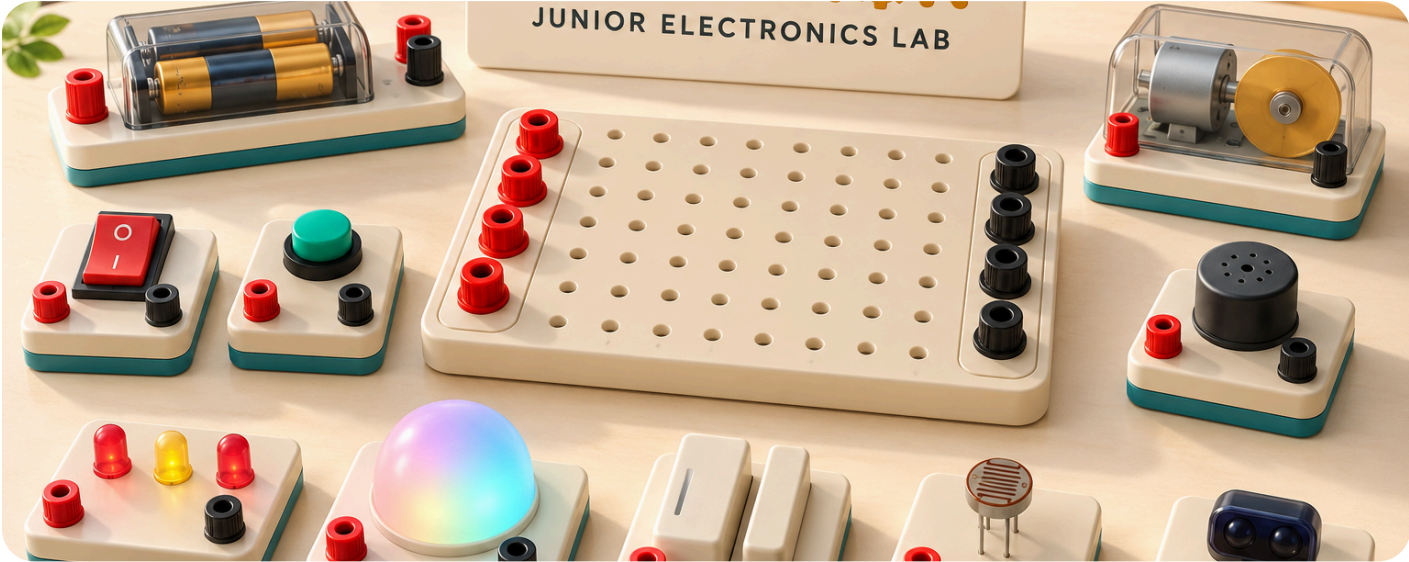


TechyTron Junior Electronics STEM Kits

Ten hands-on electronics kits for Classes 3 and 4

- Ages 8–10 years
- Classes 3–4
- No coding or soldering
- 10 standalone kits or one combined lab



AI-generated concept illustration. Final supplied hardware and wiring will follow the validated kit design.

One child or a pair, with an adult nearby. No coding or soldering.

Kit	Focus	Engagement
01 · My First Light	Electricity and switches	25–35 minutes
02 · Electric Detective	Conductors and insulators	30–40 minutes
03 · Brightness Lab	Resistance and current	30–40 minutes
04 · Two-Light Challenge	Series and parallel circuits	40–50 minutes
05 · Colour Mixer	RGB light and independent controls	35–45 minutes
06 · Buzz Button	Sound and momentary switches	25–35 minutes
07 · Magnetic Alarm	Magnetic sensing and alarm logic	35–45 minutes
08 · Motor Spin Lab	Motors, energy and polarity	30–40 minutes
09 · Automatic Night Light	Light sensing and automatic control	40–50 minutes
10 · Obstacle Alert	Infrared sensing and electronic alerts	40–50 minutes

Included in every standalone kit

Every standalone kit includes the battery holder, four 1.5 V alkaline AA batteries, protected regulated 5 V power supply, breadboard, connecting wires, activity guide and observation sheet listed below. All wiring is prepared for connections without soldering. A combined lab can reuse these essentials between experiments.

How children build

Parts arrive with fitted leads and clear connection labels. Children follow the illustrated connection card. Functional diagrams explain the principle; they are not pin-by-pin wiring diagrams.

