



## STRUCTURE :-

The appealing structure of the **ATMAN** consist of highly advanced technology and the design is configured as may upgraded in future if the technology introduced later is better than currently using.

**ATMAN** is composed of six segments:

1. Torus
2. Torus
3. Torus
4. Torus
5. Torus
6. Central Hub
  - i. Central cylinder
    - a.Storage Units
    - b.Transportation
  - ii. Upper Thrusting Section
    - a.Two upper minor thrusters
    - b.One upper major thruster
  - iii. Lower Thrusting section
    - a.Two lower minor thrusters
    - b.One lower major thruster
  - iv.Upper Docking Section
  - v. Lower Docking Section
  - vi.Space Observatory Lab
  - vii. Reflecting Mirrors

## STRUCTURE ILLUSTRATION:-



Striking features of the ATMAN APACE SETTLEMENT gives life to mass number of Human Beings

I. The ATMAN be composed of five torus system of same minor radii which gives more space to us

- i. Torus - The most important torus in all other torus . It contains of Industries, Mining Extraction Processing Units.
- ii. Torus - This torus is consist of research labs ,Nuclear Power plant with all safety measures etc.. and the shelter will be provided to them to stay there it self .
- iii. Torus - The major torus in the settlement is also a major residential torus where the life survives mostly
- iv. Torus - This is a minor residential torus
- v. Torus - This torus is also caled as green torus because the green life is exist here ,this is a agricultural torus and our sttlement speciality was the crop based industries are built beside the fields, which gives easy access to processing of production

## II. THE CENTRAL HUB

Central Cylinder is of height 2740 meters . It is composed by storage units ,Transportation , Thrusting sections, Docking sections, space observatory lab, reflectibg mirrors, connection to torus.

i. STORAGE UNIT :-

- a) water storage :- The extracted water from martian polar ice caps are stored here, and supplied from here to all torus .



b) food storage :- The processed final food products are stored here.

c) Industrial storage :- The industries produced products are stored here.

ii. TRANSPORTATION :-

All spokes contains **MAGLEV** (magnetic levitation) type transportation and central hub consist of **MULTI DIRECTIONAL ELEVATOR** type system , It carries goods ,fuel,food..... from one torus to another and to storage units .

iii. THRUSTING SECTION :- The central hub consist of six thrusters . Four minor for side move and two major for up and down movement of the settlement .

iv. DOCKING SECTION :- We have two docking sections upper docking section is for the ships used for mining activities and the lower docking section is for the ships used for transportation,space trips etc...

v. SPACE OBSERVATORY LAB:- we have a great innovative idea –for a clear note we have to observe for a period of time, as the torus rotates we didn't get a proper observation on asteroids,planets,meteroids etc.. so we have decided to place the space observatory lab in the central hub as it not rotates.

vi. REFLECTING MIRRORS :- The major light source sun only gives light to the half part of the torus , so we provides another half part with the help of mirrors .

