

IAF BUSINESSES AND INNOVATION SYMPOSIUM (E6)
Public-Private Partnerships: Traditional and New Space Applications (2)

Author: Mr. Alan Baral
Space Generation Advisory Council (SGAC), Nepal

Mr. Prudence AYIVI
Space Generation Advisory Council (SGAC), Benin
Mr. Oussema Jouini
Space Generation Advisory Council (SGAC), Tunisia
Mr. Sayujya Bhandari
Space Generation Advisory Council (SGAC), Nepal
Mr. David Kasibante
Space Generation Advisory Council (SGAC), Uganda
Ms. Mahima Gehlot
Space Generation Advisory Council (SGAC), India

AUTOMATED ROBOTIC FLEET FOR SUSTAINABLE EXTRACTION OF WATER RESOURCE
FROM NEAR-EARTH ASTEROIDS

Abstract

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Near-Earth Asteroids (NEAs) hold immense potential for humankind, offering a plethora of opportunities for industrial expansion, resource utilization, and paving the way for sustainable space exploration. This paper aims to explore the wide-ranging possibilities presented by NEAs by exploiting the potential of automated robotic fleets to extract and process water resources from Near-Earth Asteroids (NEAs). In this scenario, the establishment of industries based on Near-Earth Asteroids (NEAs) that will be operated by a fleet of automated robots is envisioned. These robots will extract and transform water and other volatile resources found on Near-Earth Asteroids, making them available for potential use in future space exploration as fuel and life support systems by breaking the extracted water down into its constituent elements, hydrogen and oxygen. Additionally, the research encompasses the identification and characterization of targeted asteroids, focusing on the potentiality of mining, further augmenting the understanding of these celestial bodies. This paper also studies the technical feasibility, outlining the challenges involved while proposing a new legal framework to solve key considerations involved in implementing this scenario. The research is predicated on the notion that mining NEAs could enhance space exploration capabilities by procuring essential materials directly from space, thereby reducing reliance on Earth-bound supplies. The successful implementation of NEAs resource mining could represent a paradigm shift in space travel and habitation, making the vision of humanity thriving in space a closer reality.