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UCT student's smart UVC sanitiser has multi applications

University of Cape Town (UCT) electrical engineering student Rowyn Naidoo is finalising the design of an affordable, smart short-wavelength ultraviolet-C (UVC) light system that disinfects surfaces, the air and large rooms – and even face masks, making them reusable. The research is in response to Professor Amit Mishra's challenge to engineering students to design devices to help counter COVID-19.

In taking up Mishra's challenge, Naidoo – an undergraduate student – started by looking at his own campus: the now-empty classrooms, lecture halls and other large spaces, expanding on his long-held interest in science and technology. "I took the route of how we can destroy or inactivate the actual viruses that are around on a large scale, with a view towards getting our campuses and similar spaces functioning normally, but safely," said Naidoo.

UVC light is effective in killing other viruses and micro-organisms in and on our surroundings. It does this by destroying nucleic acids and disrupting their DNA. "UVC light also works on drug-resistant superbugs, fungi and bacteria, and disinfects in a matter of seconds or minutes – depending on the dosage," Naidoo added.

It's also not the same as the UV lights used in places like discos, he explained. UVC is light in the UV part of the spectrum, but at a higher frequency. It's a more obscure part of the spectrum that emits shorter, more energetic wavelengths of light – and it can be dangerous to humans if they're directly exposed to it. "While there are some commercially available UVC disinfection products, this project will provide automatic, optimised disinfection on a much larger scale, such as entire rooms or lecture venues.

"I took the approach of how to actually kill the viruses while playing to my strengths as an electrical engineering student. I was aware of the use of UVC for this application and that it's not in common use because of safety factors and cost. I then played around with these limitations towards a solution that is safe, feasible and cost-effective." Naidoo ran his idea past two of his lecturers and is being mentored by Mishra as he finalises the

design. It uses a combination of wall- or ceiling-installed lamps and occupancy detection sensors to determine if the room is vacant. It then automatically and safely switches on the UVC lights to irradiate the air and surfaces for the required amount of time, then automatically switches off for effective, economical disinfection.

His design incorporates other safety precautions such as trip switches in the event someone opens the door to enter the room. This prevents their exposure to the harmful light. "This solution requires no operational labour, which makes it easy to use and means no one needs to touch the surfaces, so cleaning staff won't be in danger of being exposed to surfaces contaminated by viruses by physically having to clean these with chemical disinfectant."

Naidoo's system will also disinfect the air, reducing the spread of airborne illnesses such as the common cold, influenza and tuberculosis. "This is especially important in confined spaces with many people, such as lecture venues," he notes. In this way, Naidoo envisages fewer disruptions to the academic programme when students and staff get sick.

"Practically, the lights can be used to disinfect lecture venues before and after each lecture, with similar applications to cinema theatres, classrooms, labs, toilets, etc."

Another way Naidoo envisages his smart UVC system being used as a defence against COVID-19 is by disinfecting face masks. "This will address the issue of insufficient face masks and is a more sustainable solution to simply producing more and more single-use masks."

It has put Naidoo's initial early time in lockdown, before the university switched to online teaching, to good use too. But he misses the contact and vibe of campus. "I'm in an off-campus accommodation in Cape Town. It's been difficult to readjust and maintain focus, so I've been reminding myself of current deadlines, making my own deadlines and generally reminding myself of my goals," he said.

"I've recently been encouraged by the quote 'Don't count the days, make the days count' by Muhammad Ali, which is particularly relevant these days!"
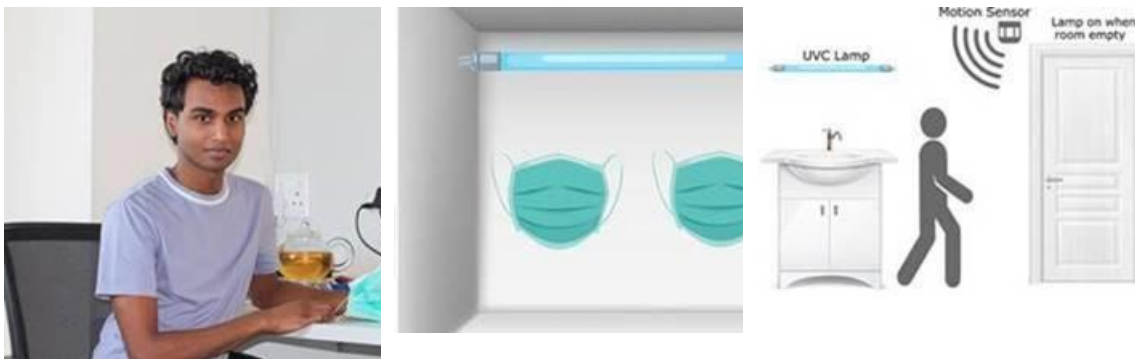

Photo Captions:

1. UCT electrical engineering student Rowyn Naidoo ([Download high-res photo](#))
2. Sterilising face masks for reuse ([Download high-res photo](#))
3. Optimised disinfection on a larger scale, such as entire rooms or lecture venues. ([Download high-res photo](#))

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