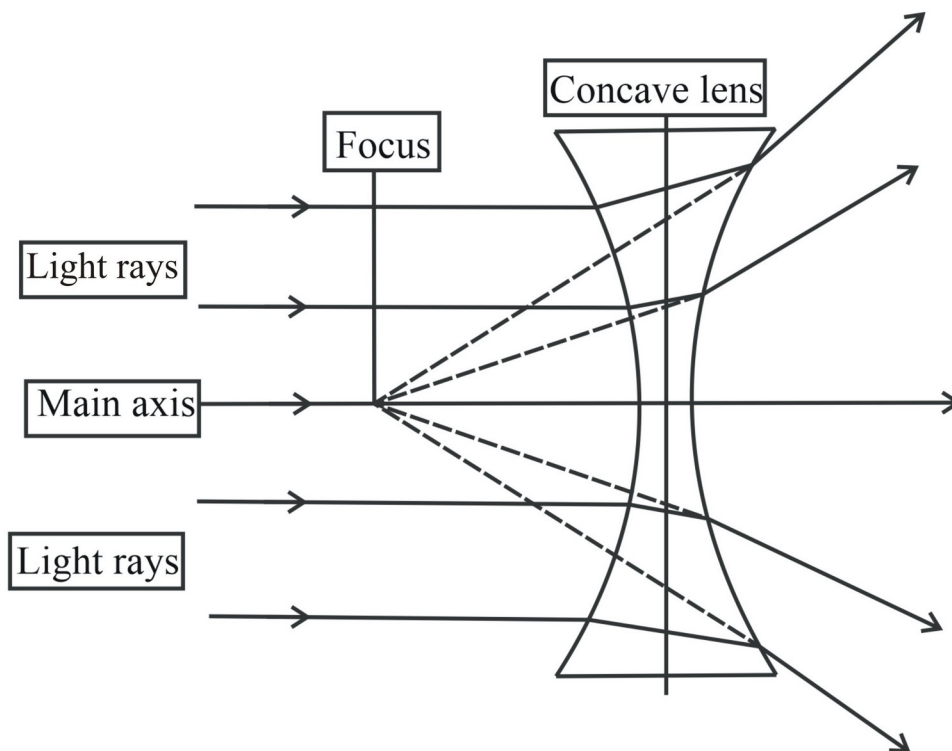
vii. CONCAVE LENS:- The lens which splits the sunlight to sides and gives natural light to the torus and . this process



reduces the usage of electricity and gives directly natural sunlight .

viii. CONNECTION TO TORUS :- the central hub is connected to torus with spokes

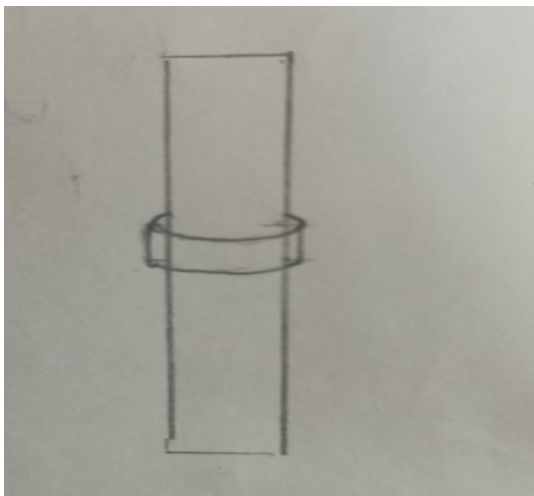
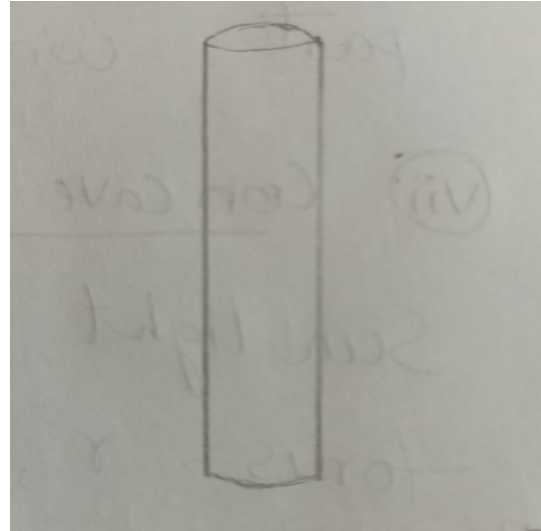
ix. OPAQUE SHEET:-This is used to cover the transparent part of torus to make day and night





