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HYPEROPS COMPETITION

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STATEMENT OF PROBLEM

Process to manage passenger flow in a hyperloop portal while maintaining targets for level of service and passenger experience.

- Managing an off-nominal scenario and maintaining passenger flow when 2 pod bays are out of service at one time.
- Managing passenger traffic into and out of the portal via different modes of transport

OBJECTIVES

The prototype is developed to maintain the smooth flow of all the passengers in and out of the Pod keeping in mind the capacity of passengers to be shipped per hour and minimizing the waiting time of the passengers on the platform.

The system is designed such that the passenger will be automatically directed towards the Pod they can catch smoothly and comfortably without any rush.

It also helps to keep the traffic of both the stations (ie Mumbai and Pune) distributed equally amongst all the pods, so that there is no delay in transporting passengers as well as all the passengers are transported in time.

PROPOSED SOLUTION

Introduction

The solution is made considering the route of the Hyperloop to be from Mumbai to Pune with a max passenger capacity of 168 passengers in a convoy and 13 platforms in operation per side having 6 pod bays each.

<u>Detailed Overview of the Solution</u>

When the station opens in the morning, we can consider having 6 convoys at Mumbai station and 6 at Pune station which will be running at an interval of 1 minute so that the passengers coming in can board a pod according to there comfort and time they have (running pods/convoy at an interval of 1min will keep the smooth running of all the pods and making them run at different times will provide passengers coming at different times to board a pod without waiting for long).

For an example let's consider the starting time of Convoy is 5:30AM in the morning.

Then, the first pods convey will be departing at 5:36AM from Mumbai to Pune and vice-versa, and next pod after 1min interval + 6min for passengers to board the pod and get settled comfortably and so on.

Station Number	Convoy Number	Departure Time
1	1M	5:36 AM
2	2M	5:43 AM
3	3M	5:50 AM
4	4M	5:57 AM
5	5M	6:04 AM
6	6M	6:11 AM

M after the convoy number stands for **Mumbai**.

As provided in the data, seats per pod are 28 and 6 pods are there in a convoy so in a trip by a single convoy (consisting of 6 pods) it can take 28*6 = 168 passengers.

So, these 6 convoys running in 41min. will be able to transport 168*6 = 1008 passengers.

But, as the convoys will be coming from Pune with the passengers from 8:31 AM, in return trip it can transport passengers from Mumbai to Pune hence helping in increasing the passengers transported per hour.

Station Number	Convoy Number	Arrival Time	Departure Time
7	1P	6:01 AM	6:07 AM
8	2P	6:08 AM	6:14 AM
9	3P	6:15 AM	6:21 AM
10	4P	6:22 AM	6:28 AM
11	5P	6:29 AM	6:35 AM

P after the convoy number stands for **Pune**.

The passengers that can be transported from the convoys that will be coming to Mumbai from Pune in an hour are 5*168 = 840.

Hence, the total amount of passengers that can be transported in an hour from one side is 1008 + 840 = 1848.

The 6min interval time between the arrival and departure of convoy is also divided, for the smooth offboarding and onboarding of passengers for the next trip.

Time	Task
2 minutes	Offboarding of passengers
2 minutes	Onboarding of new passengers
1 minute	New passengers can settle down and make themselves comfortable.
1 minute	**BONUS TIME**
TOTAL = 6 minutes	

The Exit of the passengers will be through 3 gates that are gate A,B & C.

Gate Name	Description
A	For the passengers who want to board a taxi or just simply want to exit the station.
B	Basement Parking
C	Will lead the way to the nearest metro station.

These 3 gates A,B & C would be there at every station. For example if we are at station number 7 the exit gates would be labeled as 7A,7B and 7C.

This will hence allow smooth dispersal of the passengers.

CURRENT DEVELOPMENT STAGE

I have decided to make a portal/website to make the experience of the passengers smooth, using the website the passengers can book the ticket see which Pod they would be getting and what is time they should reach the station to catch the pod on time and smoothly.

The website/portal would be having other sections too such as **Schedule** to make the most out of it.

