# Implementation of Gyroscopically Leveled Spherical Drones Optimized Through Neuro-Evolution of Augmented Topologies for Reconnaissance and Imaging of Martian Environments

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In today’s Aerospace industry, space-giant organizations use ill-suited rovers to map and inspect the expanse of Mars. In general, rovers being used are built with the traditional design of a wheel chassis supporting the bulk of the vehicle, but this does not take into account the frequent dust storms, nor the heavy winds that plague Mars. A proposed solution to this issue is the use of a gyroscopically leveled spherical drone, which can combat all of the aforementioned problems involving the environment of Mars, as well as offer the ability to deploy in groups and map large terrains at the same time both efficiently and autonomously. The design of this proposed drone utilizes an axle-driven main motor assembly, suspended inside an enclosed sphere with a mounted camera capable of turning and movement. The spherical body of the drone takes advantage of the decreased gravity, and is fully enclosed, protecting it from the recurrent dust storms of the planet. Regarding the reconnaissance element, the wireless communication devices inside the drone allow for autonomous sensory and transmission to other drones of its kind, allowing for synchronized shots using the cameras mounted on the head for detailed three-dimensional imaging. In addition to the stabilization programming, the drone uses a machine learning algorithm, applied using a fitness function and numerous neural networks, which allows for the drone to essentially optimize itself to any surface through simulation. The drone opens up new possibilities for the aerospace industry to steer away from traditional, non-efficient rover designs.

**Awards Won:**

Third Award of $1,000

International Council on Systems Engineering - INCOSE: Certificate of Honorable Mention