Mars Exploration Rover

What is the rover?

The rover is a robot that was sent to Mars to collect information that proves that there was once water on Mars. NASA built the rover and programs it. It weights 384 pounds and is 5.2 feet long and has a height of 5 feet.

Why is the rover a robot?

It is a robot because the rover is given a task and through it's programming and software, it is able to complete the task by itself.

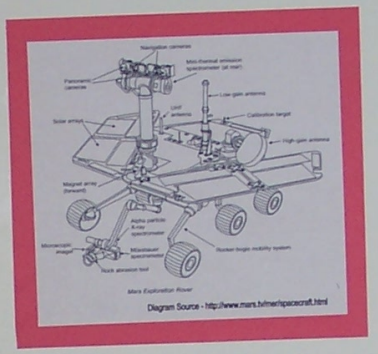

Diagram Source - http://www.mars.fvlmer/spacecraft.html

How it works: hazard avoidance software

The hazard avoidance software prevents the rover from tipping over. If the rover is tilting more than 30 degrees, the software can adjust the suspension to prevent the rover from tipping over. The hazard avoidance software also allows the rover to take the right path. After the rover moves 30 cm, the hazacams scan the area in front of the rover and determines multiple paths that the rover can take. The software tells the rover to drive the safest path.

What the rover does:

- The rover is able to self navigate through terrain on it's six wheels and suspension system.
- It can turn in place 360 degrees.
- It can collect data from rocks and sends that information back to Earth.
- It is able to prevent damage and choose the right path to take using hazard avoidance software.
- It can control the temperature around its main computer and software.
- The rover takes pictures and live video feeds.
- It supplies it's own power.

How it works: power

"The main source of power for each rover comes from a multi-panel solar array" (Beck). When the solar panels are fully illuminated, it produces 140 watts of power for four hours per Mars day. The rover needs 100 watts to drive. There are also two rechargeable batteries that provide power when the sun is not shinning or at night. Eventually, these batteries will degrade along with the solar panels that will get covered by Mars dust and the rover will not have the power needed to operate.

How it works: sight

The rover has a head that is 5 feet from the ground and in that head there are 4 cameras that take pictures and videos that are sent back to Earth.

Courtesy NASA/JPL-Caltech

How it works: movement

The rover moves on its 6 wheels. The front two and back two wheels have a motor that turns them to make the rover turn. Each wheel has it's own motor so there are 6 motors for driving and 4 for turning. This allows the rover to turn in place a full 360 degrees and enables curved turns.

How it works: data collection

The rover collects information about the surface of Mars with its four instruments that are attached to the end of its arm. The four instruments are the rock abrasion tool (RAT) used for drilling rocks and making holes, alpha particle X-ray spectrometer which determines the elemental chemistry of rocks and soils using alpha particles and X-rays, Mössbauer spectrometer that is specially designed to study iron-bearing minerals, and the microscopic imager which is a microscope and a camera. After the data has been collected from the 4 tools, the rover uses its high-gain and low-gain antennas to send the information to Earth or to an orbiting satellite that will pass the message on to Earth.

Source - www.nasa.gov/...ipl/news/mer-2007 1015 prt.htm

The unexpected:

It was predicted that the rover's power source would fail in 90 days due to the dust covering the solar panels and without the solar panels; the rover would have no power.

Five years later, missing a wheel and a few other parts, both rovers (Opportunity and Spirit) are still exploring Mars and show no signs of stopping. Some scientists say that the wind on Mars has blown the dust off the solar panels which allows the rovers to still operate.

Robot in the news by Patrick Manning

Note: Bibliographic information is on the back of this presentation board.