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MISSION PLANNING AND DESIGN OF ROVERS FOR SEARCHING AND MINING OF PRECIOUS METALS ON NEA

Abstract

Researchers suggest that more than half of all humanity's gold has been extracted in past 50 years, and now the earth's richest deposits are far being depleted, and new discoveries are rare. On the contrary, some of the Near-Earth Asteroids (NEA) are found to be rich in precious metals with as much as 20 times gold ever mined on earth. These asteroids are easily approachable and mining them with today's technology can be economically feasible even for countries with a smaller economy. Resulting from this type of mining, such countries can proliferate their economic growth within the matter of some years. Therefore, this paper discusses detecting, mining, processing, storing and transporting of gold found on NEAs, briefing about the scientific and technical methods employed in detecting gold sites on an asteroid, detailing functioning of rovers in mining the gold from both surface and under the surface, explaining different processes to save maximum weight possible in storing and transporting it back to earth. The whole mining process will be controlled from a central station powered by nuclear energy, this station will have the capacity for storing gold and other metals after they have been extracted and processed. Numerous rovers mainly divided into two categories – Surface rovers and Drill rovers – will carry out the whole process of searching, extracting and bringing the gold from the previously detected sites to the processing plants at the central station. "Surface rovers" will have the facilities to dig and extract metals from top 5 feet of the surface, "Drill rovers" will aim for the rather deeper sources of gold extending to as much as 100 feet. Asteroids being micro-gravity planetoids make the task easier and intricate at the same time. Design and functioning of these rovers will be briefly explained. Possibility and feasibility of different gold processing approaches will be discussed and compared. The paper also lays down a brief sequence of events that has to happen to successfully accomplish the mission. A general approach has been employed to accomplish the mining of an asteroid to curtail the complexity involved in space missions keeping in mind the economic margins and scientific competencies of the present technology.