Use and supervision

Use only the supplied low-voltage power unit. Switch power off before changing connections. Keep metal objects across the test gap only, never across the battery terminals. Keep liquids away. Adults handle battery access and inspect parts. Kit 8 uses an enclosed motor indicator, not an exposed propeller. Use the buzzer at a comfortable level away from ears.

Engagement times are estimates for guided first use, including building, testing and discussion. Extension challenges can be repeated on another day. These are proposed kit specifications; production assemblies and instructions require prototype validation. Animations illustrate the principle and do not represent measured test footage.

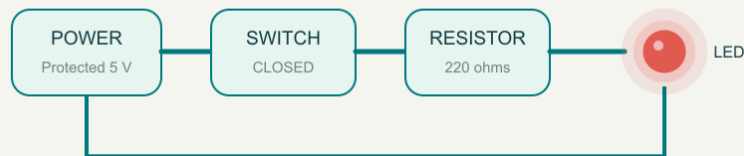
My First Light

Make your first working electrical circuit.

Explore 5 min · Build 10–15 min · Test and discuss 10–15 min

01 My First Light

Switch closed · LED ON



Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- 5mm LED - Red Color — 1 LED
- 220 Ω 1/4 Watts (10 PCS) — 1 resistor (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- 2-Pin SPST ON-OFF Mini Rocker Switch - 2A 250V — 1 switch (Used only with the supplied low-voltage DC power supply.)

Steps to make it

1. Keep the power off. Place the power supply, switch, resistor and LED on the breadboard, following the supplied connection card.
2. Connect power + $\rightarrow$ switch $\rightarrow$ 220 Ω resistor $\rightarrow$ LED +. Connect LED – back to power –.
3. Check the labels with an adult, turn on the power unit and close the switch.
4. Open and close the switch. Record when the LED glows.
5. Turn the power off, disconnect one lead, then turn the supply on briefly. Compare the result with the complete circuit; turn off before reconnecting.

What children learn

- A working circuit needs a complete return path.
- A switch makes or breaks that path.
- An LED has polarity and needs current limiting.

Test challenge

Does an LED glow when there is a gap anywhere in its circuit? Change only the switch position or one connection at a time.

Observation task

Complete a four-row ON/OFF prediction table, then draw the path around the working circuit.

Expected result

The LED lights with the correctly connected circuit and closed switch; it goes out when the path is opened.

If it does not work

Switch off, check LED polarity and confirm that all connectors are seated. Keep the resistor in the circuit.

Try next: Place the switch on the return side of the same series circuit. Does it still control the LED?

Electric Detective

Discover which materials let electricity pass.

Predict 5–10 min · Build 10 min · Test and sort 15–20 min

02 Electric Detective

Metal sample · LED ON



Compare samples in the same protected circuit.

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- 5mm LED - Red Color — 1 LED
- 220 Ω 1/4 Watts (10 PCS) — 1 resistor (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- Alligator Double-ended Clip Jumper Wire (10 Pcs) — 2 test leads (Two individual insulated double-ended leads supplied.)
- Conductor and Insulator Sample Set — 1 set (Aluminium, steel, dry wood, plastic and rubber.)

Steps to make it

1. Sort the samples into predictions: will light the LED or will not light the LED.
2. With power off, connect power + → resistor → LED → first test clip. Connect the second test clip to power –.
3. Clip an aluminium sample between the two test clips and turn on the supply.
4. Observe the LED, switch off, replace the sample and repeat for every material.
5. Compare your results with your predictions and sort the samples again.

What children learn

- Conductors allow enough current through this circuit to light the LED.
- Insulators resist current flow.
- A prediction can be checked by a fair test.

Test challenge

Which of the five dry materials completes the same LED circuit? Keep the battery, resistor and LED unchanged.

Observation task

For each sample, mark your prediction, whether the LED lights and your final classification.

Expected result

Clean aluminium and steel contacts should light the LED. The supplied dry wood, plastic and rubber should not.

If it does not work

Check clean clip-to-sample contact. A dark LED means insufficient current for this tester; it does not prove absolutely zero conductivity.

Try next: Try a coated metal sample with a prepared exposed-metal patch. Compare touching the coating and the metal.

