



Press release

Munich, 18th July 2017

Students from TU Munich present new Hyperloop pod

Sleeker, lighter, faster: the WARR Hyperloop team at the Technical University of Munich (TUM) unveiled their new prototype on Tuesday. In late August, they will be showing it off at the second SpaceX Hyperloop Pod Competition in Hawthorne, California. The student engineers have their eyes firmly set on a new speed record in the SpaceX tube, which means beating their own course-best time from the first competition back in January of this year.

Elon Musk's Hyperloop concept

In 2013 Tesla and SpaceX CEO Elon Musk declared that a mode of transportation safer, faster, and cheaper than current modes had become achievable. His conceptual vehicle was an electrically driven, airtight pod, able to move at ultra-high speed through partially evacuated tubes and suitable for intercity routes that are too short for flying to be sensible. Musk created the SpaceX Hyperloop Pod Competition to build momentum and tempt engineers into designing vehicles for the test tube built by his company, SpaceX. Now in its second iteration, the competition sees international student teams pit their designs against one another. With no precedent and few rules governing the entries, Hyperloop prototyping has so far escaped constraint by convention, and we expect to again see lots of creativity the second time around.

Preparing for California

For the second iteration, the judging criteria have shifted from design and scalability of concept to speed alone. WARR's first prototype won prizes for *Fastest Pod* and *Best Performance in Flight*. Building on their past success in the speed category, in March a new WARR team—thirty students from eleven countries—passed the initial design stage with a completely new design. On Tuesday they revealed their finished prototype for the first time after months of work. The team and their pod will travel in mid-August to SpaceX headquarters, where they will attempt to post the winning time in the 1250m long test tube.

The new pod: technical details

The carefully optimized propulsion system employs a 50 kW electric motor. To better transfer power through the system, pneumatic 'muscles' press the single drive wheel down onto the rail—similar to the effect of wings on racing cars. The designers prioritized lightweight design—all of the main structural components are carbon fiber—limiting the total weight, including on-board energy storage, to 70 kg. The result is 1.5 g of acceleration and a top speed of 350 km/h.

Thirty-eight on-board sensors capture the data needed for navigation and performance analysis: everything from the pod's location to the temperatures of key components is handled by the



WARR

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sophisticated self-designed on-board computer. The electronics are not safety-critical, however, as a mechanical stabilization system ensures the pod remains centred on the rail at high speeds. The braking system uses four pneumatic brake callipers that are activated at a certain location in the tube, or automatically during in a power failure. Braking from 350 km/h takes just five seconds.

Background: the WARR success story

Almost 300 students are active in branches of space technology thanks to TUM's Scientific Workgroup for Rocketry and Spaceflight (in German: *der Wissenschaftlichen Arbeitsgruppe für Raketentechnik und Raumfahrt*, A.K.A WARR), a student organization that has brought international success and recognition. Besides the Hyperloop project—the youngest—WARR has been developing and building rockets, satellites and space elevators for over fifty years. WARR first made history in 1974 with the flight of the first German-designed hybrid-propellant rocket, and again in 2015 with the first hybrid rocket launch in Brazil.

Contact and further information

Requests should please be emailed to pr@warr.de or hyperloop@warr.de, or contact us by telephone at +49 89 28916028.

We are happy to arrange interviews. We ask you to contact the team directly at one of the above E-mail addresses, so that we can respond as promptly as possible.

Further information can be found on the following websites:

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| WARR Hyperloop project | www.hyperloop.warr.de |
| WARR student group | www.warr.de |
| SpaceX competition | www.spacex.com/hyperloop |
| Hyperloop Alpha Study | www.spacex.com/hyperloopalpha |

Our physical address is:

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Media

A selection of photo and video media from the project can be found at:

http://hyperloop.warr.de/#sec_press

Video is available in higher quality and without overlays on request.