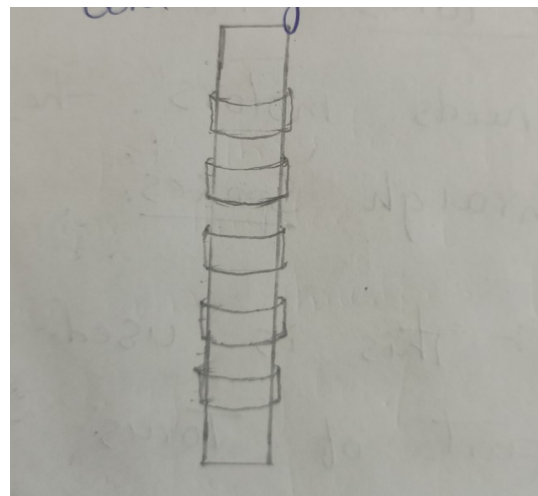
## STRUCTURE SEQUENCE

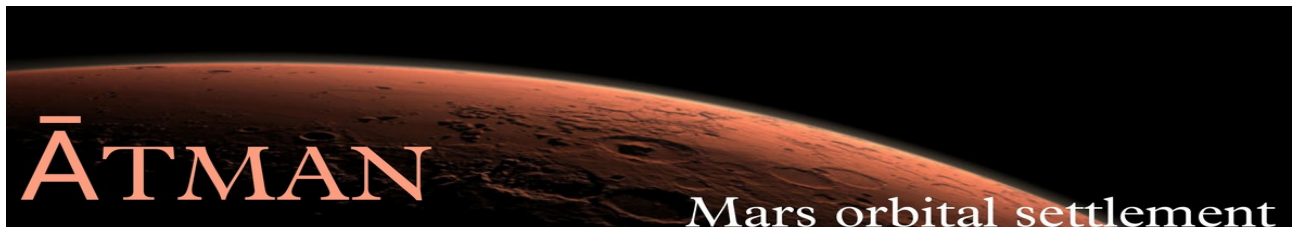
1. Firstly the central hub  
of ATMAN should build



