision and global impact of the Royal Academy of Engineering is inspirational, and I first applied because I wanted to be a part of this.

Beyond the benefits of being part of the community, and funding for research and equipment, I am extremely proud to be a DIA. It adds tremendous validation to my research, teaching and engagement activities.

About the Distinguished International Associates Programme

The Distinguished International Associates Programme is an award scheme for international engineers working across all sectors, who are at the cutting edge of engineering research or innovation.

Awardees are offered a grant to amplify the impact of an existing collaboration with the UK in an area that aligns with the Academy's new strategic priority themes.

The programme aims to develop a broad international network of excellent diverse engineers across countries and disciplines, with research and innovation links to the UK, to work alongside the Academy to enhance progress towards achieving its goals for an inclusive economy and sustainable society.

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Registered charity number 293074