Brightness Lab

Control how brightly an LED shines.

Explore 5 min · Build 10 min · Compare and discuss 15–25 min

03 Brightness Lab

220 ohms · bright



Same power + same LED · only the resistor changes.

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- 5mm LED - Red Color — 1 LED
- 220 Ω 1/4 Watts (10 PCS) — 1 resistor (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- 470 Ω 1/4 Watts (10 PCS) — 1 resistor (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- 1K Ω 1/4 Watts (10 PCS) — 1 resistor (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- 2-Pin SPST ON-OFF Mini Rocker Switch - 2A 250V — 1 switch (Used only with the supplied low-voltage DC power supply.)
- LED Brightness Comparison Shade — 1 piece

Steps to make it

1. Turn the supply off. Connect power + $\rightarrow$ switch $\rightarrow$ 1 k Ω resistor $\rightarrow$ LED +, then LED $- \rightarrow$ power $-$.
2. Turn on and observe the LED under the comparison shade.
3. Switch off and replace only the resistor with 470 Ω . Turn on and observe again.
4. Repeat with 220 Ω . Never replace the resistor with a plain wire.
5. Rank the three settings from dimmest to brightest.

What children learn

- A resistor limits current through the LED.
- For the same LED and supply, larger series resistance usually gives less brightness.
- Changing one variable makes comparisons clearer.

Test challenge

How does resistor value affect the brightness of the same LED at the same supply voltage?

Observation task

Rank each setting using a simple 1–3 brightness scale; this is a visual comparison, not a current measurement.

Expected result

The 1 k Ω setting should be dimmest and 220 Ω brightest, with 470 Ω between them.

If it does not work

Keep viewing conditions consistent. The difference may be harder to see in strong daylight.

Try next: Repeat the ranking in a second trial without looking at the resistor labels.

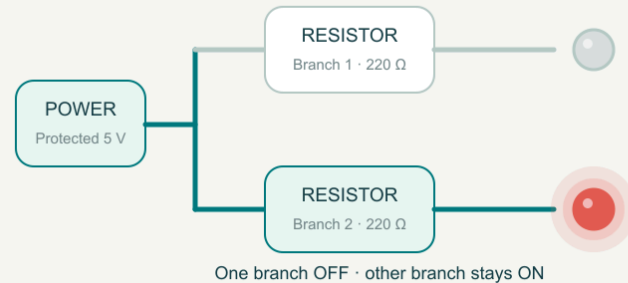
Two-Light Challenge

Find out why separate circuit paths matter.

Predict 5 min · Build both circuits 20–25 min · Compare 15–20 min

04 Two-Light Challenge

Parallel · one path opened



Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- 5mm LED - Red Color — 2 LEDs (Matched low-forward-voltage red LEDs.)
- 220 Ω 1/4 Watts (10 PCS) — 2 resistors (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- 2-Pin SPST ON-OFF Mini Rocker Switch - 2A 250V — 1 switch (Used only with the supplied low-voltage DC power supply.)
- Series and Parallel Circuit Connection Cards — 1 set

Steps to make it

1. With power off, follow Card A: power + → switch → one 220 Ω resistor → LED 1 → LED 2 → power -. Both LEDs face forward along the path.
2. Turn on and observe. Turn off, open one LED connection, then turn on briefly and record what happens.
3. Turn off and rebuild using Card B: after the switch, split the positive supply into two branches. Each branch contains its own 220 Ω resistor and one LED; both branches return to power -.
4. Turn on and observe both LEDs.
5. Turn off, disconnect just one LED branch, then turn on and observe the other branch.

What children learn

- Series components share one path.
- Parallel branches provide separate paths.
- Each parallel LED branch needs its own current-limiting resistor.

Test challenge

When one LED connection is opened, does the other LED remain on in each arrangement?

Observation task

Draw one-path and two-path circuits. Record the second LED state after one branch is opened.

Expected result

Opening the series path turns both LEDs off. Opening one parallel branch leaves the other working. Series LEDs may look dimmer.

If it does not work

This 5 V design requires the supplied matched red LEDs. Substituting blue or white LEDs may prevent the series pair from lighting.

Try next: Add a switch to just one parallel branch and explain why it does not control the other branch.

