VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Yantra
A Week of Technical Innovation

SEDS VIT
Think Infinite...

APHELION
IDEATHON

@sedsvit

Important Instructions

1. You have been given 5 problem statements in this document. Out of these, you have to choose **one**, and prepare your solution document based on the same.

2. The solution document is to be submitted in PDF format within 24 hours.

3. Only **one** person from each team is required to fill the following form to submit the final solution document: https://sedsvit.in/aphelion/submission

4. You must include the following points in the title page of the solution document:
    - Team Name
    - Full Names of all the Members
    - Registration Numbers

5. If you are stating any factual data/statistics, please give suitable references.

6. Plagiarism is not allowed. If found, your submission will not be considered.

7. The file size of the solution shouldn't be larger than 10MB.

8. The solution containing these points will be preferable:
    - Background information, including existing technology for the problem selected
    - How innovative is your idea
    - Cost + feasibility
    - Sustainability
    - References

Problem Statements

1. Based on the current rate of population growth around the world, it is projected that we will face global food shortage by 2050. This shortage could be attributed to the fact that agricultural area would have decreased around the globe. One possible solution is to establish extra-terrestrial landforms for farming. Therefore, design an agricultural base outside of Earth.

2. Even in the 21st century, clean and potable water is still a luxurious commodity for many people. Likewise, for the astronauts living on the ISS, water is a scarce and valuable asset. To maintain a continuous supply of clean water, the astronauts there have established a strict routine and built an efficient water recycling facility. Taking this as an inspiration, come up with affordable solutions to manage water shortage in drought-ridden regions around the world.

3. In 1964, a soviet astronomer Nikolai Kardashev came up with an idea to classify different civilizations on the basis of their capabilities of utilizing the energy available to them. Currently, human civilization is at 0.6 on the Kardashev Scale. We will only be considered as type 1 civilization if we manage to harness the entire energy of our planet. In order to reach type 2 on the scale, we must be able to harness the entire energy of our host star, that is, the Sun. An already proposed mega structure to achieve this is the Dyson sphere. You are required to design a Dyson sphere to harness the energy of our sun. Be sure to provide the structure/design, the material that you want to use and the working principle behind your design.

4. When we think of space travel, one of the common things that people think of is feeling weightless and floating about. This condition of feeling weightless in space is referred to as microgravity (very low gravity - approaching weightlessness). However, even though it might be fun initially, prolonged exposure to microgravity can have some serious medical side effects such as loss of bone and muscle mass, redistribution of fluids, reduced ability to absorb oxygen leading to problems with the cardiovascular system, etc. Over time, these effects can compromise an astronaut's performance, which can increase the risk of them being harmed. Provide a solution that prevents or reduces these effects due to long-term stay in microgravity.

5. Space debris is rapidly becoming a major threat to all existing satellites, as well as spacecrafts that are yet to be launched into orbit. Space debris is the ‘junk’ that has been left in space due to a myriad of reasons ranging from leftover satellite machinery, failed satellites or used satellites that continue to stay in orbit. As their concentration increases, the probability of them colliding with crucial satellites such as those that monitor weather increases and in turn poses a serious threat, as this would hinder natural disaster predictions. Moreover, they always have the potential of making a re-entry into the earth’s atmosphere. Even though most of them burn up in the atmosphere, there have been cases of chunks of space junk landing in our oceans. Suggest a solution to reduce the amount and/or the impact of space debris.

All the Best!