

CURIOSITY

A MARTIAN ROBOT



HOW IT WORKS

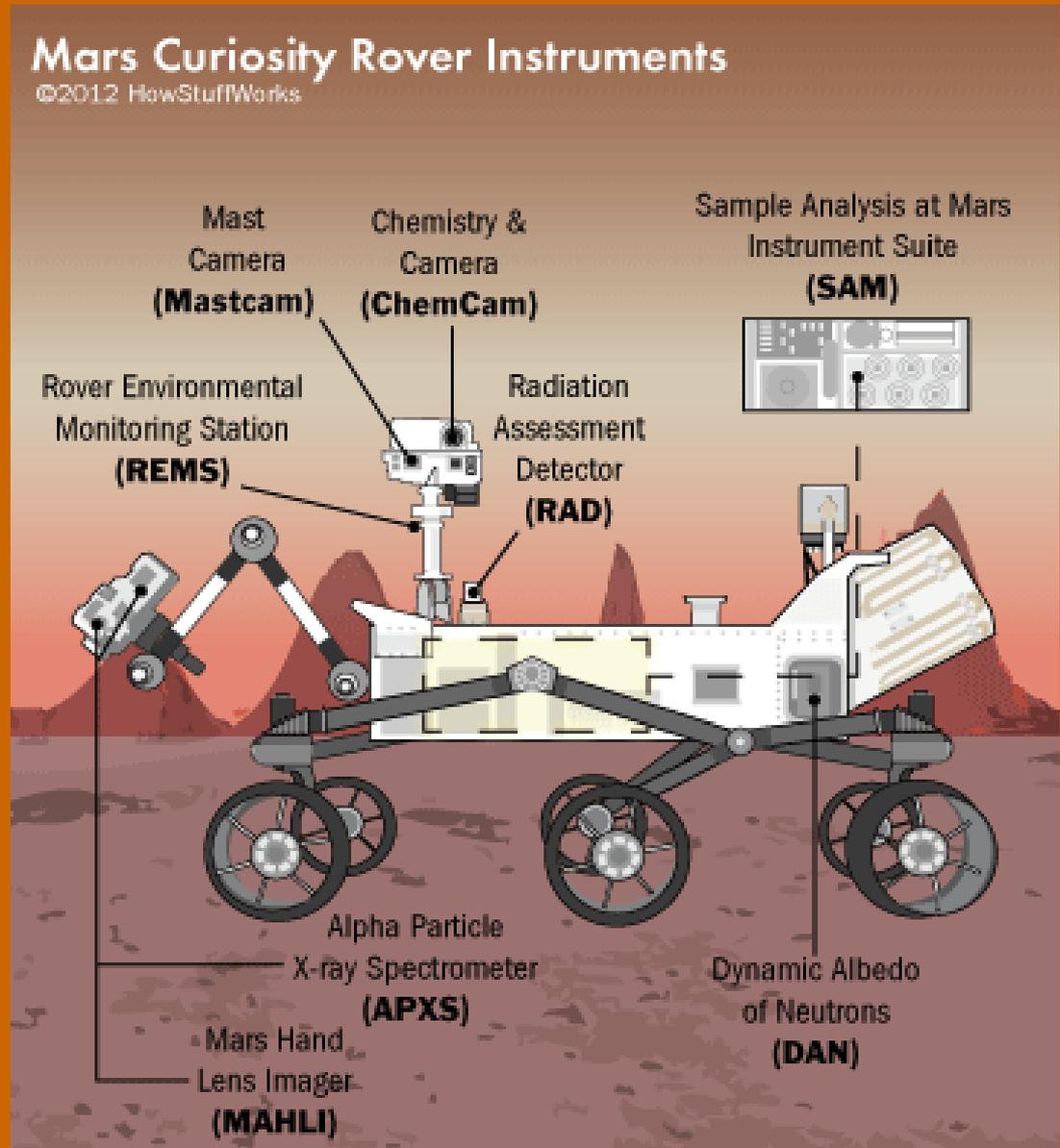
- The Mars Science Laboratory Curiosity has to investigate whether conditions exist, or have ever existed, that could support microbial life on Mars, and whether clues to such life remain preserved in Mars's rocks and soil.



