

SSPI Scholarship – Satellite Futures

Orbits are elliptical or circular in shape, with respect to that celestial objects (like natural/artificial satellites) move around another planet/s. In another word, the orbit is a gravitational (typically) elliptical path around static (may not be static compared to the whole universe) body in a vacuum. Such as earth-moon and Jupiter-Juno. Orbits were artificially defined and named by taking earth's Geo-centre as a reference. The height of the celestial body (satellite) from the surface of the earth is known as altitude. Elliptical orbit has a focal point slightly shifted to the right side of actual hallucination of the centre point. The near end (of the elliptical orbit) from the surface of the earth is known as a perigee and another far end is known as apogee. Understanding of orbital motion comes from Einstein's general theory of relativity. Additionally, Kepler's laws help to find a specific time for one orbit rotation. Types of orbits are Low Earth Orbit (LEO), Medium Earth Orbit (MEO), Geosynchronous Orbit (GEO) and Geostationary orbit (GSO). Their heights from the earth surface are 160-2000 Km, 1200 – 35790 km, 35790 Km, and 35790 Km respectively.

Space debris control and mitigation is a task which is at high priority for all nations. It is the biggest issue of security. Debris could be of the scale from a small tennis ball to a giant mountain (like Mount Everest). It could be a reason for humanity devastation same as happened for dinosaurs. The only thing, nations could do is to design such technologies in space and on ground, to destroy them before reaching on the ground and warn people in certain areas to rehabilitate to save their lives from remainder falling parts of debris. There are other ways to move space debris are snagging and relocating space junk in a safer area, pulling the debris out of the space, slowing down the speed using the power of electricity, solar sail, bursting in space to change the paths of debris and electro-dynamic debris eliminator with the help NanoSat network [1].

In 21st-century satellite developing technology is evolving dramatically and it has become a most challenging competition among the front space runners. Radio communications are not only limited to satellites and it is also used for astronomy, weather forecasting, broadcasting, mapping and so many other applications [2]. And for such applications, various frequency bands that can be used, and those all bands are designated with alphabets so that they can be easily identified. Bandwidth is directly proportional to frequency, the higher the frequency band, the wider the bandwidth will be. The magnetic waves are prone to degradation due to external factors like rain, storm and other interferences [2]. Designing the satellites (especially SmallSats) is a most popular thing and now it is becoming a domain of university engineers. Nations are keep doing experimenting by launching a bunch of satellites in space. Because of the launching of satellites very often (for various scientific experiments), their

number and size in space, congestion has become a serious issue in the lower frequency bands. New technologies are under development to investigate how to use higher bands [2].

Rockets are doing their job to launch the heavy vehicle into space along with the scientific experimental orbital satellites. After 2-3 stages rocket launches satellites into their orbit/s. Manned maneuvers are needed to leave those satellites into the correct orbit and to perform their job successfully. For example, trajectory reorientation, engine firing, terminates the started operation, re-orienting the satellite for communication link etc. Now, scientists of recent century proved that they have maneuverability for deep space contact. For example, Indian Mars mission had applied additional changes to slow down Mars orbital Mission (MOM) while entering into the Martian orbit. Same way, Juno satellite had been slow down using thruster maneuvers to let the Juno be grabbed by Jupiter's gravitational force. So, today's man is more experienced and has the ability to do the things smartly and to improve the past mistakes [3].

References

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