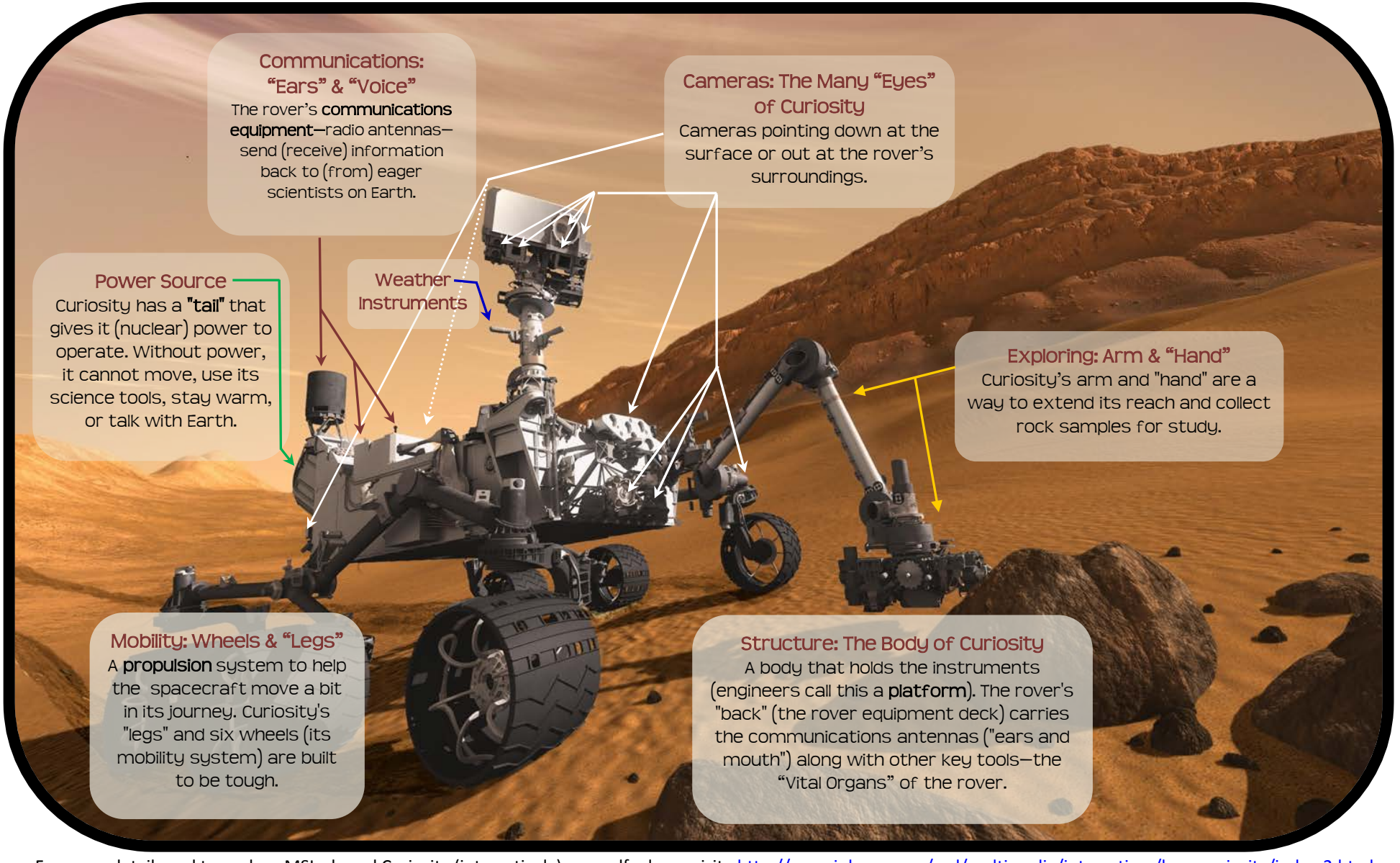
Mars Engineering: CURIOSITY



For more details and to explore MSL aboard Curiosity (interactively) yourself, please visit: http://mars.jpl.nasa.gov/msl/multimedia/interactives/learncuriosity/index-2.html

