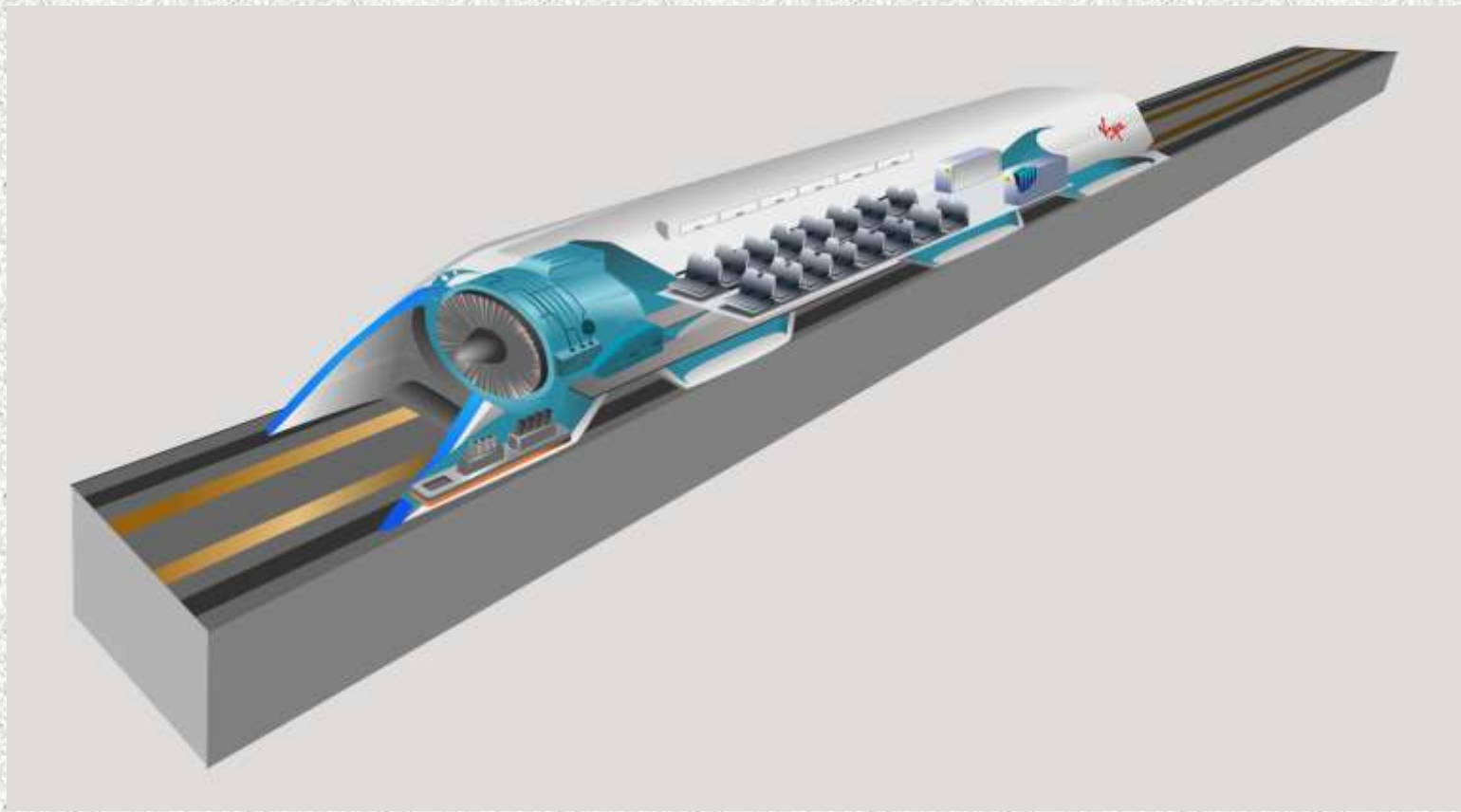
HYPERLOOP:FUTURE IN MAKING

HYPERLOOP



WHAT IS A HYPERLOOP?

