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Singapore's first 3D-printed urban electric car and tilting three-wheeler ready to race

By [Lakshmi Sandhana](#)
February 4, 2015

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The NV 8 and the bullet-shaped NV 9 will both participate at the Shell Eco-marathon Asia (Photo: NTU)

[Image Gallery](#) (7 images)

A 3D-printed, partially-solar-powered, battery electric car created by students at Singapore's Nanyang Technological University (NTU) is all set to hit the racetrack at Shell's Eco-marathon Asia later this month. With a body shell comprising 150 printed parts, mounted on a carbon fiber single shell chassis, the NTU Venture (NV) 8 is an urban concept car that can reportedly achieve a top speed of about 60 km/h (37 mph). Racing in the solar prototype category will NTU's prototype three-wheeler, the NV 9.



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"We are extremely proud to have designed and assembled a 3D-printed body shell for the [NV 8] electric car, which is Singapore's first and probably Asia's first 3D-printed concept car," said Prof Ng Heong Wah, Associate Professor, School of Mechanical & Aerospace Engineering, NTU.

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The various 3D-printed parts of the lightweight plastic shell were produced using different machines at the university and by a variety of partners, making assembly a challenge. Printing and assembling the body shell alone took the students a period of three months.

The team printed an array of honeycomb shapes on the car's inside surface to stiffen the structure, making it both rigid and strong enough to withstand anticipated loads, while also making it lightweight. They also incorporated a unique joint design to hold the various parts together.

With dimensions of 3.2 x 1.3 x 1.3 m (10.5 x 4.3 x 4.3 ft), the NV 8 weighs 120 kg (265 lb) without a driver, and has an eye-catching design that features vertical opening doors. Its creators claim an estimated mileage of 425 km (264 miles) per kWh of electrical energy.



In addition to their 3D-printed urban car, the students also built a partially-solar-powered, battery electric, three-wheeled racer prototype called the NV 9, which tips the scales at about 42 kg (93 lb) without a driver and is also claimed to achieve around 425 km (264 miles) per kWh of electrical energy. The racer has a special tilting mechanism that will enable it to lean up to 40 degrees in the direction of the turn and take sharp corners with minimal speed loss.

"We took our inspiration for the tilting mechanism from motorcycle racing, where racers would lean left or right during sharp turns to maintain their handling and speed," says Winston Tan, a final-year electrical and electronic engineering student. "The resulting design looks like a fusion between a F1 race car and a glider plane, with an all surround canopy for increased visual awareness."

Both the NV 8 and the NV 9 incorporate handmade silicon solar cells along their curved surface, that are constructed in a time- and labor-intensive process. To get them to conform to the car's shape, the cells are first sliced by high speed saw into narrow strips and then wired up in series and parallel to form a module. This assembly is then sealed between transparent films for protection and curved with the aid of a mold to get the final shape.

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"For their small area, they will provide from about 50 to 100 watts (peak) of power depending on sunshine levels," Lester Kok, a media representative at NTU tells Gizmag. "This will partially power the car."

The two eco-cars were built over a total period of a year and are the result of a collaborative effort between two NTU teams consisting of 16 students. The NV 8 will compete in the Urban Concept category at Shell’s Eco-marathon Asia that takes place in Manila from February 26 to March 1, while the NV 9 will participate in the Prototype category. The teams also received help from Stratasys, Creatz3D and The Singapore-MIT Alliance for Research and Technology.

Source: [Nanyang Technological University](#)

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About the Author

When Lakshmi first encountered pig's wings in a petri dish, she realized that writing about scientists and imagineers was the perfect way to live in an expanding mind bubble. Articles for *Wired*, *BBC Online*, *New Scientist*, *The Economist* and *Fast Company* soon followed. She's currently pursuing her dream of traveling from country to country to not only ferret out cool stories but also indulge outrageously in local street foods. When not working, you'll find her either buried nose deep in a fantasy novel or trying her hand at improvisational comedy.

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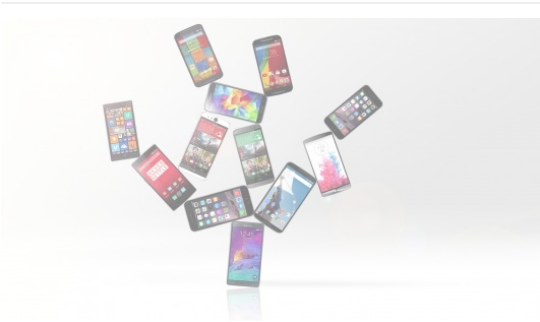
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But I guess beggars can't be choosers, eh?

Gaëtan Mahon
5th February, 2015 @ 04:19 am PST

That 3 wheeler is the vehicle of my dreams

Richard Guy
5th February, 2015 @ 06:15 am PST



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