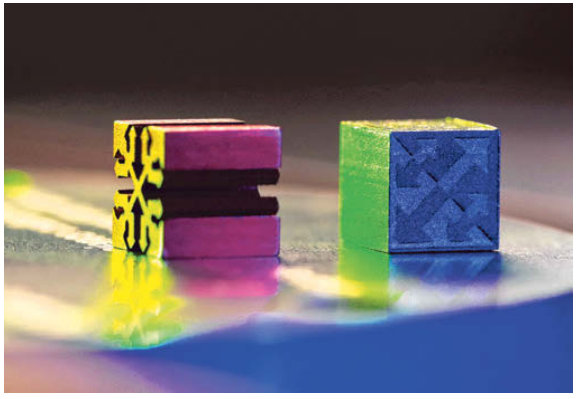
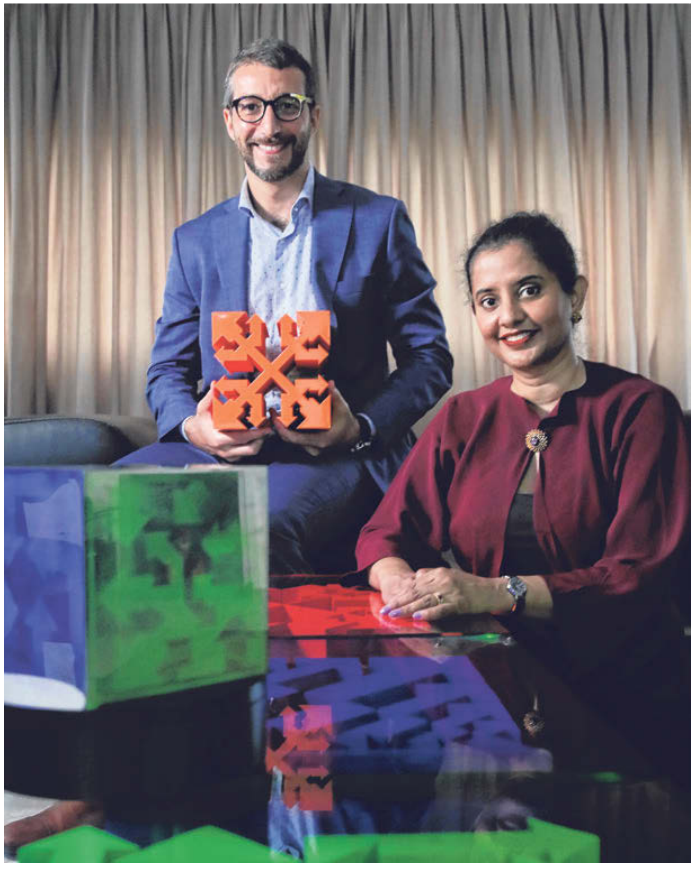


Both the Cube Of Interaction (left) and the 3D-printed Structure & Reflectance cube are part of the extraterrestrial art gallery. Four of the faces of the 3D-printed cube, which is smaller than a standard dice, depict a unique series of patterns recreated from Ms Lakshmi Mohanbabu's paintings.

# Singapore architect's 3D-printed cube heading to the Moon



Local architect and designer Lakshmi Mohanbabu collaborated with Dr Matteo Seita from Nanyang Technological University's School of Mechanical and Aerospace Engineering for the 3D-printed Structure & Reflectance cube (model seen in foreground). Dr Seita is holding a model of the Cube Of Interaction, another artwork by Ms Lakshmi that is also part of the Moon Gallery. ST PHOTOS: GIN TAY

## It is one of her two submissions for the first permanent extraterrestrial art gallery – set to land there by 2025

**Cheryl Tan**

An intricately designed 3D-printed cube, which represents the melding of art and science, is one of the Republic's contributions to an exhibit that mankind will be sending to the Moon.

The cube, named Structure & Reflectance, is smaller than a standard dice – measuring 0.98cm on each side – with four of its faces depicting a unique series of patterns.

It is among a hundred artworks selected by the Moon Gallery Foundation, based in the Netherlands, as the first permanent extraterrestrial art gallery, which is set to land on the Moon by 2025.

The art gallery, which is in the form of a 10cm-by-10cm tray that is 1cm deep, will be on board a test flight to the International Space Station – the final frontier of human habitat in space – via the NG-17 rocket as part of a Northrop Grumman Cygnus resupply mission in February next year.

On its return flight, the Moon Gallery will become a part of the NanoLab technical payload, a module for space research experiments.

The 3D-printed cube was a collaboration between local architect and designer Lakshmi Mohanbabu and Dr Matteo Seita from Nanyang Technological University's (NTU) School of Mechanical and Aerospace Engineering.

Ms Lakshmi also submitted another cube in metallic orange, known as the Cube Of Interaction, to the Moon Gallery.

This project was supported by the National Additive Manufacturing Innovation Cluster, which linked Ms Lakshmi up with scientists from different organisations to help her fabricate her designs.

The patterns seen on the faces of both cubes were recreated from Ms Lakshmi's paintings, which revolve around the concepts of unity, diversity and complexity in humankind, she told The Straits Times in an exclusive interview.

"Part of the complexity lies in the duality of people – there's the external facade which we perceive about each other, but there are parts of ourselves that we don't reveal," she said.

"In a way, the Moon has the same quality – there's the far side of the Moon that always faces away from Earth that we've never got to see, until space travel made it possible."

To create the 3D-printed cube, figuring out a way to convey these ideas using materials was the key challenge, said Dr Seita, who is also a faculty member of NTU's School of Materials Science and Engineering. "However, we soon realised there is a clear parallel between materials and people, in that they are both made of very complex – and mostly hidden – structures."

For instance, metals are made of small crystallites of different atomic lattice orientation. The crystallites may assume different shapes, sizes and orientation in different metal objects, depending on the processes used to make them, noted Dr Seita.

"Using additive manufacturing (also known as 3D printing), we're able to control those features – and thus the structure of metals – at an incredible level of detail."

Each patterned face of the cube, which is made of stainless steel, consists of two distinct crystals with different orientations, and a shape that mimics Ms Lakshmi's artwork. When viewed from certain angles in coloured light, these patterns come to life.

"It's the idea of perspective. The cube is able to take on the different colours shown on it – much like how people see things with different coloured lenses," she said.

Creating the small, intricate cube also showed the potential applications of 3D printing technology.

"We're now able to create objects with both complex geometry and complex structure, which would be impossible to make with any other manufacturing process," said Dr Seita.

These capabilities could be used to produce parts using much less material – such that they are more lightweight, with improved durability and strength compared with when manufactured conventionally.

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