About the Components

The Smart Rover uses building blocks with snaps to build the different circuits for each project. Each component has a different function and is colored so you can identify it. Each component easily snaps together so you can build the circuit.

ABOUT YOUR COMPONENTS

Smart Module: The Smart Module is a Raspberry Pi and camera assembled in a housing. A Raspberry Pi is a full-functioning miniature computer.

The Smart Rover should only be powered with the AA batteries in the bottom. The Raspberry Pi should only be powered with the USB cable provided with the kit. Neither should ever be used with power sources from other Elenco® sets or external components.

Base Grid: The base grid functions like the printed circuit boards found in most electronic products. It is a platform for mounting parts and wires, though in most products the wires are "printed" on the board.

Snap Wires: The blue snap wires are used to connect components; they transport electricity and do not affect circuit performance. They come in different lengths to enable orderly arrangement of connections.

Jumper Wires: The jumper wires are used to make flexible connections where using snap wires would be difficult. Though they have different colors, they are interchangeable, but the color-coding helps when connecting them to the rover rear snaps.

Resistors: Resistors are used to control or limit the current in a circuit by "resisting" the electricity. The higher the resistance, measured in ohms, the more the resistor limits the current.

Slide Switch & Press Switch: These switches connect or disconnect the wires in the circuit, allowing you to turn it on or off, like water with a faucet. When on, they have no effect on the circuit.

LED: A light-emitting diode (LED) acts as a special one-way light bulb. In the "forward" direction (indicated by the "arrow" in the symbol), electricity flows if the voltage exceeds a turn-on threshold; brightness then increases. A high current will burn out an LED, so they have internal resistors to protect them. LEDs block electricity in the "reverse" direction. The color LEDs have a pre-programmed color sequence that is not programmable via code. In projects where the White LED (D4) is used, the Color Changing LED (D8) and the Slow Changing LED (D12) can be used instead.

Horn & Speaker: These convert energy to sound by making mechanical vibrations.

Phototransistor: The phototransistor uses light to control electric current; more light creates more current, and vice versa with less light.

Capacitors: Capacitors store electric charge. They are used to direct or block currents. The higher the capacitance, measured in farads, means more energy can be stored.

Programmable Fan: The fan is a motor with an LED circuit, which converts electricity into mechanical motion. The LEDs in the fan blade flash in a pattern based on the programmed phrase and are synchronized with the motor speed. The flashes are precisely timed and very brief, giving the illusion of words floating in space. For more details on using the Programmable Fan with the Selector, please see Project 15 in the Snap Circuits® Arcade (Model SCA200) manual, available online at **elenco.com/manuals**.

Motor Control: This module contains 16 transistors and resistors that are needed to control the motors of the rover.

NPN Transistor: NPN transistors are components that use a small electric current to control a large current and are used in current switching, amplifying, and buffering applications.

Selector: The selector is a more complex switch that allows for three inputs, rather than just one.

Rover Body: The rover body has both motors and a battery. We can build circuits on the rover body that are not connected to the motors, if we just want to use the batteries as a voltage supply. The **motors** in the rover body convert electrical energy into mechanical motion. Inside the motor is a coil of wire and metal plates. When a large electric current flows through the wire loops, it will turn ordinary metal into a magnet. When the current flows through the coil, it will magnetize the plates, which will repel from the magnet in the motor shell, causing the shaft to spin. The small gear on the shaft spins with it, which drives the larger gear system, moving the rover.

(+) **Power from batteries**

LF **Left forward control input**

LB **Left backward control input**

RF **Right forward control input**

RB **Right backward control input**

+

U8

MOTOR CONTROL

—

Left backward motor drive L-

Left forward motor drive L+

Right backward motor drive R-

Right forward motor drive R+

(-) **Power return to batteries**

R- **Right backward motor drive**

L- **Left backward motor drive**

(+) **Power from batteries**

ROVER REAR

Power return to batteries (-)

Right forward motor drive R+

Left forward-motor drive L+