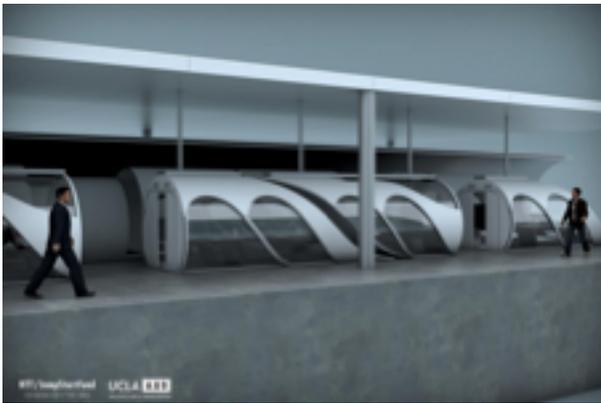


WIRED

These Dreamers Are Actually Making Progress Building Elon's Hyperloop

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When Elon Musk unveiled his idea for the Hyperloop in August of 2013, no one seemed sure what the next step would be. The Tesla Motors and SpaceX CEO [dropped a 57-page alpha white paper](#) on us, noting he didn't really have the time to build a revolutionary transit system that would shoot pods full of people around the country in above-ground tubes at 800 mph.

Fortunately for futurists and people who enjoy picking apart complicated plans, an El Segundo, California-based startup has taken Musk up on his challenge to develop and build the Hyperloop. JumpStartFund combines elements of crowdfunding and crowd-sourcing—bringing money and ideas in from all over

the place—to take ambitious ideas and move them toward reality.

When Musk proposed his idea, JumpStartFund was fresh off its beta launch, and taking on the Hyperloop seemed like the perfect way to test the company's approach (and drum up headlines), says CEO Dirk Ahlborn. So they reached out to SpaceX, proposed the project on their online platform, and created a subsidiary company to get to work: Hyperloop Transportation Technologies, Inc.

The incorporated entity has a fancy name and all, but it's less a standard company than a group of about 100 engineers all over the country who spend their free time spitballing ideas in exchange for stock options. That said, this isn't a [Subreddit trying to solve the Boston Marathon bombing](#). These gals and guys applied for the right to work on the project (another 100 or so were rejected) and nearly all of them have day jobs at companies like Boeing, NASA, Yahoo!, Airbus, SpaceX, and Salesforce. They're smart. And they're organized.

The team is split into working groups, based on their interests and skills, that cover various aspects of the massive project, including route planning, capsule design, and cost analysis. They work mostly over email, with weekly discussions of their progress. Hierarchy is minimal, but leaders have naturally emerged, says Ahlborn. And if a decision needs to be made, as CEO, he makes the call.

A lot of the work is being done by 25 UCLA students. The school's SUPRASTUDIO design and architecture program partnered with JumpStartFund, and now the students are working on all the design solutions the new transit system would require.

Ahlborn doesn't expect to have the technical feasibility study finished until mid-2015, but he decided to show off what his team has done so far to coincide with the midterm break of the design group at UCLA. So far, the team has made progress in three main areas: the capsules, the stations, and the route.

Here's what we know so far about the Hyperloop JumpStartFund wants to build.

The Route

The group working on finding a suitable route used algorithms that account for things like existing buildings, roads, and geography, and optimize the path for speed and comfort. That means keeping the line as straight as possible. Like in a plane, high speeds alone don't lead to nausea, but if you start turning, you feel the g-forces. The route won't be completely smooth, Ahlborn says, but contrary to [the claim of one transportation blogger](#), "I don't think it's a barf ride." Musk's proposed Hyperloop route running from San Francisco to Los Angeles came under a lot of criticism: What about earthquakes? Right of way? Crossing the San Francisco Bay? How will you avoid the political struggles that have made the region's in-development high-speed rail system something of a punch line? Ahlborn has the answer: Pick a different route. Los Angeles to Las Vegas is being considered, as are other parts of the US and the world. "We would love to see LA to San Francisco, but our primary goal is to build the Hyperloop." Yes, there are political hurdles. But not everywhere. Not in Dubai.

The UCLA students working on potential routes imagine networks criss-crossing the country, as well as Europe and Asia. This is where things get fanciful: we're at least 10 years away from a commercially viable Hyperloop, and the idea of a national network is hard to imagine. They tacked on the idea of a "Mini Hyperloop," which would offer shorter routes into and around cities.

The Capsules

The team had to make a few changes to the capsules Musk proposed. The Tesla CEO suggested doors that would open upward, but Ahlborn says that's hard to do, since the low-pressure environment of the tube requires fairly heavy doors. So the team decided on what it calls a "bubble strategy." There's the swanky capsule, the one with fancy doors and windows, that pulls into the station. It's the "bubble." Passengers get in, and that capsule enters an outer shell as it's loaded into the tube. The outer shell is built to handle the ride, and has the air compressor and other needed bits.

Don't expect the Hyperloop to end the struggle between the bourgeoisie and proletariat: in addition to capsules made for freight, there will be economy class, and a roomier business class.

The Stations

As the UCLA students imagine it, a passenger would arrive at a station and drop her luggage off with a Kiva robot (the kind [Amazon uses in its warehouse](#)). She would pass through security on what seems to be a moving sidewalk going under a metal detector, an idea that sounds tricky when you consider how often people in airports forget to take coins or [various terrifying objects](#) out of their pockets. But once through, she would be able to kill time in the lobby doing some shopping, grabbing a bite, using the bathroom, or renting a tablet for the trip. Then she heads to her platform, gets in her assigned seat, and is whisked away.

The Hyperloop would be made of two stacked tubes, in which the capsules travel in opposite directions. When a capsule reaches a station, the bubble slides out sideways and onto the platform, and the passengers unload. Then the capsule is moved to the opposite tube and ready to get going again.

What Remains to Be Done

So JumpStartFund and the UCLA students have made good progress, but there's a lot to figure out before anyone gets to tackle the really fun parts like testing, permitting, and construction. Ahlborn says the questions of how to build the low-pressure tube and the pylons that support it have mostly been solved, and creating the capsules shouldn't be too tricky. The hard part is moving the capsules within the tube, and seeing how fast they can go. To eliminate friction in the tube, Musk proposed using a compressor to create a pocket of air under the capsule. That's the cheapest approach, Ahlborn says, but it has its drawbacks. His team is looking at the possibility of using magnetic levitation and other alternatives. "We want to find the best possible way to make this work."

"I have almost no doubt that once we are finished, once we know how we are going to build and it makes economical sense, that we will get the funds," Ahlborn says, and Musk's cost estimate of \$6-10 billion for a 400-mile stretch of Hyperloop is on point, based on the team's work.

Considering the [nonsense that's getting venture capital](#) these days, that's not a crazy thing to say, though it will require unusually patient investors. Ahlborn expects to start building the first in a series of prototypes sometime in 2015. A final product "can be built within the decade," Ahlborn says. "That's for sure."

At some point, Hyperloop Transportation Technologies will likely have to shift from this work-when-you-can-but-don't-expect-money model to something a bit more conventional with, you know, employees. But for now, it's a fitting approach: Bring in as many minds as possible to sort through the myriad questions an idea this ambitious presents. This is why Ahlborn's excited about the Hyperloop: It's a huge undertaking. That's why people like Elon Musk, he says: The dude wants to die on Mars and he's actually moving toward the awesome, if macabre, goal. "Other people work on their next app."

<http://www.wired.com/2014/12/jumpstartfund-hyperloop-elon-musk/#slide-id-1685033>