Making a Remote-controllable Mars Rover with the Main Functions of the Real Rovers

Rozsavolgyi, Matyas (School: Perintparti Szo-Fogado Szombathelyi Waldorf Ovoda, Altalanos Iskola, Gimnazium es Alapfoku Muveszeti Iskola)

My aim was to build a remote-controlled Mars rover based on Opportunity with similar basic functions: a special suspension, a manipulator arm that can be moved in all directions, a camera that can be rotated in arbitrary directions, and a solar-powered energy source. I also wanted it to be able to transmit audio and video to the control unit. Each part had to be easily replaceable. I didn't want it to look lifeles and I wanted to make it kind-looking, with eyes and a gaze that can express mood. I reckoned the 3D printing procedure to be the fastest and easiest way to construct the vehicle. The entire mechanical construction is unique, each component was designed by me with a 3D modeling software. I also manufactured the entire vehicle, with the exception of some pre-made components, e.g. motors, radios… Some of these components also required the design and manufacture of custom electrical circuits (e.g., blink and lighting controllers, camera movement system, and power supply). I designed the circuit boards on a computer, made the panels with a milling machine, and assembled them individually. The suspension is able to perform in extreme terrain conditions. With the manipulator arm, I can lift objects near the Mars rover, move them in the desired direction, and rotate them to a specified angle. The camera can be rotated 450 ° horizontally and moved up and down ± 50 ° relative to the horizon. In addition, it transmits video and audio in real-time to the control unit. The solar panels on the back of the rover are suitable for recharging the batteries. It also can blink with its "eyes", and it can look kind or angry. The model has many functions similar to the original Mars rover. Thanks to computer design, all its components can be reproduced at any time.

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