



Avishkar
Hyperloop

DEVELOPING
SCALABLE
TECHNOLOGIES FOR
INDIA'S FIRST
HYPERLOOP



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WE ARE AVISHKAR HYPERLOOP



We are an internationally proclaimed, diverse team of 50+ students hailing from all academic disciplines offered by IIT Madras working on a common thread of developing scalable technologies to realise the dream of [#IndianHyperloop](#). Started as a student team in 2017, we have proven our mettle at international competitions since the budding ages of the team.





Avishkar has been granted with a patent this year titled **"Evacuated Tube Infrastructure for Rapid Transportation"** on optimizing the tube design and hence, the cost.

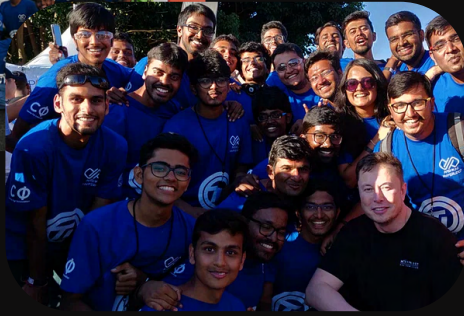
We have also been granted a patent titled **"Magnetic Track System For Levitating Vehicles"** where the track sustains the magnetic fluxes without Drag.



Our Team Interacted with the **Honorable Prime Minister Of India** at the Vande Bharat flagging off event at Chennai.

The **400m** tube facility is being built , backed by the **Indian Railway Ministry**.

EXCELLENCE IN THE INTERNATIONAL CIRCUIT



Developed an **autonomous pod** and emerged in the Top 10 in SpaceX Hyperloop Competition in 2019

2019



Emerged in **Global Top 5** in Electrical, Traction and Complete Pod categories at EHW'22

2020-21

2022



Won the **'Most Scalable Design'** award among others at EHW'21

2023



We emerged **Top-3** in the Socio-Economic Aspects of Hyperloop Development Category, **Top-5** in the Guidance Category and **Top-6** in the Sense and Control Category in the European Hyperloop Week 2023 held at Edinburgh, Scotland.

Pod 2.0

We developed India's first autonomous pod and participated in the SpaceX Hyperloop Pod Competition in Los Angeles, United States and came in **Top-10 among 1600 finalists.**



Pod 4.0 | Garv

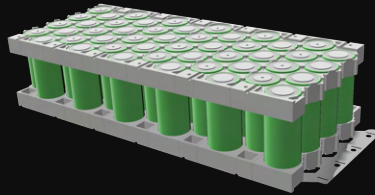
We developed the 2nd iteration of the pod amidst the pandemic incorporating **contactless propulsion and braking.**

Pod 5.0

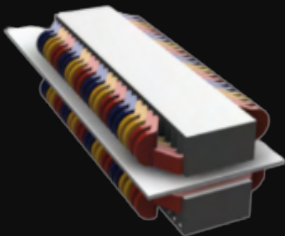
Achieved **80% efficiency at 120 kmph.** **4 kWhr** battery pack with very high volumetric energy density, in-house built. Li-Fe polymer with max discharge of **400 A.**



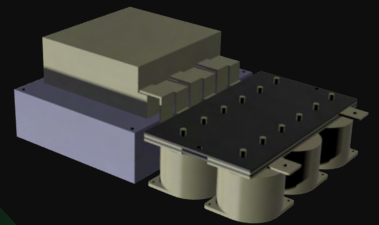
3kWh primary battery pack with
high volumetric power density
and great structural strength



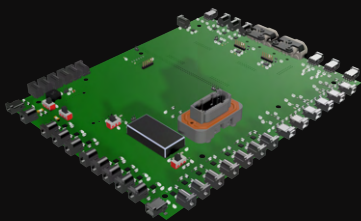
High performance DSLIM
propulsion,
where the motor brakes
the pod.



