# MARS-Q: A Vertical Thrust Vehicle Capable of Planetary Reconnaissance in a Martian Atmosphere

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In recent years major advances have been made in propulsion and space exploration technology enabling the possibility for manned missions to mars. At the same time UAV technology has catapulted into the global spotlight as an effective and safe way to perform tasks too dangerous for humans. This begs the question as to whether they can be utilized together in order to enhance the operational efficiency and safety of the establishment of a Martian colony by employing UAV's to scout Martian landscape. Several designs are being investigated by NASA, JPL and ESA but none are testing the efficacy of quadcopters which are much more stable than other vertical thrust aircraft. The objective of the current experiment was to design and test the effectiveness of a UAV in a Martian environment by coupling high-speed motors, high-thrust props, and high capacity batteries typically not conducive to sustained Earth flight. The experiment involved the testing of the MARS-Q (Martian-Aerial-Rover-Scout-Quadcopter) within a vacuum chamber simulating the air density of mars. The MARS-Q was tested against a control aircraft not designed for a Martian environment. The experiment saw a significant difference between the performance of the MARS-Q and the control aircraft: the MARS-Q was able to continue flying at 28" Hg while the control drone ceased all vertical thrust at 16.5" Hg. This experiment demonstrates the efficacy of using UAV's in a Martian environment to increase operational efficiency and safety on a planet hostile to life.

**Awards Won:**

National Aeronautics and Space Administration: Second Award of $750