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UCT's first-ever Google Research Scholars Program recipients
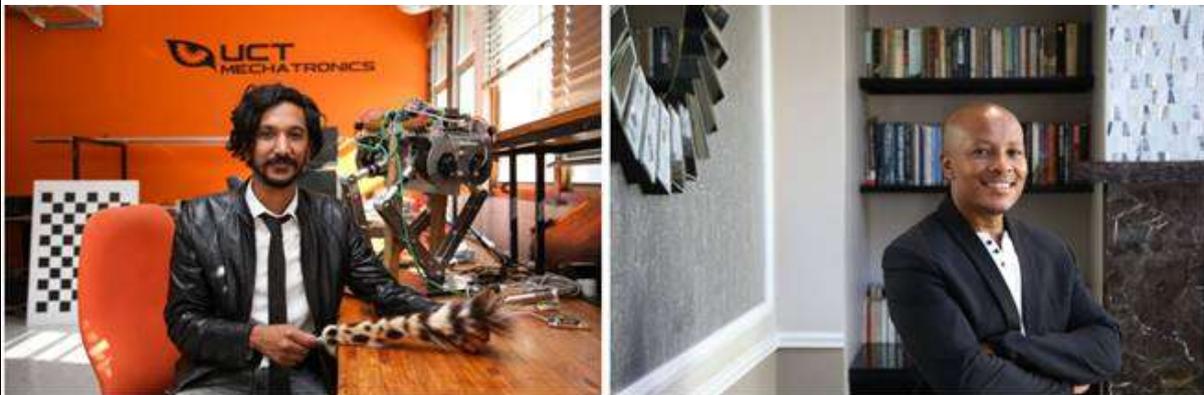
From left: Associate Professor Amir Patel and Dr Moholola Tsoeu.   Photos: Je'nine May/UCT
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Associate Professor Amir Patel and Dr Mohohlo Tsoeu, both from the University of Cape Town's Department of Electrical Engineering and its newly formed African Robotics Unit, have become the institution's first-ever recipients of search engine giant Google's Research Scholar Program. They are also the only Africans in the Program's 2021 cohort.

The Program aims to support early-career researchers who are pursuing research in fields relevant to Google. It provides "unrestricted gifts to support research at institutions and is focused on funding world-class research". To be eligible for the award, the recipient's research must be in Computer Science and related fields. Patel has been awarded in the category "Machine Perception" and Tsoeu in the category "Natural Language Processing".

"It feels amazing to be recognised by Google, one of the largest tech companies in the world. It is also exciting and encouraging for us to be mentioned among some of the world's top universities in the field of robotics and artificial intelligence," said Patel.

Tsoeu said he was "excited and honoured" to be one of only two researchers from an African university to receive the prestigious award this year.

"It is a positive affirmation that our research is important, has the potential to have great impact and that we have the intellectual capital to deliver," he said.

Patel was awarded for his research project "WildPose: 3D Animal Biomechanics in the Field using Multi-Sensor Data Fusion". The project aims to provide deeper insight into the abilities of the world's greatest animal athletes (located in Africa), such as the cheetah; into how they can "robustly traverse through the unstructured world"; and it will prove invaluable for legged robots if they are ever to leave the confines of the laboratory.

Patel explained that currently, the biggest impediment to a holistic understanding of animal locomotion is measuring and modelling whole-body motion in the wild. Therefore, his project proposes developing a deep learning-based motion capture system (WildPose), which leverages complementary sensor data to remotely obtain high-speed, whole-body 3D animal kinematics in the field from a single view.

The WildPose system will enable videographers to capture biomechanical data from animals, such as cheetahs and lions, in the wild using a single handheld device, creating a new source for data collection. "This research is important as it will allow us to measure the motion of animals in the wild at an unprecedented level," said Patel.

Further, Patel believes the proposed system will be disruptive to the fields of ecology, by providing new insight into how climate change affects animal behaviour; in neuroscience (how animals like the cheetah respond to the motion of prey during hunts); in evolutionary biology (how the cheetah – the only surviving species in the Acinonyx genus – evolved compared to Africa's other big cats); and in robotics (holistically understanding animal locomotion will enable the design of more agile robots).

"I believe this award will help me further my goal of moving biomechanics beyond the confines of the laboratory," he shared.

Tsoeu was awarded for his project "Corpora collection and complete natural language processing of isiXhosa, Sesotho and South African Sign languages". His project will contribute to the development of comprehensive, high-quality language corpora for indigenous South African languages. It will also investigate and develop novel and high-performance machine learning algorithms aimed at application areas such as automatic speech recognition, translation, and text-to-speech/sign technology.

Tsoeu explained that these applications are in the growing area of human-machine interfacing (HMI), but more importantly in the South African context, they contribute towards bridging the human language divide and improve equal access and participation to restore the dignity of currently marginalised groups such as the Deaf and hard of hearing communities.

His passion is to do research that drives good social change and believes that in conducting such research, one opens avenues for good fundamental and applied research questions that contribute new knowledge and advances scholarship.

His research interests are in machine learning, with specific applications to aspects of natural language processing. This includes language designing, language corpora for machine learning, investigating novel algorithms for language translation, automatic speech and sign recognition, and text-to-speech and sign synthesis. Tsoeu said it is a multi-disciplinary research area that stimulates collaborations between Engineering, Linguistics and Psychology of learning and, as he puts it, "is really fascinating".

Tsoeu's research contributes to "bridging the human-to-human language divide that devastates South Africa, leading to political language debates at universities and other spaces, and marginalisation of native speakers of native languages, especially the Deaf Community".

"The world is getting extremely connected, both through travel and the web, and the language divide remains a bottleneck towards enjoying full global connectedness," said Tsoeu.

Tsoeu and his team's work will also open doors to "amazing research ideas and innovation in the areas of machine learning, human-machine interfacing, media content distribution and education".

But all of this costs money, and a lot of it. Therefore, the funding Tsoeu will receive from the Program will make a significant contribution to the project's "enormous costs" which includes his and his team's research activities, funding students, travel costs, fieldwork and attending conferences. "I am honoured to have received it".

ENDS

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