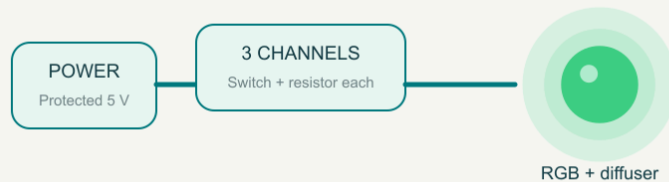
Colour Mixer

Make new colours by combining coloured light.

Explore 5 min · Build 15 min · Mix and record 15–25 min

05 Colour Mixer

Channels G · mix coloured light



R + G + B may look tinted rather than pure white.

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- RGB LED - 5mm - Common Cathode — 1 LED
- 330 Ω 1/4 Watts (10 PCS) — 3 resistors (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- 2-Pin SPST ON-OFF Mini Rocker Switch - 2A 250V — 3 switches
- RGB LED Light Diffuser — 1 piece
- RGB Colour Combination Chart — 1 piece

Steps to make it

1. With power off, connect the RGB common – terminal to power –.
2. Connect each R, G and B terminal through its own 330 Ω resistor and switch to power +, following the labelled card.
3. Turn on the supply. Switch on one channel at a time and name the light colours.
4. Try pairs of channels: R+G, G+B and R+B.
5. Try all three channels together and then all switches off. Record all eight combinations.

What children learn

- An RGB LED contains three separately controlled light sources.
- Red, green and blue light mix additively.
- Three ON/OFF controls give eight combinations, including all off.

Test challenge

What colour does each combination produce? Change the switches while keeping the supply and diffuser unchanged.

Observation task

Complete the eight-row switch chart with the colour you actually observe.

Expected result

Pairs produce yellowish, cyan and magenta light. All three produce a pale mixed colour; it may not look pure white because channel brightness differs.

If it does not work

Check the shared cathode and individual channel labels with power off. Each channel must retain its resistor.

Try next: Ask a partner to set a colour, then work out which switches are on.

Buzz Button

Build a button-controlled electronic sounder.

Explore 5 min · Build 10 min · Message challenge 10–20 min

06 Buzz Button

Button held · buzzer sounds



An active buzzer needs no code or tone generator.

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- 5 V Active Buzzer — 1 buzzer (Self-oscillating; no external tone generator required.)
- Tactile Push Button Switch 12x12x8mm 4-Pin — 1 switch
- Short and Long Signal Code Card — 1 piece

Steps to make it

1. With power off, connect power + → push button → buzzer +, then buzzer – → power –.
2. Turn on the supply and press the button briefly.
3. Release it and compare the result. Notice that it does not stay pressed like a latching switch.
4. Use short and long presses to send a three-symbol message.
5. Ask a partner to decode the message, then swap roles.

What children learn

- An active buzzer converts electrical energy into sound without coding.
- A momentary switch closes the circuit only while pressed.
- Information can be represented by patterns of signals.

Test challenge

Does the buzzer sound when the button is released? Can another person reliably identify your short and long signals?

Observation task

Write a three-symbol message and record how many decoding attempts succeed.

Expected result

The buzzer sounds while the button is held and stops when released.

If it does not work

Check polarity and the supplied active-buzzer label. A passive sounder cannot replace it without an oscillator.

Try next: Agree on a code for five words and send a message without speaking.

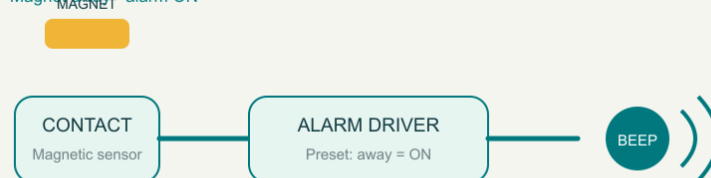
Magnetic Alarm

Make an alarm that notices a moving magnet.