FULLY LOADED FOR SCIENCE

Mars Science Laboratory aboard the Curiosity Rover

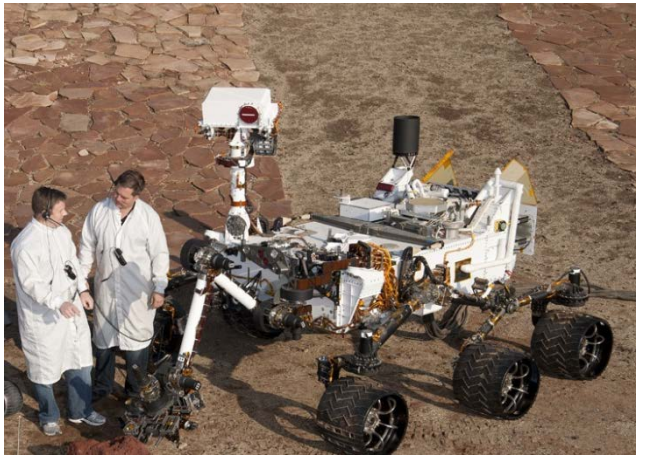


Image of the rover prior to launch (on Earth). Image Courtesy : NASA/JPL

ROBOT AS BIG AS A CAR

Curiosity is a nuclear-powered,, six-wheeled science lab the size of a Mini Cooper and weighs 1,982 pounds (899 kilograms).

Mission: To access whether the Martian environment has ever been a potential habitat for life.

Goals:

1) Assess the **biological potential** of at least one target area
2) Characterize the **geology** of the landing site
3) Investigate past **planetary processes** relevant to habitability
4) Characterize the **surface radiation** in the Mars environment

Note: While MSL **cannot** detect either present-day life or fossilized microorganisms, Curiosity's instruments are capable of verifying three conditions that would be necessary for life on Mars:

1) Liquid Water
2) Certain necessary chemical ingredients
3) An energy source

ROVER INSTRUMENTS & TOOLS

Brains, Head, & Neck

Curiosity has computers onboard to serve as its "brain" and process information. It also has a "head" and "neck" - or as scientists call it—the **mast**, which gives the rover a human-scale view. Curiosity's mast carries seven of Curiosity's seventeen camera "eyes."

Eyes

Cameras give the rover (and scientists) information about its environment and are an extremely powerful tool for the scientists back on Earth. Cameras on Curiosity's mast provide a view similar to what a nearly seven-foot-tall basketball player would see on Mars. Before deciding whether it is worth it to make the drive over to rocks and rock layers of interest, a laser on the rover's "forehead" can zap them from a distance analyze what the vapor is made of to see if they are interesting enough to study close up. Most interesting are materials that formed in water, key to life as we know it.

Ears & Voice: Communications—Can you hear me now?!

Curiosity will use its radio antenna for sending large data sets of its discoveries back to Earth. Because the rover's and orbiters' antennas are close-range, they act a little like "walky talkies" compared to the long range of the low-gain and high-gain antennas. Using orbiters to relay messages is beneficial because they are closer to the rover than the Deep Space Network (DSN) antennas on Earth and they have Earth in their field of view for much longer time periods than the rover does on the ground. That allows them to send more data back to Earth at faster rates.

Hand, Arm, & Body

Curiosity has a "hand" at the end of its jointed robotic arm called a **turret**. The turret carries a drill, a brush to remove dust, a soil scoop, a camera for close-up views, and two science tools to understand if Mars ever had habitable conditions for microbial life. One science tool can detect rocks and minerals altered by water and another is designed to detect carbon-based compounds known as organics, the chemical building blocks of life.

The rover body holds the instruments (engineers call this a platform). The rover's "back" (the rover equipment deck) carries the communications antennas ("ears" and "mouth") along with other key tools—the "vital organs" of the rover. Some of these vital parts (and a few not so vital) include: the observation tray, sundial, scientific instrumentation (which will analyze rocks and minerals), and "Send your name to Mars" chips!

Legs & Wheels (Going Mobile)

Curiosity's "legs" and six wheels (its mobility system) are built to be tough. The rover will land on its wheels and also cross potentially rugged terrain. The rocker-bogie design of the "legs" allows the rover to keep all of its wheels on the ground, even on uneven terrain.