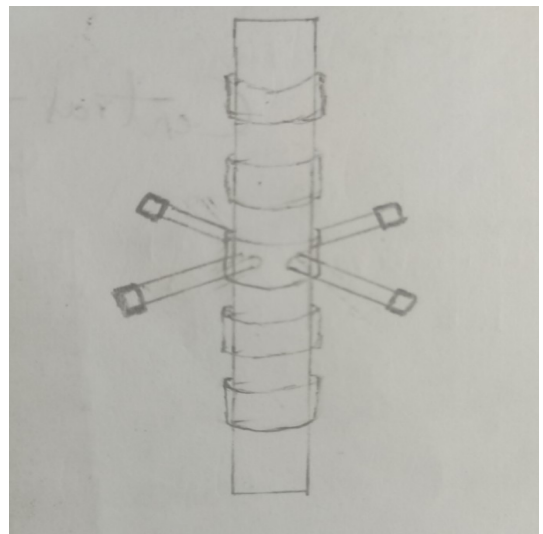
2. Next building of belt

3. completing the central hub  
by building total five belts

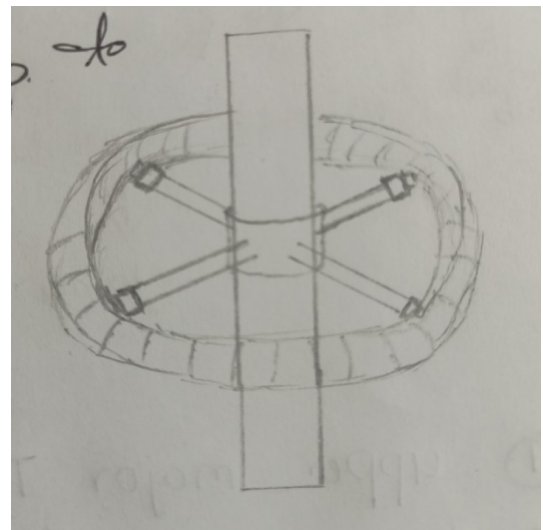




4. building up of spokes



5. next joining of spokes  
to other four belts



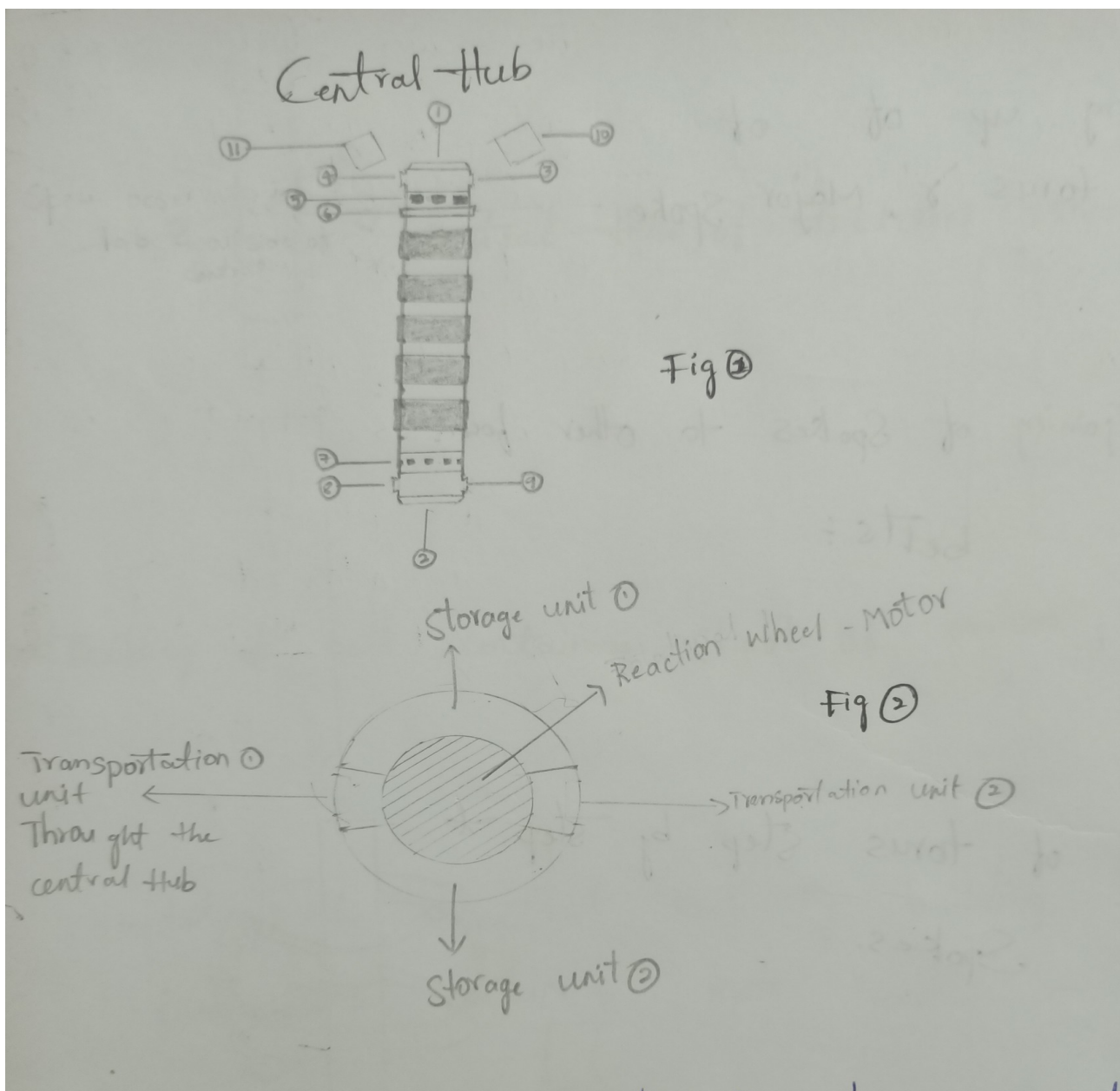
6. welding of torus step by  
step to spokes





