



A long, thin antenna picks up signals from a transmitter and relays them to the receiver on the circuit board.

An off-the-shelf microprocessor, a radio receiver, a battery, and stimulating electrodes are attached to a custom-printed circuit board and mounted on a beetle's back with beeswax.

Pulses delivered to two electrodes implanted in the insect's brain trigger and halt flight. Signals sent to electrodes implanted in the left and right basilar flight muscles make the beetle turn right and left, respectively.

Radio signals from a transmitter attached to a laptop running customized "Beetle Commander" software convey control signals to the microprocessor on the beetle's back.

**CYBORG BEETLE** By equipping a giant flower beetle with a processor and implanting electrodes that deliver electrical jolts to its brain and to its wing muscles, scientists have created a living machine whose flight can be wirelessly controlled.