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| Sl No | Component Name | Specification | Quantity | Usage | Connection Notes | Safety Notes | Checklist |
| 1 | ESP8266 NodeMCU (ESP-12E) | ESP8266 Wi‑Fi microcontroller board, USB interface, 3.3V I/O | 1 | Runs the control firmware (connects to Wi‑Fi and receives commands from Google Assistant via IFTTT/MQTT). | Connect VCC to 5V USB, GND to ground; use 3.3V logic on GPIOs. Use TX/RX for serial programming. | Do not apply >3.6V to GPIOs. Use stable USB power during flashing. | ☐ |
| 2 | 4-Channel Relay Module | 4×5V relays, SPDT or normally-open contacts, opto-isolated recommended | 1 | Acts as the mains switch—each relay switches one bulb's hot line on/off | Relay VCC to 5V, GND to common ground, IN1–IN4 to NodeMCU GPIOs (use transistor/driver if required). | Relay coils draw current—ensure power supply can source it. Keep relay board and mains wiring physically separated. | ☐ |
| 3 | 5V DC Power Supply (USB) | 5V 2A (or higher) USB adapter to power relays + NodeMCU | 1 | Provides stable power to NodeMCU and relay module (if relay module uses 5V). | Plug into relay VCC (if relay accepts 5V) and NodeMCU USB. Consider separate 5V supply for relays if coil noise occurs. | Undersized supply causes resets/relay chatter. Use a regulated supply with enough current headroom. | ☐ |
| 4 | Micro USB Cable | Micro USB to USB-A (data + power) for programming/power | 1 | Program the NodeMCU and supply USB power during testing and deployment. | Connect NodeMCU to PC for flashing; later to USB adapter for standalone power. | Use a good-quality cable (some cables are power-only). | ☐ |
| 5. | LED Bulb (mains) | 230VAC (or region-appropriate) LED bulb, e.g., 9W, E27 | 1 | The load being controlled. Each relay switches one bulb's hot line. | Wire bulb hot to relay common/NO contact, neutral to mains neutral. Observe correct bulb wattage for relay rating. | Ensure bulb and wiring rating ≤ relay contact rating (typically 10A/250VAC). | ☐ |
| 6 | Bulb Holder with wires | E27 lamp holder/socket with insulated leads | 1 | Holds the bulb and provides connection points for hot and neutral | Connect hot lead through relay; neutral direct to mains neutral. Use proper strain relief. | Use ceramic holders for high temperatures; secure in fixture/enclosure | ☐ |
| 7. | Mains AC Wire | Flexible mains cable (e.g., 1.0 mm² or as local code) | As Per Required | Carries 230VAC to bulbs and relay module (through its switched contacts). | Use color-coded wires; route hot via relay NO contact. Keep mains and low-voltage wires separated. | Follow local electrical codes; use insulated wires with correct gauge. | ☐ |
| 8. | Female-to-Male,Male-to-Male Jumper Wires | Assorted jumper wires for low-voltage connections | As Per Required | Connect NodeMCU GPIOs to relay IN pins and sensors if any. | Keep wires short (<10–15 cm) to reduce noise; use soldered joints for permanent installs. | Loose jumpers can disconnect—use solder or dupont housings for reliability. | ☐ |
| 9. | Breadboard | Solderless breadboard or perfboard for organizing low-voltage wiring | 1 | Useful during development to test wiring and code before finalizing. | Place NodeMCU and relay control wiring; don't put mains wiring on breadboard. | Never connect mains AC to a breadboard—it's unsafe. Use only for low-voltage circuits. | ☐ |
| 10. | Resistor | Assorted values (220 Ω, 330 Ω, 1 kΩ, 4.7 kΩ, 10 kΩ, 100 kΩ), 0.25 W (¼ W) metal-film (1% or 5% tolerance). Also include some 0.5 W and a few wire-wound/ceramic power resistors (2 W–5 W) for high-power needs. | As per Required | Used for pull-ups/pull-downs (e.g., 10 kΩ), LED current limiting (220–330 Ω), transistor base/gate resistors (1 kΩ typical), voltage dividers. | - | Standard ¼ W resistors dissipate little heat; do **not** use them to drop mains voltage or as a substitute for a proper mains resistor. | ☐ |
| 11. | IFTTT account or MQTT + Home Assistant | Service to link Google Assistant to ESP (IFTTT, Adafruit IO, or local MQTT/Home Assistant) | - | Bridges voice commands from Google Assistant to the ESP — either via webhooks (IFTTT) or via Home Assistant/MQTT. | IFTTT uses webhooks to call your ESP endpoint (requires port forwarding or ngrok unless you use a cloud MQTT). Home Assistant can run locally with MQTT broker (Mosquitto). | Cloud integrations may expose endpoints—use secure keys and HTTPS where possible. Local MQTT is more private and faster. | ☐ |