Mission to Mars

By: UPRA Swarmathon Team

Environmental exploration of Mar's geographical structures. Proposed autonomous reconnaissance/scouting mission for surface cave systems. Mission goals include cave exploration carried out by autonomous rovers equipped with various sensors to gather data concerning the farthest and easiest possible route available covering as much of the cave's ground as possible. Mission is purely a scouting mission. At least two rovers in total are needed to ensure a constant supply of information depending on the size of the cave and the depth and scope of exploration. Two types of rovers with different tasks are suggested: information provider and information gatherer robots. Providers will act as antennas, maintaining a constant flow of information between Gatherers, the base and orbiting satellites to minimize the loss of information and connectivity. Gatherers will used onboard sensors to gather any information about the path to be taken, how to go through it, and how to return from it. Gatherer robots will be all terrain travelers. Main onboard sensors: camera and ultrasonic.

Autonomous scouting deployment.

a) Cave entrance location is received by all robots.
b) From the base, robots navigate to cave entrance location.
c) One by one, Gatherer robots enter the cave, mapping the cave and their path.
d) Provider robots stay in strategic points outside and inside the cave, behind Gatherers.
e) When a path can no longer be found, robots retrace their steps, exiting the cave. f. Robots return to base. Mission complete.

Recovery deployment. In the event of signal or information loss that would lead to a lost or stranded robot.

a) Provider robot is notified if a Gatherer or Provider robot's location is lost.
b) Provider robot or robots travel to last known robot location.
c) Once found, Provider robots reconnect lost or stranded robot.
d) If reconnection fails, robot is abandoned.
e) Path taken is retraced and cave is exited.
f) Robots return to base. Mission complete.

Video: https://youtu.be/wNTqM4DZvew