



The 'smart' device includes a transparent dome-shaped cover for protection against environmental conditions | Photo source NTU Singapore

Innovation > Agriculture & Energy > Smart solar device lights underground work and living spaces

## SMART SOLAR DEVICE LIGHTS UNDERGROUND WORK AND LIVING SPACES



AGRICULTURE & ENERGY

### Researchers have developed a device that can harvest daylight and relay it to underground spaces, reducing the energy cost of lighting them up

**Spotted:** After dark is not the only time light is needed. As we have recently highlighted, there are large-scale plans in the works to build **underground** work and living spaces. Moving some buildings underground can help save energy, free up space for nature and allow building in polluted areas. Now, a team at Nanyang Technological University, Singapore, has designed a smart device that can harvest daylight and relay it to underground spaces, reducing the energy cost of lighting them up.

The team developed a device that sits above ground. It includes an acrylic ball, a plastic optical fibre cable, light sensors and computer-assisted motors. The ball acts as a magnifying glass, bringing the sunlight into sharp focus. This focused light is collected at one end of the fibre cable and transported to light fixtures underground, where the light is emitted through the other end of the fibre.

In order to optimise the amount of sunlight received by the device, the small motors automatically adjust the position of the fibre's collecting end as the sun moves. The device was developed by Assistant Professor Yoo Seongwoo from the School of Electrical and Electronics Engineering and Dr Charu Goel, Principal Research Fellow at NTU's The Photonics Institute. It is compact enough to be mounted on a light post and can be made with off-the-shelf materials.

According to Assistant Professor Seongwoo, “Our innovation [is] potentially very easy to fabricate at scale. Due to space constraints in densely populated cities, we have intentionally designed the daylight harvesting system to be lightweight and compact. This would make it convenient for our device to be incorporated into existing infrastructure in the urban environment.”

Efficient use of solar energy is a vital component of creating more sustainable buildings and cities. Technology like that developed at NTU joins other lighting and energy innovations, including a [film](#) that converts light to clean energy and an [LED art installation](#) that helps plants grow.

### NTU Singapore scientists design 'smart' device to harvest sunlight



Written By: Lisa Magloff

**Explore more:** [Agriculture & Energy Innovations](#) | [Science Innovations](#)

6th April 2021

Email: [junn@ntu.edu.sg](mailto:junn@ntu.edu.sg)

Website: [ntu.edu.sg](http://ntu.edu.sg)

#### Takeaway:

In experiments in a pitch-black storeroom, the researchers found the device produced 230 lumens/Watt of light. This is much brighter than the 90 lumens per Watt put out by a typical LED bulb. This suggests that the device could be useful in a range of areas, including car parks and lifts. The team also points out that the device can be customised to produce more or less light by using a larger or smaller acrylic ball. The researchers are working with Singapore-based design agency Technolite to explore ways to incorporate the device into industrial projects.