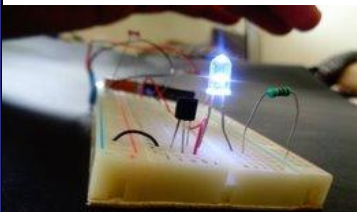


1.	Hands-on electronics: LDR Darkness Sensor (light-activated switch) (13)	
Target group	Pupils	
Age	12–16	
Duration	1.5–2 hours	
Content	 An LDR (Light Dependent Resistor) is a sensor that changes resistance based on light. In bright environments, its resistance is low, and in darkness, it increases. Using this property, we can build a simple circuit that switches an LED ON in the dark and OFF in light, just like automatic streetlights.	
Materials and Tools Needed	• Light Dependent Resistor (LDR) – 1 piece • 50 kΩ resistor – 1 piece (or two 100 kΩ resistors in parallel) • 1 kΩ resistor – 1 piece • NPN transistor BC547 – 1 piece • 9V Battery – 1 piece • LED (any color) – 1 piece • Breadboard or base for assembly (optional) • Connecting wires • Soldering tools (optional for permanent setup)	
How Does It Work?	The LDR's resistance decreases when exposed to light and increases in darkness. This resistance change controls the transistor, which acts like an automatic switch for the LED. • In light: LDR has low resistance → transistor remains OFF → LED OFF • In dark: LDR has high resistance → transistor turns ON → LED glows Light triggers → voltage at base → transistor switches → LED ON/OFF	
Instructions	1. Connect the LDR • Connect one end of the 50 kΩ resistor to the positive terminal of the 9V battery. • Connect the other end of the 50 kΩ resistor to one end of the LDR. • Connect the other end of the LDR to the negative terminal of the battery. • The junction of the 50 kΩ resistor and LDR will be used as the input to the transistor base. 2. Connect the LED and Transistor • Connect one end of the 1 kΩ resistor to the positive terminal of the battery. • Connect the other end of the 1 kΩ resistor to the anode (long leg) of the LED. • Connect the cathode (short leg) of the LED to the collector (C) of the BC547 transistor. • Connect the emitter (E) of the transistor to the negative terminal of the battery. 3. Trigger the Transistor • Connect the junction point between the LDR and 50 kΩ resistor to the base (B) of the transistor. • When it gets dark, the increased resistance from the LDR provides enough voltage to the transistor's base to switch it ON—thus lighting the LED.	
Think Like an Engineer	• Trigger your curiosity with these thought questions: • Why does the transistor turn on only in darkness? • What happens if you reverse the LDR and resistor positions? • Can this circuit drive a relay to turn on AC lights? • What if we replace the LED with a buzzer—can we make a dark alarm?	

	How would you modify this circuit to detect sudden shadows (like a security trip alarm)?
Bonus Ideas	Smart Night Lamp: Place this circuit inside a desk lamp to make it turn on only when it's dark. DIY Garden Light: Add this to a solar garden lamp setup for automatic night lighting. Security System: Combine this with a buzzer for detecting movement in low-light conditions. Closet Light: Use it to automatically turn on an LED inside a dark closet when the door opens (reducing light).
Educational value	Analog electronics, sensor-based automation, transistor switching; extension ideas (buzzer, relay, shadow detection)
Evidence	participant count: photo of setups if consented