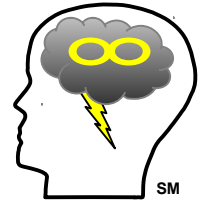


# Robust SpaceCraft Architecture (OSCAR) Mech

## A Communication of the Intractable Studies Institute

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### The Challenge

The exploration of space, planets and asteroids/comets is **hazardous** due to extreme environments. It is **IMPOSSIBLE** to design a spacecraft to prevent every possible condition that may occur. Thus many spacecraft, landers and rovers fail and are often effectively mission-ended. The high cost of these craft makes it desirable to have a robust architecture than can address and solve this challenge so that the craft can complete its mission. Examples of failure:

- The Martian rover Spirit got a wheel stuck in the sand, cannot move.
- The Rosetta Philae lander landed in shade, batteries drained rapidly.
- The ESA Beagle 2 Mars lander/rover never communicated back.

We can generalize this challenge to any remote dynamic craft, whether in space, on other planets, comets, asteroids, or even at remote Earth places.

A generic Robust Spacecraft Architecture (OSCAR) is needed that includes a fail-over mechanism to deal with all of these failures **AFTER** they happen. A key observation we make is that manned craft have human beings present as astronauts, engineers, and **mechanics** to either prevent problems or deal with the resulting problem after it happened. This pattern can be re-used with a variation where the biological human is replaced with a miniature robot.

### OSCAR Mech requirements

1. Remote Craft w/OSCAR include an autonomous "**Mech**" (mechanic) robot.
2. The primary purpose of the Mech is to fix the craft or the problem.
3. The Mech has free-roam inside, outside and away from the craft.
4. If necessary the Mech can break out of a damaged craft.
5. The craft can request the Mech to investigate or fix a problem.
6. When the craft fails to check-in at the regular interval, the Mech concludes a problem has occurred and initiates diagnosis mode.
7. The Mech can use the crafts communication system powered normally or bypass, and the Mech can use it's own separate communication system.
8. The Mech can use a laser/receiver to bypass the craft transmitter/antenna to communicate with external craft or earth.
9. The Mech has eyes, wheels, tracks, legs, arms, hands, and scales.
10. The Mech can deploy slow air bags to lift a craft up off the surface.
11. The Mech can deploy strong thin lightweight cables with anchors and use it's slow internal winch to pull or drag a craft out of danger or to sunlight.
12. The Mech has Artificial Intelligence to reason and figure out complex challenges.
13. The Mech is extremely light-weight, using a modular architecture to limit its weight/volume to what is necessary for each task. It can detach tools.
14. The Mech can deploy its own solar panels to power itself and the craft.

**Compact mode of OSCAR has all its appendages (arms, wheels) inside its can(ister). Size is 3" diameter x 5" tall and weight .5Lb.**



### Remote Craft with OSCAR Mech deployed.