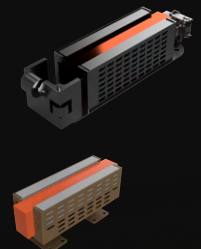
In-house built
IGBT based Inverter.



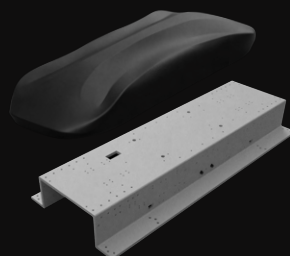
Autonomous embedded
systems capable of speed
and bi-direction control and
real-time data acquisition



EMS levitation with
lift-to-weight ratio of 8,
while being incredibly
power efficient.

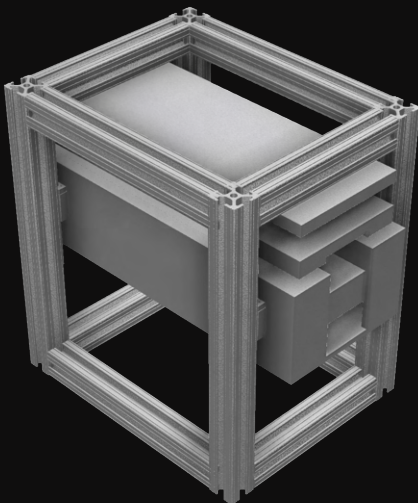
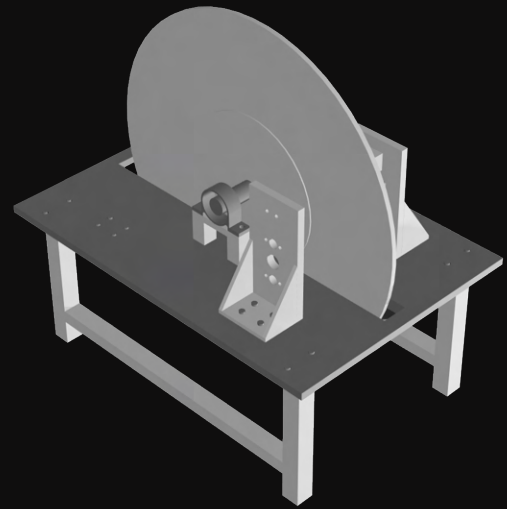


Optimised chassis and shell structure
that is lightweight, yet durable.



DSLIM Wheel Setup

The propulsion system was tested prior to its assembly on pod. This test rig was **designed completely in house**. The DSLIM was also tested on a dynamometer from which we have received various statistics to run our pod.

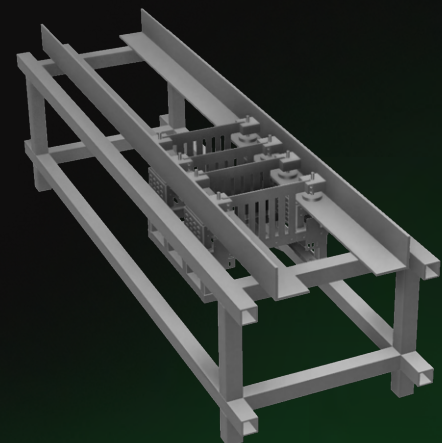


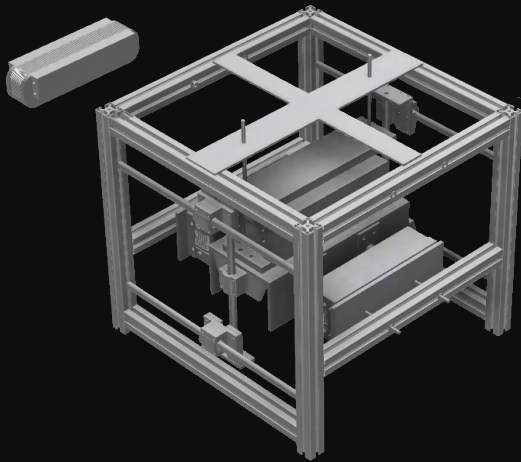
1 DOF TEST SETUP

The 1 DOF Test Setup mimics the **vertical levitation** of the pod. Such a system is the most elementary setup to study when trying to achieve levitation in a full-scale hyperloop pod.