Explore 5 min · Build 15 min · Measure and discuss 15–25 min

07 Magnetic Alarm

Magnet away - alarm ON



Sensor → preset controller → buzzer · all powered at 5 V

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- MC-38 Door Window Sensor Magnetic Switch Home Alarm System — 1 sensor pair (Includes the matching encased magnet. Supplied contact behaviour is configured with the alarm circuit.)
- Magnetic Door Alarm Interface Circuit — 1 piece
- 5 V Active Buzzer — 1 buzzer (Self-oscillating; no external tone generator required.)
- Magnet Position Guide with Ruler — 1 piece

Steps to make it

1. Keep power off. Connect the power unit to the alarm-driver POWER terminals.
2. Connect the magnetic contact to SENSOR and the buzzer to BUZZER, matching the labels.
3. Place the matching magnet beside the contact at the marked closed position.
4. Turn on, then slide the magnet away until the buzzer sounds.
5. Move it back and repeat three times. Record the separation where the alarm changes state.

What children learn

- A magnetic contact can sense a magnet without physical contact between the two housings.
- An interface can turn a sensor state into an alarm response.
- Repeated measurements may differ slightly.

Test challenge

At approximately what magnet separation does the alarm turn on and off? Use the same orientation each time.

Observation task

Write the turn-on and turn-off separations for three trials using the supplied guide.

Expected result

The supplied preset driver keeps the buzzer quiet when the magnet is near and sounds it when the magnet moves away.

If it does not work

Use the supplied matching pair and preset driver. Bare reed-switch contact conventions vary; the adult validates the assembled near/far behaviour.

Try next: Rotate the magnet housing and compare whether its orientation changes the switching separation.

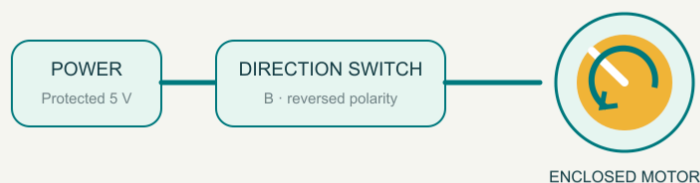
Motor Spin Lab

Reverse a motor with a switch.

Explore 5 min · Build 10–15 min · Observe and explain 15–20 min

08 Motor Spin Lab

Direction B · opposite rotation



Return to centre OFF and let the motor stop before reversing.

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- 3V Miniature DC Motor — 1 motor (Selected motor must support the supplied 5 V; supply must tolerate its startup current.)
- DPDT Center Off Rocker Switch - 6A 250V — 1 switch (Supplied prewired for motor reversal; low-voltage DC use only.)
- Enclosed Motor Rotation Indicator — 1 piece
- Motor Direction Observation Card — 1 piece

Steps to make it

1. Check that the motor indicator guard is fitted. Put the direction switch in centre OFF and keep the power off.
2. Connect power to the switch POWER terminals and the motor assembly to its MOTOR terminals.
3. Turn on the supply. Select direction A and observe the marked disc through the guard.
4. Return the switch to centre OFF and wait for the motor to stop.
5. Select direction B and record the change. Always stop between reversals.

What children learn

- A motor converts electrical energy into motion.
- Reversing polarity reverses this brushed DC motor.
- A centre-OFF switch gives a controlled stopping position.

Test challenge

Viewed from the same side, what happens to rotation direction when the switch reverses the motor connections?

Observation task

Draw an arrow for direction A and direction B, using the same viewing side.

Expected result

The enclosed disc rotates in opposite directions for the two switch positions and stops in the centre position.

If it does not work

Switch off if it stalls. An adult checks the free-running motor and startup-current capacity; children must not open the guard.

Try next: Explain the power → switch → motor → movement sequence to a partner using four picture cards.

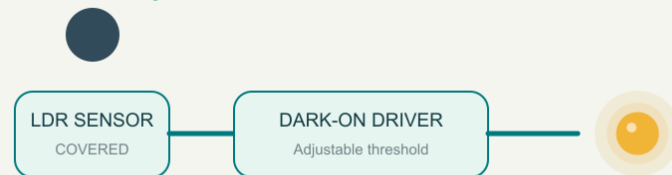
Automatic Night Light

Make a light that responds to darkness.