• Curiosity is tasked with collecting rock and soil samples and placing them into onboard instruments for analysis. With this in mind, the rover comes equipped with a 2.1-meter camera mast and a 2-meter, three-jointed robotic arm which can scoop, dust, drill, powder, collect, sort, sieve and deliver samples.

• Located on the rover arm, the **Mars Hand Lens Imager** can photograph rocks, soil -- and, if present, ice -- in extreme close-up. This uber-camera can spot details thinner than a human hair or focus on objects more than an arm's length away.

- The **Alpha Particle X-ray Spectrometer for Mars Science Laboratory**, also located on the arm, can figure out the relative amounts of various elements present in Martian rocks and soils.
- The **Mars Science Laboratory Mast Camera (MSLMC)**, attached at human-eye height, helps the rover navigate and record its surroundings in high-resolution stereo and color stills or high-definition video. The MSLMC can view materials collected or treated by the arm.
- **Stereo hazard-avoidance cameras** located further down the mast aid the rover's navigation. Another mast-mounted instrument, **ChemCam**, can vaporize thin layers of material up to 30 feet (9 meters) away using laser pulses, then analyze them with its spectrometer. Its telescope can capture images of the beam's target area.



Beyond these sample-analysis instruments, the rover also packs scientific gadgets that will examine local conditions, which could prove relevant for future human missions or understanding the planet's capacity for supporting life:

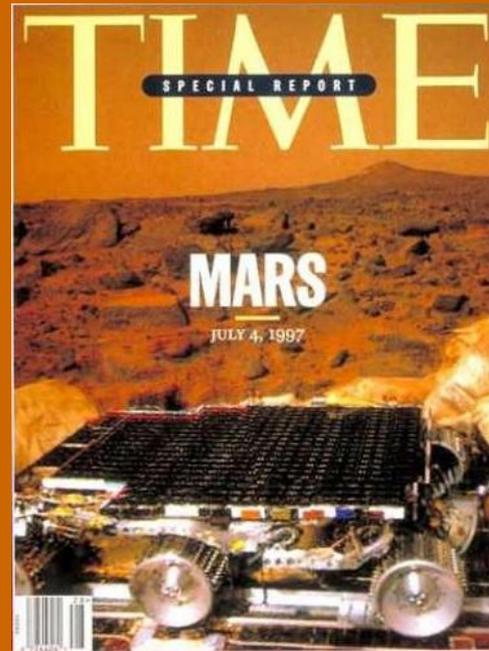
- The **Radiation Assessment Detector** monitors surface radiation levels.
- The **Rover Environmental Monitoring Station** takes readings of atmospheric pressure, temperature, humidity and wind, as well as levels of ultraviolet radiation.
- The **Dynamic Albedo of Neutrons** instrument can detect hydrogen -- a potential indicator of ice or water trapped in minerals -- up to 1 meter beneath the surface



•Curiosity pulls power from plutonium-oxide. As the radioisotope decays, it gives off heat, which the rover converts to electricity using thermocouples. This **Multi-Mission Radioisotope Thermoelectric Generator (MMRTG)** will keep the rover's battery topped off with 110 watts of electrical power.



(Spirit)



(Pathfinder)

- The system packs more power than the solar approach and has no moving parts to break, but can this generator outperform solar panels? Spirit operated until the spring of 2010, and Opportunity is still alive even having driven 34 kilometers per day. These exceptional vehicles far exceeded their 90-day mission mandates, partly because of free, renewable, solar power.
- Curiosity's system has 14-year life expectancy: Curiosity will cover more ground than its predecessors, travelling at roughly twice their speed.

Bibliography

- <http://science.howstuffworks.com/mars-curiosity-rover3.htm>



5CM - UMBERTO



Pininfarina

Istituto Tecnico Industriale Statale