7. welding of torus to all  
remaining torus

## CENTRAL HUB SPECIFICATIONS





1. Upper major thruster for down movement
2. lower major thruster for up movement
3. upper minor thruster for right side movement
4. upper minor thruster for left side movement
5. upper docking section for mining space ships
6. space observatory lab for a detailed observation on asteroids, meteroids, plantes.... this lab is outside of the central hub inner part of the lab is same as shown in figure \_
7. lower docking section for space crafts ,space trip ships etc..
8. lower minor thruster for left side movement
9. lower minor thruster for right side movement
10. & 11. big reflecting mirrors ,which gives sun light to the half part of torus where the sunlight doesn't falls directly





## PARAMETER OF ATMAN

Structural Component	Dimensions			Surface Area (m <sup>2</sup> )	Used Surface Area (m <sup>2</sup> )	Volume (M <sup>3</sup> )
	Major radii	Minor radii	Height			
Torus 'Z'	595M	156M	—	3660672.2 M <sup>2</sup>	<del>1663941.9 M<sup>2</sup></del> 1464268.8 M <sup>2</sup>	285552438.4 M <sup>3</sup>
Torus 'P'	990M	156M	—	6090866.4 M <sup>2</sup>	2436546.5 M <sup>2</sup>	475087586.68 M <sup>3</sup>
Torus 'Y'	1120M	156M	—	6890677.2 M <sup>2</sup>	2756270.8 M <sup>2</sup>	537472825.3 M <sup>3</sup>
Torus 'S'	990M	156M	—	6090866.4 M <sup>2</sup>	2436546.5 M <sup>2</sup>	475087586.6 M <sup>3</sup>
Torus 'Σ'	595M	156M	—	3660672.2 M <sup>2</sup>	1464268.8 M <sup>2</sup>	285552431.4 M <sup>3</sup>
CENTRAL HUB.						
Upper Docking Section	155M	—	<del>10M</del> 150M	296887 M <sup>2</sup>	296887 M <sup>2</sup>	11315775 M <sup>3</sup>
Lower Docking Section	155M	—	<del>10M</del> 110M	257951 M <sup>2</sup>	257951 M <sup>2</sup>	8298235 M <sup>3</sup>

Space Observatory lab	165M	—	10M	20724 M <sup>2</sup>	20724 M <sup>2</sup>	51810 M <sup>3</sup>
Upper Thrusting Section	<del>155M</del> <del>140M</del> 175M	—	90M	<del>202916 to</del> 258485 M <sup>2</sup>	<del>202916 to</del> 258485 M <sup>2</sup>	<del>5558960 to</del> 6789469 M <sup>3</sup>
Lower Thrusting Section	<del>155M</del> <del>140M</del> 175M	—	90M	<del>202916 to</del> 258485 M <sup>2</sup>	<del>202916 to</del> 258485 M <sup>2</sup>	<del>5558960 to</del> 6789465 M <sup>3</sup>



## ARTIFICIAL GRAVITY

Artificial Gravity is the creation of an inertial force that mimics the effects of a gravitational force, usually by rotation.

Artificial gravity, or rotational gravity, is thus the appearance of a centrifugal force in a rotating frame of reference (the transmission of centripetal acceleration via normal force in the non-rotating frame of reference), as opposed to the force experienced in linear acceleration, which by the equivalence principle is indistinguishable from gravity. In a more general sense, "artificial gravity" may also refer to the effect of linear acceleration, e.g. by means of a rocket engine .

In the context of a rotating space station, it is the radial force provided by the spacecraft's hull that acts as centripetal force. Thus, the "gravity" force felt by an object is the centrifugal force perceived in the rotating frame of reference as pointing "downwards" towards the hull.

1. Centrifugal force varies with distance: Unlike real gravity, the apparent centrifugal force felt by observers in the habitat pushes radially outward from the axis, and the centrifugal force is directly proportional to the distance from the axis of the habitat. With a small radius of rotation, a standing person's head would feel significantly less gravity than their feet. Likewise, passengers who



move in a space station experience changes in apparent weight in different parts of the body.