3 DOF TEST SETUP

The 3 DOF Test Setup mimics the pod and demonstrates **stable levitation** of the actual pod within the constraints. A 2m long track has been manufactured in order to test the setup dynamically as well.



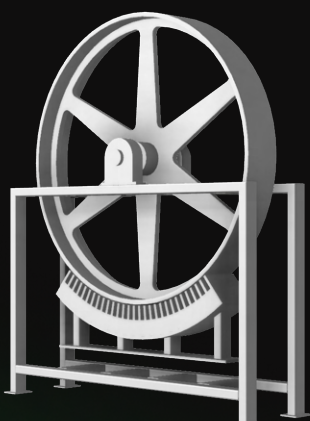
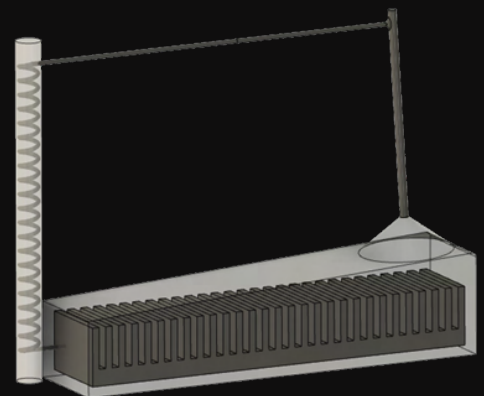


Lateral EMS Test Setup

The motivation behind this setup is to test the **Lateral suspension mechanism**, accounting for the effect of the vertical EMS, such as the lateral restoring force produced.

Immersion Cooling Test Setup

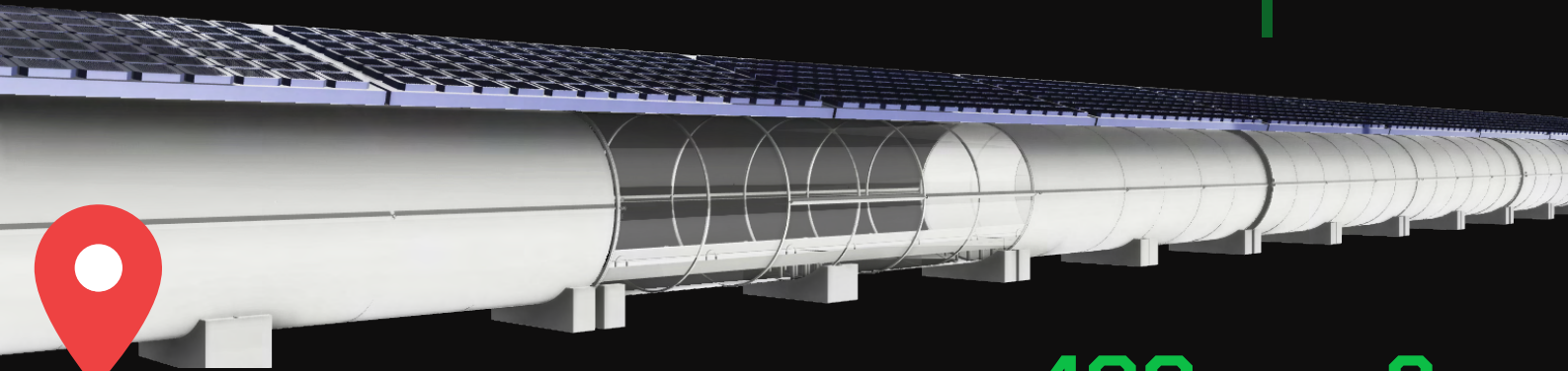
We have developed a small-scale prototype (scaled-down dimensions of primary heat source and container) to test the working of Immersion Cooling. This mini prototype is developed to test the theory and to cool the components **dissipating very high heat flux.**



SLIM Test Setup

The Single sided LIM **provides a lift force** that also helps with levitation. Such a propulsion system allows for a scalable track design conducive to turning.