Tech Stack

React.js & React-Bootstrap

Figma for Ideation

Currently the static data is coded in React whereas if in future I need a strong backend and Database , I will be using **Node.js** and **MongoDB.**

Progress till now

Ideation of UI/UX part is done, the theme of the web portal and color schemes & fonts to be used are finalized.

The website work can be further divided into 2 parts that is:

1. **Frontend part** that would be developed using React, the website is designed in such a way that it would look like the extended version of original website of Virgin Hyperloop(https://virginhyperloop.com/), so that there is design similarity among the both.
2. The **Logic Part** of the site that would be holding the schedule, so that we can achieve target of running maximum pods with smooth user experience while travelling. The static data will be coded using React only, whereas in future if I come across problems where I need a strong backend and database, we can use Nodejs and MongoDB.

90% of the Frontend work is done and currently working on the Logic part and side by side researching to get the most out of the portal.

A private repo is created by me on my personal GitHub where I regularly push my changes, so that the Techfest team can refer to it in the future.

Some screenshots of the portal
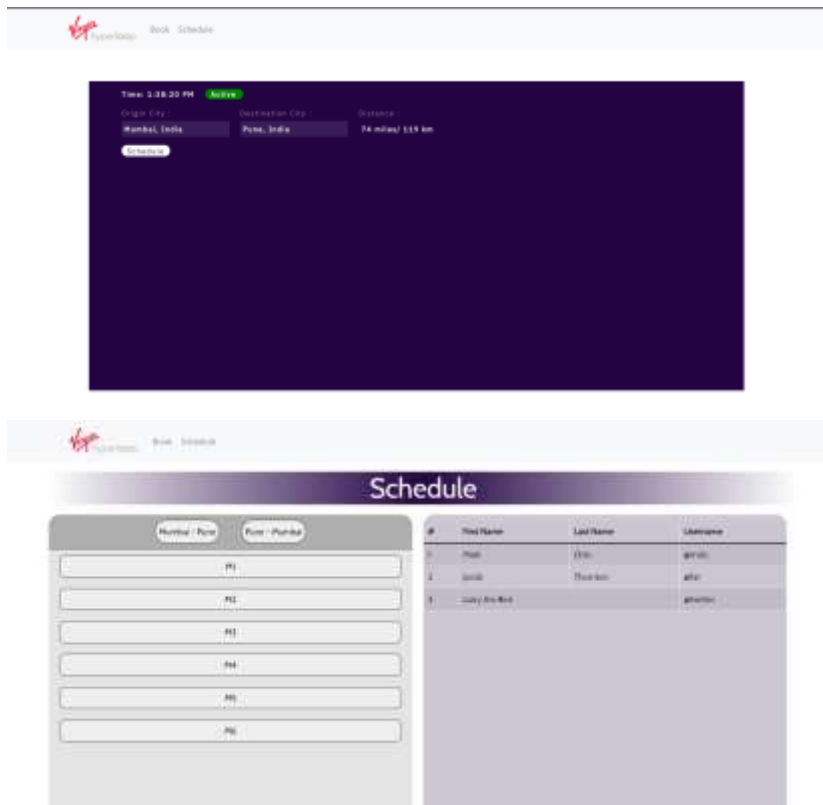
NOVELTY OF APPROACH

The solution helps in managing passengers and time in a well manner, alongside transporting maximum number of passengers possible. In the solution we have used only 12 stations that means one station is always idle to use in case of any repair service or emergency.

The solution will be able to transport 33,936 passengers every day from one side that means the total number of passengers travelling in a day in Hyperloop will be 67,872. The pods would be running continuously without any stoppage between Mumbai and Pune and none of the Pod/Hyperloop will be stationary on a station for more than 6 mins.

The halt time of 6 mins. is also divided in the chunks of (2+2+1+1) so that there won't be any crowd while entering and leaving the Pod and passenger gets adequate time to get comfortable.

The solution is made following all the points and keeping reference parameters in mind. The solution not only transport the maximum passengers but has also given importance to comfort of passengers.