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WE SENT A DRONE TO MARS, BUT DID WE CHOOSE THE RIGHT ONE? AN ANALYSIS OF VARIOUS DRONE CONFIGURATIONS AND THEIR VIABILITY AND APPLICABILITY FOR MARTIAN EXPLORATION MISSIONS

Abstract

In the realm of Mars exploration, NASA's successful flight of "Ingenuity" in the Martian atmosphere marked a significant milestone. It demonstrated the feasibility of flying drones on Mars, opening up a world of new possibilities for exploration. Now is the time to consider the potential that using drones in Mars exploration could unlock.

Exploring Mars with drones could enable the exploration of zones where it's difficult for Rovers to go. This could lead to improved understanding of the planet. The idea of aerial exploration of Mars is exciting, but there are significant obstacles to overcome.

The biggest obstacles for that could be the density of the Martian atmosphere, its atmospheric conditions, limited space and weight in the launch, the absence of well-built take-off zones, and the impossibility of maintenance or evaluating and fixing problems as we do on Earth.

Considering these obstacles, the first and perhaps most important aspect for the successful completion of the mission is to choose the right drone configuration for further development.

This work will provide an analysis of the advantages and disadvantages that different drone configurations - multirotors, fixed-wings, VTOLs, and their different subtypes - could present. It will take into account the characteristics of the Martian environment, the mission objectives, and the limitations and challenges encountered during the launch process from Earth to the take-off point, as well as energy limitations.

The drone will be analyzed and evaluated in different aspects, for example aerodynamics, stability, energy consumption, autonomy, transportability, payload capacity, and other aspects that could be important for more specific missions.

This work is intended to provide an answer to the question "Which drone from those that we have on Earth could be the most useful to continue and improve Mars exploration?"