PDC2025
Stellenbosch, Cape Town, South Africa

Please submit your abstract at https://iaaspace.org/pdc.

(please select the topic that best fits your abstract from the list below)
(you may also add a general comment - see end of this document)

- ☐ **Ongoing and Upcoming Mission Highlights**
- ☐ **Apophis: T-4 Years**
- ☐ **Hypothetical Asteroid Threat Exercise**
- ☐ **Key International and Policy Developments**
- ☐ **Near-Earth Object (NEO) Discovery**
- ☑ **~~NEO Characterization~~**
- ☐ **Deflection / Disruption Modeling & Testing**
- ☐ **Space Mission & Campaign Design**
- ☐ **Earth Impact Effects & Consequences**
- ☐ **Disaster Management & Impact Response**
- ☐ **Public Education and Communication**
- ☐ **The Decision to Act: Political, Legal, Social, and Economic Aspects**

Enhancing Near earth object detection and characterization by optimizing ground based technology and small satellite constellations

Mahima Gehlot[(1)]**, Sama Khanjani**[(2)]**,**
[(1)(2)]*Near Earth object Project Group, Space Generation Advisory Council,*
Schwarzenbergplatz 6, 1030 Vienna, Austria, mahima.gehlot@spacegeneration.org

Keywords: *Near Earth Object, Asteroid detection, Small Sat, Impact risk, space based telescopes, modeling, data analysis,early warning systems*

Near-Earth objects provide a considerable risk to mankind. To comprehend the issue and safeguard our planet, it is essential to monitor and advance technologies to alleviate the risk. NEOs are mineral-rich and potentially provide fresh resources for future space research missions. Monitoring Near-Earth Objects (NEOs) may enhance our understanding of solar system origin as well.
By analyzing and characterizing NEO, we may anticipate the effect and mitigate the repercussions. Larger NEOs provide a higher hazard, but smaller NEOs are more prevalent and have considerable influence. It was believed that small NEOs disintegrate while entering the atmosphere, the chelyabinsk meteor of size around 18m proves we

need to work more in detecting small NEOs. We have around 34,000 known near earth asteroids and over 120 comets still the work is far from done.

While our ground based telescopes and radars have proven success in the past, their restricted sensitivity due to climate and weather conditions and other technological restrictions makes space based technology a crucial need. With the introduction of Infrared astronomical satellite (IRAS), a joint project by NASA,UK science and research council and netherland space agency in 1986 we were able to scan 96% of our sky and also understood the importance of space based telescopes for NEOs detections. Though the telescope provides necessary support we have to consider factors like cost,scalability and potential risk of space debris and sensitivity of the instrument.

The technology of small satellites provide a good alternative to these giant space based telescopes. The project focuses on design and optimisation of small sat constellations specifically dedicated for detections and characterization of near earth objects, aiming to tackle technical challenges and potential future development. The project also emphasizes on the limitations of current ground based telescopes and radar and concentrates on optimizing and integrating their effects with small satellites.Where our major focus is on designing and optimizing the tech we have also included the constraints with cost and scalability and issues related to quick deployment while mitigating the risks associated with rising space debris and collision avoidance. The project also focuses on analyzing prior flyby missions and proposing appropriate modifications to improve research effect and enhance understanding of NEOs.

The initiative encompasses planetary defense strategy to govern operations and enhance global corporations including responsibilities of private stakeholders.