- A **Hyperloop** is a proposed mode of passenger and/or freight tranportation, first used to describe an open-source vactrain design released by a joint team from tesla and spaceX Drawing heavily from Robert Goddard vactrain, a hyperloop is a sealed tube or system of tubes through which a pod may travel free of air resistance or friction conveying people or objects at high speed while being very efficient, thereby drastically reducing travel times over medium-range distances.

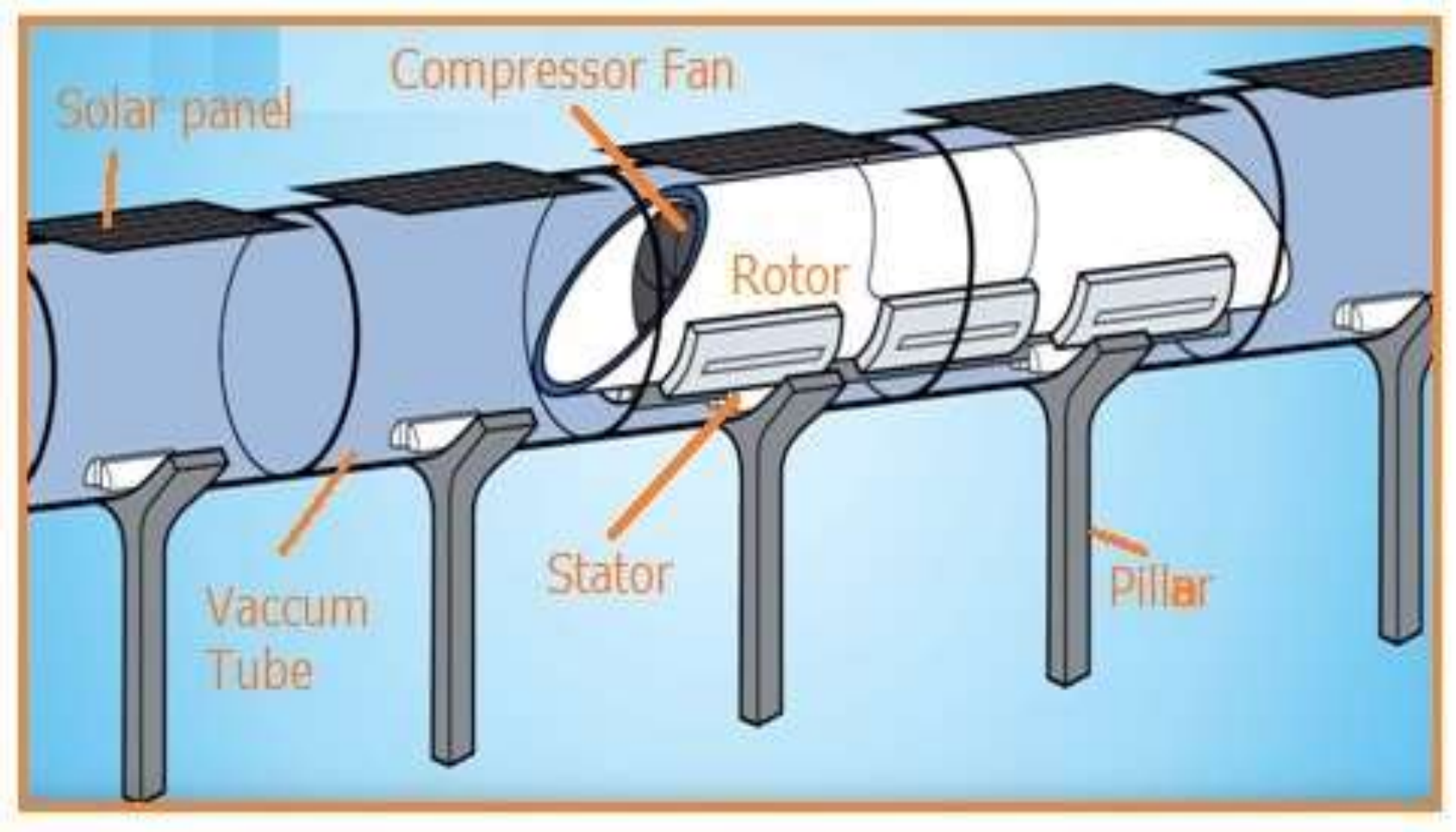
CREATORS

- IT WAS A COLLAB OF TWO VERY RENOWNED COMPANIES SPACEX AND TESLA.IT WAS THE IDEA OF ELON MUSK HIS INSPIRATION WAS ROBERT GODDARD’S VACTRAIN.