2.The Coriolis effect gives an apparent force that acts on objects that are moving relative to a rotating reference frame. This apparent force acts at right angles to the motion and the rotation axis and tends to curve the motion in the opposite sense to the habitat's spin. If an astronaut inside a rotating artificial gravity environment moves towards or away from the axis of rotation, they will feel a force pushing them in or against the direction of spin. These forces act on the semicircular canals of the inner ear and can cause dizziness Lengthening the period of rotation (lower spin rate) reduces the Coriolis force and its effects. It is generally believed that at 2 rpm or less, no adverse effects from the Coriolis forces will occur, although humans have been shown to adapt to rates as high as 23rpm.

3.Changes in the rotation axis or rate of a spin would cause a disturbance in the artificial gravity field and stimulate the semicircular canals . Thus, the rotation of a space station would need to be adequately stabilized, and any operations to deliberately change the rotation would need to be done slowly enough to be imperceptible.

# ĀTMAN

## Mars orbital settlement

As we know

$$F = ma \quad (1)$$

And  $F = mv^2/r \quad (2)$

Where  $m$  = mass of an object lying on the periphery of the torus

$r$  = major radius of the torus

$v$  = Velocity of the object ( $v = 2\pi r/t$ )

$t$  = time period of rotation = 61s

Therefore, equating (1) and (2)

$$mv^2/r = ma$$

$$\Rightarrow a = v^2/r$$

$$\Rightarrow a = (2\pi r/t)^2/r$$

$$\Rightarrow a = 4\pi^2 r/t^2$$

For Torus 'α' and Torus 'Σ'

$$a = 4 \times 3.14 \times 3.14 \times \frac{1120}{61^2} \times 595$$

$$a = 9.83 \text{ m/s}^2 = 1g. \quad a = 9.77$$

$$a \approx 9.8 = 1g.$$

For Torus 'β' and Torus 'δ'

$$a = 4 \times 3.14 \times 3.14 \times 990 / 63^2$$

$$a = 9.83 \text{ m/s}^2 = 1g$$

For Torus 'γ'

$$a = 4 \times 3.14 \times 3.14 \times 1120 / 67^2$$

$$a = 9.83 \text{ m/s}^2 = 1g$$





\* Torus ,Torus ,Torus ,Torus and Torus contains 1g for humans, creates earth like environment ,increases human efficiency,psychologically viable....

\*CentralHub [Zero G]

central hub has no gravity for easy storage in storage unit's,Docking Systems work best in zero G.

## TRANSPORTATION

Transportation is the activity of taking goods or people from one place to another in a vehicle

Here in ATMAN we use transportation of air,land,track and space.

**\*Internal Transportation**

**\*External transportation**

### 1. INTERNAL TRANSPORTATION

The highly advanced transportation system called hyperloop is cancelled because of critics quickly pounced on the project's problems and impracticals. Some argued the system would be pricier and require more energy than Musk had calculated, making the Hyper loop impractically expensive. If the hyper loop is succeed currently using Maglev may replaced as much as by hyper loop in our ATMAN Space Settlement



## **\* MAGLEV**

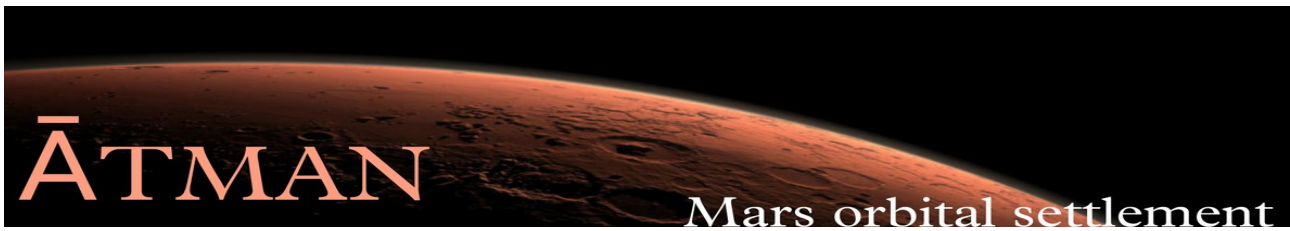
Maglev (derived from *magnetic levitation*), is a system of train transportation that uses two sets of ELECTROMAGNETS. Here we in ATMAN Space Settlement uses maglev for people transportation and goods also throughout the torus and trough spokes.

