

SPACE SYSTEMS SYMPOSIUM (D1)  
Innovative and Visionary Space Systems Concepts (1)

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ARYAVARTA – A NOVEL APPROACH TOWARDS INNOVATIVE AND EFFICIENT SPACE  
TRANSPORTATION SYSTEMS

**Abstract**

With the advancement of technology, there is a growing interest about other planets and so it would be necessary to shift the scientific analysis activities from the earth's orbit to that of other planets. The main aim of project ARYAVARTA is to shift a satellite orbit from one planet to another with the help of an Unmanned Space Vehicle (USV). For example, to shift scientific activities economically to other planets, we need to change the orbit of the satellite from earth to that of the other planet instead of sending separate space probes, as that would entail comparatively much higher cost. A solar powered USV is one that will be having ion propulsion system along with solar propulsion system. The USV, placed in rocket boosters, will be externally launched like a space shuttle to enable it to go beyond the atmospheric limit of the earth with sufficient escape velocity. Xenon cylinders attached to the USV will provide ion propulsion for furthering the mission. The USV will then be attached to the satellite revolving in the orbit of the earth. The satellite which is attached to the USV will be deorbited with the help of xenon engines, and will be shifted to another orbit of another planet/satellite. Electricity generated by solar panels, made from multicrystalline solar cells, of the USV will be stored in the USV to help the mission/operational requirements. With the help of multireflectors, the reflected solar rays will be re-concentrated to the solar panel and hence, power efficiency will increase more than twice. Solar-electromagnetic propulsion would make such a mission possible because an ion engine can run almost continuously and outperform any chemical rocket for such long flights. This project will help to achieve higher efficiency with great economy, and eliminate the need for sending extra space probes for any other mission. As xenon engine occupies lesser room than conventional engines, more compact instruments will emerge ahead resulting in the overall reduction of the size and mass of the spacecraft, and thereby further increasing efficiency of the spacecraft.