WHAT IS A VACTRAIN?

- A **vactrain** (or **vacuum tube train**) is a proposed design for very-high speed rail transportation. It is a maglev (magnetic levitation) line using partly evacuated tubes or tunnels. Reduced air resistance could permit vactrains to travel at very high (hypersonic) speeds with relatively little power—up to 6,400–8,000 km/h (4,000–5,000 mph). This is 5–6 times the speed of sound in Earth's atmosphere at sea level. Vactrains might use gravity to assist their acceleration, as in a gravity trains. If these trains achieve the predicted speeds, they could surpass aircraft as the world's fastest mode of public transportation.

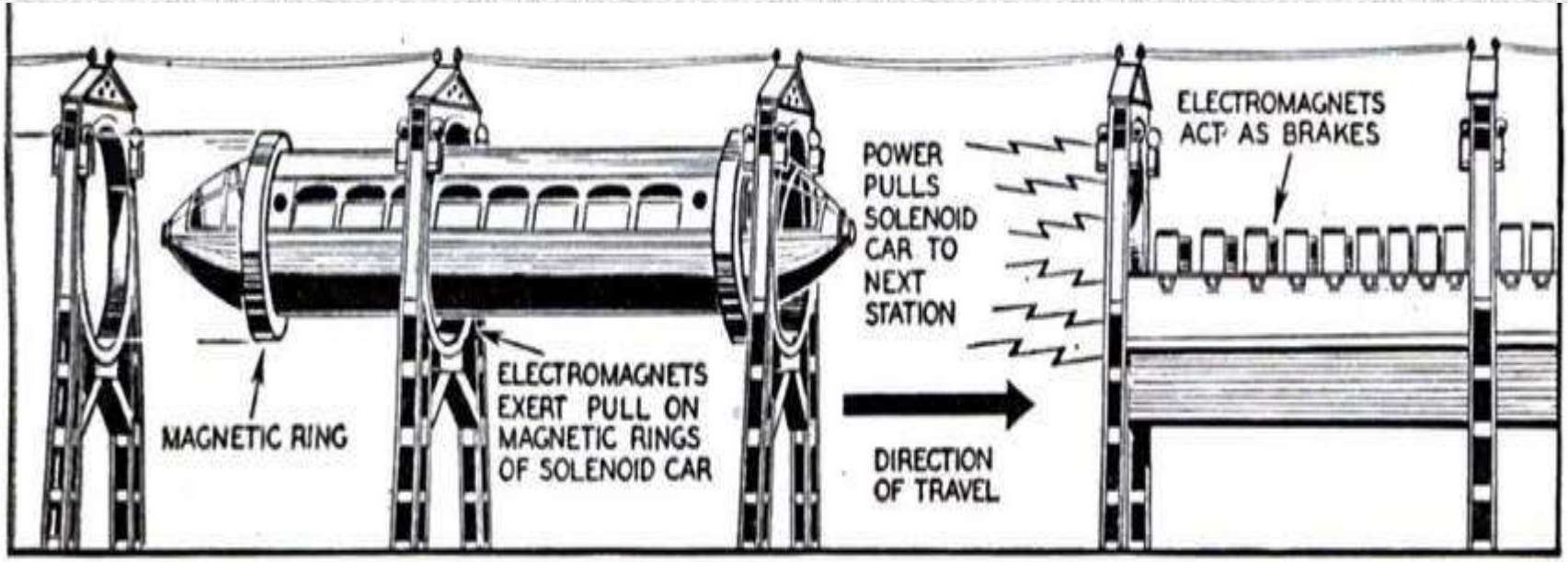
COMPONENTS


Solar panel
Compressor Fan
Rotor
Stator
Vaccum Tube
Pillar

WORKING OF A HYPERLOOP?