Two sets of Electromagnets:-

one set to repel and push the train up off the track, and another set to move the elevated train ahead, taking advantage of the lack of friction . Such trains rise approximately 10 centimetres (3.9in) off the track. There are both high speed, intercity maglev systems (over 400km/h or 250mph), and low speed, urban maglev systems (80–200km/h or 50–124mph) being built and under construction and development.

With maglev technology, the train travels along a guideway of electromagnets which control the train's stability and speed





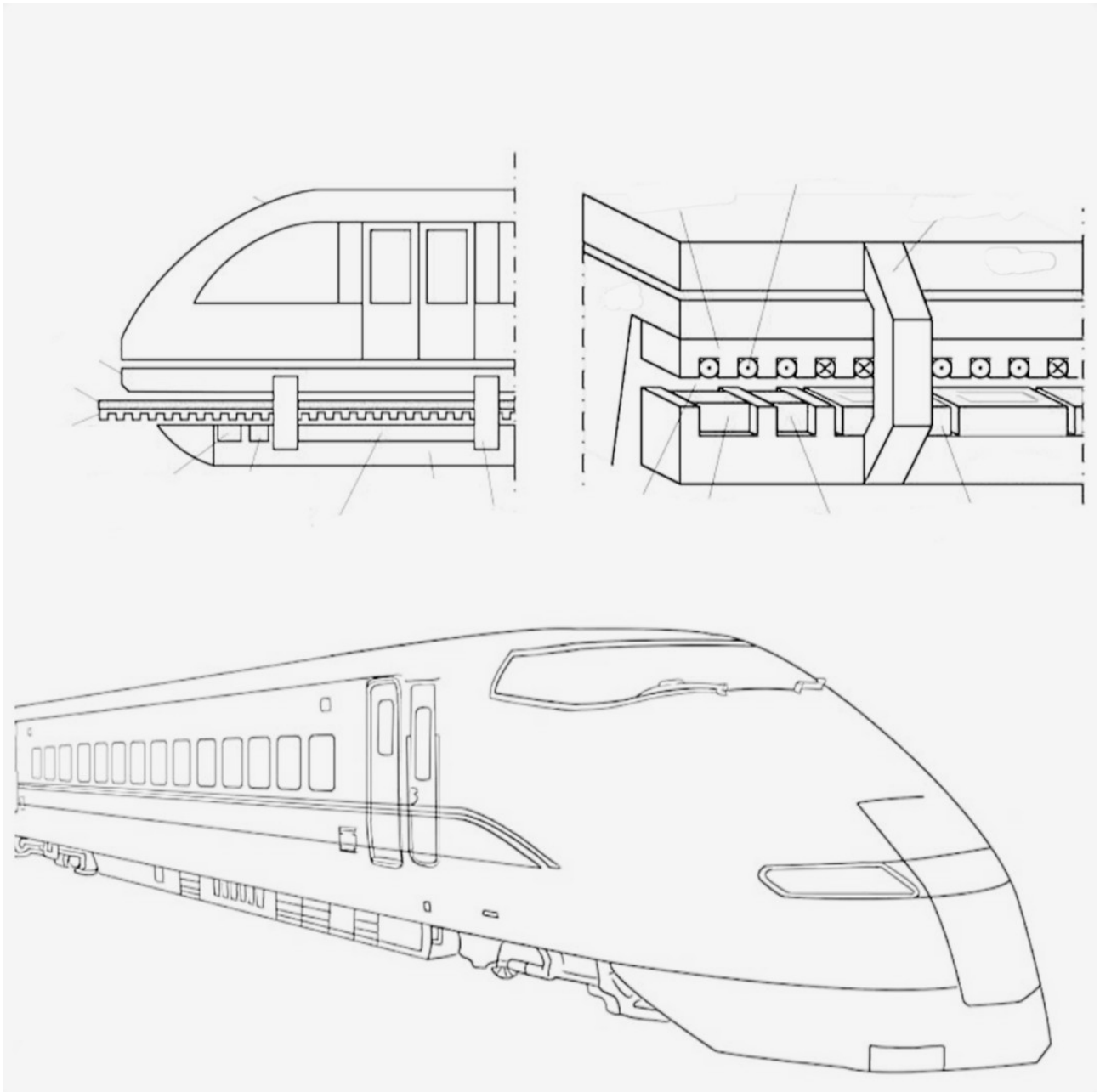
## **\*SMART BICYCLES**

Researchers have developed an autonomous bicycle that can respond to voice commands due to a neuromorphic chip. In addition to recognizing voice commands, this chip includes hundreds of thousands of sensors that help the bike avoid obstacles and maintain balance. This Bicycles works as a physical activity to the residents of ATMAN

## **#\_MULTI DIRECTIONAL ELEVATOR**

With increase in population and restriction in space the need for tall building has increased exponentially. However current elevator technology interfere the efficient construction and use of skyscrapers. This review paper discuss about the working of rope free multi-directional elevator which could move both in horizontal and vertical direction. This multi system elevator are powered by electromagnetic induction system as a result magnetic levitation system which help the elevator car to move sideways as well in upward and downward direction. This technique eliminate the limitation caused by rope, which restrict building height and slow down the elevator car. It also reduces waiting time, optimizes cost and increase energy efficiency. This multi technique allows multiple elevator cars to fit into one shaft and move throughout the building in a loop. By using this technique user will experience shorter waiting time.

This transportation system is used in central hub this gives us easy access to move from one torus to another torus . And also used in malls,apartments etc.. in the Space Settlement.