Predict 5 min · Build 15 min · Adjust and test 20–30 min

09 Automatic Night Light

Sensor covered · light ON



Light level → threshold decision → LED response

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- LDR Sensor Module - Photosensitive Light Detection Sensor Module — 1 sensor
- Adjustable Dark-Activated Light Interface Circuit — 1 piece
- 5mm LED - Red Color — 1 LED
- 220 Ω 1/4 Watts (10 PCS) — 1 resistor (Quantity is individual resistors supplied in this kit; the catalogue product is a 10-piece pack.)
- Opaque Light Sensor Cover — 1 piece
- Translucent Light Filter Cards — 2 cards

Steps to make it

1. With power off, connect power to the sensor and interface POWER terminals, following the card.
2. Connect sensor SIGNAL to interface SENSOR IN, then interface LIGHT OUT to the LED.
3. Turn on in normal room light. Use the marked adjustment control until the light is off.
4. Cover the LDR with the supplied opaque cover and observe the LED.
5. Uncover it, test the two filter cards and adjust the threshold. Keep the sensor facing the same direction.

What children learn

- An LDR responds to changes in light.
- A threshold decides when an automatic response happens.
- An input, controller and output can work without programming.

Test challenge

Which light-filter conditions turn the light on at each threshold setting?

Observation task

Make a table of uncovered, translucent filter and covered conditions at two marked sensitivity settings.

Expected result

The LED switches on below the selected light threshold and off in brighter conditions. It is not a continuously calibrated light meter.

If it does not work

Point the sensor away from its own output LED to prevent feedback. Adjust away from the switching boundary if the output flickers.

Try next: Set a threshold that turns on for the darker filter but remains off for the lighter filter.

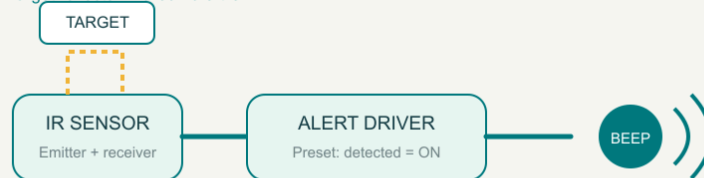
Obstacle Alert

Detect an object without touching it.

Explore 5 min · Build 15 min · Test and compare 20–30 min

10 Obstacle Alert

Target reflects infrared · alert ON



Detection changes with surface, angle and lighting.

This is a detection threshold, not a distance meter.

Functional illustration · use the supplied labelled connection card to build

Illustrated principle · see the response change

Included components

- 4 CELL AA BATTERY HOLDER WITH SWITCH / COVER — 1 holder
- AA BATTERY — 4 batteries (1.5 V alkaline AA cells.)
- Regulated 5 V Power Supply with Short-Circuit Protection — 1 power supply (Supplied in a screw-closed enclosure with fitted leads.)
- Small Breadboard / Mini Solderless Board - 400 points — 1 breadboard
- Jumper Wire Combo - Male to Male, Male to Female and Female to Female Breadboard Connecting Wires (10 Qty Each) — 1 set (Colour-coded leads supplied with fitted connectors.)
- Illustrated Activity Guide and Observation Sheet — 1 set
- IR Obstacle Avoidance Sensor Module - LM393 Photoelectric Sensor Module — 1 sensor
- Infrared Sensor Alarm Interface Circuit — 1 piece
- 5 V Active Buzzer — 1 buzzer (Self-oscillating; no external tone generator required.)
- Obstacle Detection Ruler Guide — 1 piece
- White and Black Target Cards — 1 pair

Steps to make it

1. With power off, connect the sensor and driver to POWER, sensor SIGNAL to driver SENSOR IN, and buzzer to SOUND OUT.
2. Turn on with no target in front of the sensor. An adult helps set the marked sensitivity adjustment.
3. Move the white target slowly toward the sensor along the ruler guide until the buzzer sounds.
4. Remove it, repeat three times, then repeat with the black target at the same angle.
5. Compare the switching positions. Do not change sensitivity during the comparison.

What children learn

- An infrared emitter and receiver detect reflected light.
- Object colour, angle and room lighting can affect detection.
- A detection sensor reports a condition; it does not measure distance precisely.

Test challenge

Does target surface colour change the approximate detection position when size, angle and sensitivity stay the same?

Observation task

Record three trigger positions for each card and compare the typical results.

Expected result

The buzzer sounds when enough reflected infrared light crosses the set threshold. The white card will often be detected farther away, but actual results depend on the card material and lighting.

If it does not work

Work indoors away from strong direct sunlight. Check target alignment and allow space behind the sensor so background objects do not trigger it.

Try next: Keep the same white card and compare straight-on and tilted angles.