- The speed of conventional trains — and all land based transport — is limited by friction, both against the air ahead and the ground beneath. Hyperloop drastically reduces friction in both of these areas.
- First, the tunnels through which it operates have most of their air removed. They are not complete vacuums, but much less air means reduced friction and less energy is required to reach a higher speed. Secondly, Musk's design saw the hyperloop pods, each containing a handful of passengers, held above the ground by a layer of air, similar to how the puck of an air hockey table floats across its surface.
- Musk suggested that the power required to remove air from the tunnels and propel the pods along would come from solar panels on the roof of the tunnel. He also claimed that ticket prices for the Los Angeles to San Francisco route would be as low as $20, and the journey would take just 35 minutes

WORKING PRINCIPLE OF HYPERLOOP



The artist's drawing at top illustrates the solenoid rapid transit railway now being developed by German engineers. Cars speed forward under power of giant solenoids exerting powerful pull on magnetic rings around the cars. Current to next solenoid in line is switched on automatically when fast moving car intercepts light beam from photo electric cells. Diagram shows operation of solenoids.

BREAKING SYSTEM OF A HYPERLOOP

- The team has designed a mechanically fail-safe braking system, meaning if the actuators or computers fail, the system will brake automatically. The system utilizes non-contact braking using an array of 400+ magnets and can decelerate the pod at the 2.4G maximum permitted under SpaceX rules. From top speed, the brakes dissipate 1.5MJ of kinetic energy

BREAKING SYSTEM OF A HYPERLOOP

Pod Subsystem Design: Low Speed Braking System

- Low-speed Braking System
  - This brake is engaged when the pod is traveling at a speed of about 20 mph, below these speeds the magnetic brake does not provide enough braking force
  - To brake, the brake pads will be pressed against the surface of the horizontal guiding wheels, thus using a friction force to slow the wheels and bring the pod to a safe and complete stop

Wheel with Low-speed Brake Assemblies shown interfacing with I-beam

ADVANTAGES OF HYPERLOOP

- ➡The technology offers very fast speed of transportation which is twice that of aircraft.
  ➡It has very low power consumption.
  ➡It is low cost transportation system on long run.
  ➡It is immune to bad weather conditions.
  ➡It is resistant to earthquakes.
  ➡It is safe mode of transportation system.

DISADVANTAGES OF HYPERLOOP

- ➡High speed of capsule (almost at speed of sound) may cause dizziness to the passengers travelling due to vibration and jostling.
  ➡Initial cost of investment to have the system in place is very high. The long vacuum chamber manufacturing requires more technical skills. Moreover this is costly and also risky to maintain.
  ➡Land use rights will be concern for deployment of the project.
  ➡It has very high risk to life when something wrong happens to the system.
  ➡It has limited space in the train and hence people can not move freely.
  ➡As hyperloop uses steel for track, it expands and changes shape when outside temperature is changed. This may destroy the track of hyperloop technology. This needs to be considered while designing the system based on environment of the location where it is being deployed.
  ➡The installation requires cutting of large number of trees. This leads to environment loss.

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WHERE IS HYPERLOOP AT PRESENT?

- HyperloopTT says its test track will be built in two phases: a closed 320-meter system that will be operational this year, and a 1-kilometer-long full-scale system, elevated by pylons at a height of 5.8 meters to be completed in 2019. A full-scale passenger capsule, currently under construction at the company's facility in Spain, is scheduled for delivery this summer.
- That would make it the world's third hyperloop test track to date, and the first in Europe. The other two are in the US: Virgin Hyperloop One's test track is located in the desert north of Las Vegas, while Elon Musk's track is sited outside SpaceX's headquarters in Hawthorne, California.

THANK YOU