Hyperloop: Musk unveils high-speed pneumatic transport

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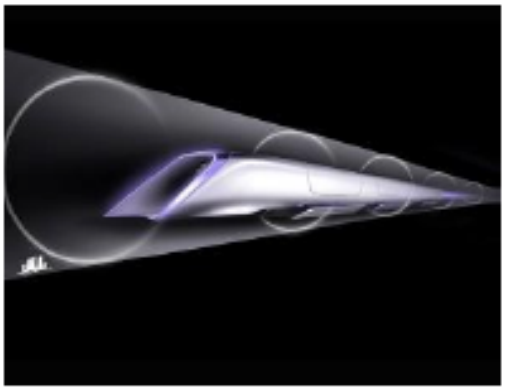
Fancy commuting into work in a narrow metal capsule that floats on air at close to the speed of sound? That's the idea behind Hyperloop, the much-hyped futuristic transport system proposed by SpaceX founder Elon Musk.



Look, no rails *(Image: Tesla Motors/AP Photo)*

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Hyperloop, finally unveiled yesterday after months of teasing and rumours, would let users travel the 610 kilometres from San Francisco to Los Angeles in just 30 minutes. Passengers and cargo would travel courtesy of a pod or capsule shooting down a low-pressure tube at around 1200 kilometres per hour.

Hyperloop will be the "fifth major mode of transportation", according to the 57-page report Musk released yesterday, after planes, trains, boats, and cars.

The basic idea is half-monorail, half-pneumatic delivery system of the kind used to move mail or packages at high speed within buildings. Musk envisages a "pod" with metal skis, enclosed within a tube where the air is at reduced pressure. A linear induction motor similar to those used on some modern roller coasters accelerates the pod up to speed. Further induction motors would give the pod occasional kicks, keeping it at a nearly constant cruising speed for most of the trip. "It would feel a lot like being on an airplane," says Musk. Passengers would embark and disembark via airlocks at stations.

Air cushion

The air within the tube is at one-thousandth of atmospheric pressure, or about one-sixth the pressure of Mars's thin atmosphere. Even at this low pressure, a build-up of air at the front of the pod would increase drag, so a fan in front of the pod sucks in the air, pressurising it and sending it into the cabin and out of tiny holes in the skis. This also allows the pod to glide through the tube on a cushion of air.

Musk has released the plans as an open-source project. He stated last week that he did not have time to devote to the project at present, but in a conference call yesterday, he said that he was coming around to the idea that one of his existing, or future, companies could take it on. "I'm tempted to make a demonstration prototype," he said. Musk estimates that it would take one or two years of dedicated work to build the prototype, and another four to five years to deploy a full-scale version between San Francisco and Los Angeles.

What is even more ambitious than Musk's proposed timeline is his estimate of the cost. He projects that Hyperloop would cost a mere $7.5 billion, about a tenth of the cost of the currently planned high speed rail corridor between the two cities. He also estimates that a ticket for a one-way Hyperloop trip could cost as little as $20, about half what high-speed rail service is likely to charge. Such modest costs are partly down to his claim that Hyperloop could generate most of the power it needs using solar panels – similar to those used at the charging stations for the electric cars made by Musk's Tesla Motors – on top of the tube.

Earthquake-proof

Most transport engineers and physicists contacted by *New Scientist* were unwilling to comment on the design without a closer look at the specifications. But some did have a view on whether Hyperloop would be able to handle the earthquakes that periodically shake California.

Musk claims that Hyperloop can easily and cheaply be made earthquake-resistant. Others agree that it won't be hard, but are less sure about the price tag. "Given the right amount of money, we can design almost anything to sustain earthquake loading," says Scott Brandenberg, an earthquake engineering expert at UCLA. "But the question is how much does it cost?"