

Space Situational Awareness: Astrodynamics:

Design and Development of a System to Track the Resident Space Objects Visible from the UAE.

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With the rapid growth of the global space industry over the past few decades, there are a very large number of resident space objects (RSOs) that orbit the Earth at various altitudes (LEO, MEO, GEO). As more and more nations are becoming space-faring and launching all kinds of space missions, the space around the Earth is getting increasingly populated with spacecraft. In addition, there is a higher amount of space debris that detach or break off from the spacecraft in orbits. Consequently, there are higher chances of satellites crosses each other's paths or getting hit by space debris. What is needed to be done is to monitor and track the orbits of spacecraft continuously in order to see if there are chances of collision with other spacecraft or debris. This initial step can later be plugged-in to a Spacecraft Traffic Management (STM) system, which will not only monitor the spacecraft in orbit, but it also relays that information so that the possible collisions could be avoided.

Under the framework of this project, a system will be designed and developed to catalogue all of the spacecraft visible from UAE based on their orbital parameters. The system will record their rising, transit and setting times above the UAE horizon and their orbital trajectories will be analyzed and studied using Satellite Tool Kit (STK). Later on, the system will be augmented with the observations and tracking of the RSOs with the NSSTC-UAEU radio-array that is currently under development. This study will also lead to the capacity building in space mission design.

PhD Student Profile:

- MSc in Space Science, Aerospace (or at least MSc Physics with an affinity for Space Flight).
- Familiarity with a programming language (preferably Python) and database systems is desirable.
- Some experience or understanding of data analysis and interpretation would be advantageous.
- Any previous experience (e.g. Masters thesis) in Astrodynamics, orbital dynamics, system development would be a major plus.
- Proficiency in English.