## \* ENHANCED DRONES

Drone technology continues to advance rapidly, especially regarding research and development of durable and lightweight materials, payload capacities, battery power, quieter operation, georeferencing tools, and sophisticated yet easy-to-use software that monitor flights in real-time and analyzes flight data.

\* These enhanced capabilities expand the ways drones can be used for the best approach for responding to medical emergency scenarios, in our ATMAN Space Settlement.





\*This enhanced Drones or flying robots are used for agriculture and military services.

\*It also used in , traffic monitoring and weather monitoring

### **\*AERO X HAVER BIKE**

Aero x hover bike is a type of aircraft which looks like a flying bike.it is created by aerofex. It can carry up to two people's, rises up to 10 feet from ground, have weight of 785lb, length of 15 feetand travel with maximum speed of 45 miles per hour.

It is much smaller in size and safer. This is used in the agriculture field work, delivery and military services.

- Free of traffic(Time saving)
- used in racing games

## **EXTERNAL TRANSPORTATION**

The Transportiom used to go out of the settlement for mining purposes,space trips,earth visits etc....

### **SPACE CRAFTS**

A **spacecraft** is a vehicle or machine designed to fly in outer\_ space. A type of artificial satellite, spacecraft are used for a variety of purposes, including communication, Earth observation, meteorologu, navigation, space colonization, planetary\_ exploration, and transportation of humans and cargo.



- Using ion thrusters space craft's move in space.
- SUB ORBITAL SPACE FLIGHT is a type of Spacecraft used to enter in space and then return to the planet, without going out of orbit.

Space craft used for human spaceflight carry people on board as crew or passengers from start or on orbit (space stations). only, whereas those used for robotic space missions operate either autonomously or telerobotically .Robotic spacecraft are space probes

- space shuttle
- space probe
- space crafts
  - i. Crewed space craft
  - ii. uncrewed space craft