WORLD'S LARGEST STUDENT-RUN HYPERLOOP TESTING FACILITY



Discovery Campus
IIT Madras

400 m
length

2 m
diameter

DESIGN VALIDATION AND PROTOTYPING

3.6 m
length

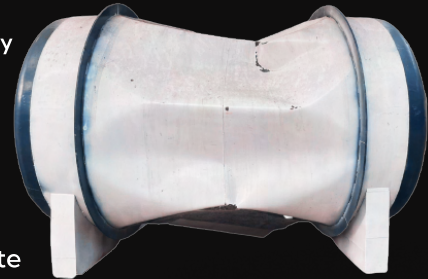
1 m
diameter



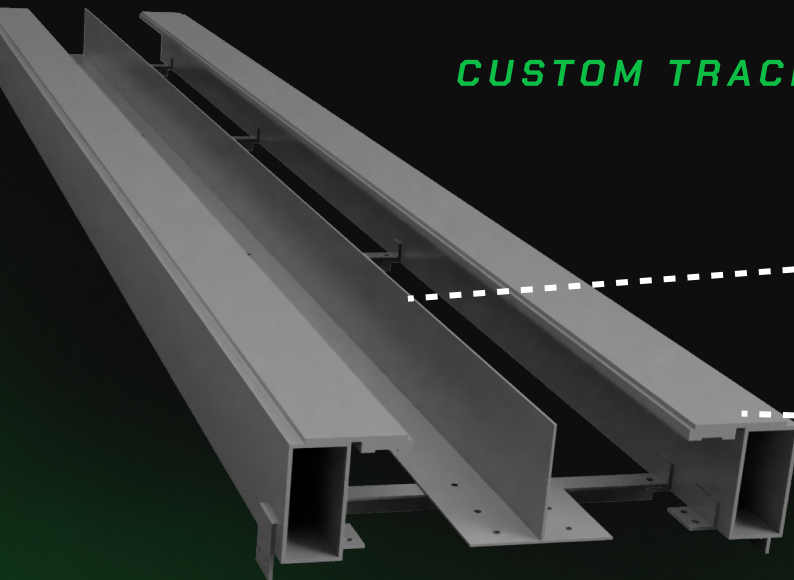
This tube was operated at pressures $< 100\text{Pa}$ validating the structural integrity of our tube design.

Buckling pressure deviation as compared to simulations **$< 5\%$** Reduced the cost by **46%**

Destructive testing of the tube prototypes was carried out to validate the **global and local buckling simulations**.



CUSTOM TRACK FOR SCALABLE DEVELOPMENT



Aluminium T-Section
for Contactless
Propulsion and Braking

Mild Steel F-Section
for Lateral and
Vertical Levitation

Our institution, the Indian Institute of Technology(IIT) Madras, has recently announced that it will be hosting the **Global Hyperloop Competition(GHC)** here at Chennai, India. Teams around the world are invited to participate in shaping the future of transportation. We are elated that our upcoming 400m tube shall be used as a key component in the competition making India a global centre for Hyperloop Research.



GLOBAL
HYPERLOOP
COMPETITION

This competition shall be jam-packed with various presentations, lecture talks, workshops with **audience from various institutions** enunciating the caricature of the Hyperloop ecosystem that shall be laid out. The competition aims to foster an **environment of collaboration**, and excellence unleashing the technical expertise to develop hyperloop technologies that are not only fast and safe but also economically viable and sustainable.

OUR PARTNERS



Avishkar Hyperloop sincerely thanks its partners for their invaluable contribution



Indian Railways



L&T Construction
Heavy Civil Infrastructure



INDIA

Scalability Partner



Creative Visual Partner



Stability Partner

FEATURED IN



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