

Video: 01

Components used: multimeter, resistor, battery.

- **Multimeter:**
 - Measuring voltage
 - Measuring current
 - Measuring resistance
- **Resistor:**
 - To prevent too much current from flowing through components like LEDs or transistors.
 - To create a specific voltage from a higher voltage source.
 - To convert excess electrical energy into heat.
- **Battery:**
 - Power Supply for Portable Devices.
 - Solar power systems store excess energy in batteries.
 - For testing components.

In the video multimeter is used for measuring voltage, current and resistance.

Video: 02

Components used: IC(Integrated circuit), LED, Arduino.

- **IC:**
 - For controlling devices like computer, mobile, washing machine.
- **LED:**
 - For lighting
 - For showing power ON/OFF in TVs, chargers, etc.
 - For remote control.
 - For controlling traffic signals.
- **Arduino:**
 - LED Projects (Blink, dim, or create patterns with LEDs.)
 - Light turns on when it gets dark.
 - Line-following robot.
 - Control lights or fans using phone/Wi-Fi.

In the video the Arduino is used for dimming all kinds of LEDs.

Video: 03

Components used: Arduino, LED, ATtiny 85 IC.

- **ATtiny 85 IC:**
 - For LED blinking projects (Making a single LED blink or run patterns).
 - Control small motors in basic robots.

In the video the project is to program microcontroller using Arduino software and Arduino uno as a programmer.

Video: 04

Components used: Arduino, resistor, LED, Android.

In the video the project is changes the brightness and color of the LED by using Arduino, Bluetooth and Android.

Video: 05

Components used: Arduino, resistor, IC, LED.

In the video the project is how to control a huge amount of LEDs inside a matrix or a cube with only a few I/O pins of your Arduino.

Video: 06

Components used: clock crystal, capacitor, resistor, ATmega.

- **Clock crystal:**
 - In Microcontrollers & Microprocessors gives a clock signal to run code at the correct speed.
- **Capacitor:**
 - Stores small amounts of electricity and releases it when needed.
 - In fans and pumps, capacitors give motors a boost to start spinning.
- **ATmega:**
 - Used in blinking LEDs, reading sensors, controlling motors, etc.
 - Controls small robots: line follower, obstacle avoider, robot arms.

In the video the project is how to use Atmega328P without an Arduino Board.

Video: 07

Components used: 7 segment display, Arduino, resistor, IC.

- **7 segment display**
 - Digital clocks
 - Calculator
 - Counter
 - Temperature meter
 - Scoreboard
 - Electronic meter

In the video the project is how to control different kinds of 7 segment display.

Video: 08

Components used: LED, power source, resistor, multimeter.

In the video the project is how to control the LED in easy way.

Video: 09

Components used: transformer, diode, resistor, LED.

- **Transformer:**
 - Step-up transformers increase voltage to send electricity long distances with less energy loss.
 - Step-down transformers reduce voltage for safe home or office use.
 - Used in mobile chargers, laptop adapters, and other battery chargers to give the correct voltage.
 - Converts high voltage (like 230V) from the power line into low voltage (like 12V or 5V) for home appliances, TVs, and phone chargers.
- **Diode:**
 - Converts AC (alternating current) to DC (direct current) in power supplies.
 - A special diode called LED gives light when current flows through it.

In the video the project is how to use diode in the circuit and bridge rectifier.

Video: 10

Components used: digital oscilloscope, speaker, Arduino, IC, resistor.

- **Digital oscilloscope:**
 - To see how signals look: their shape, frequency, voltage level, etc.
 - Shows wave types: sine, square, triangle, or complex waveforms.
 - To find problems in wires, ICs, sensors, or outputs.
- **Speaker:**
 - converts electrical signals into sound.
 - Plays music, voice, and sound effects from phones, computers, and music systems.

In the video the project is how the digital to analog signal converter works.

Video: 11

Components used: GSM Module, Arduino, multimeter.

- **GSM Module:**
 - Can send an automatic text message when a condition is met.
 - Send an SMS to control devices remotely, like turning lights ON/OFF.
 - Sends data like temperature, location, or status from remote areas.

In the video the project is to use GSM Module with Arduino uno to send SMS.

Video: 12

Components used: coil/inductor, digital oscillator.

- **Coil/Inductor:**
 - Used in DC power supply circuits.
 - Stores and transfers energy efficiently in buck, boost, and buck-boost converters.
 - Coils are used to step-up or step-down voltage in transformers.
 - Coils are used to generate magnetic fields for motion (in motors) or electricity (in generators).

This video shows the basics of coil.

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Components used: coil/inductor, digital oscillator, multimeter.

This video shows the basics of inductive reactance.

Video: 14

Components used: capacitor, digital oscillator, multimeter.

- **Capacitor:**
 - Stores small amounts of electrical energy and releases it quickly.
 - Used in radios to select specific frequencies (with inductors).
 - Used in industries to improve power efficiency.
 - Helps start and run electric motors by giving a phase shift.

This video is about the basics of capacitor.

Video: 15

Components used: NTC thermistor, LCD, multimeter, resistor.

- **NTC Thermistor:**
 - Measures temperature in electronics, air conditioners, refrigerators, etc.
 - Protects circuits from high current when power is first turned on.
 - Prevents overheating while charging batteries in phones, laptops.
- **LCD:**
 - Show numbers and messages in devices.
 - Display inputs and results.
 - Display speed, temperature, warning messages.

This video shows how the resistance of different materials is used to measure accurate temperatures.

Video: 16

Components used: battery, LED, multimeter, digital oscillator, potentiometer, Arduino, resistor.

- **Potentiometer:**
 - Adjusts sound level in radios, speakers, and TVs.

- Safely limits current to a small LED.
- Speed control in fans, motors, or power supplies.
- Dims lights or adjusts screen brightness.

This video is for the application of resistor.

Video: 17

Components used: digital oscillator, multimeter, LED, resistor.

This video is about how important digital oscillators are in circuits.

Video: 18

Components used: DC motor, digital oscillator.

- **DC motor:**
 - Moves wheels and parts.
 - Used in Arduino and robotics projects.
 - Controls wheels, arms, or tools.
 - Runs drills, screwdrivers, saws, etc.

This video is about the DC motor.

Video: 20

Components used: thyristor, TRIAC.

- **Thyristor:**
 - In motor speed control, thyristors are used to vary the average voltage supplied to the motor.
 - Thyristors control the power supplied to heating elements by switching on and off rapidly (zero-cross switching or phase angle control).
 - If the voltage exceeds a safe limit, a thyristor is triggered and creates a short circuit to blow the fuse and protect the rest of the circuit.
 - Thyristors are used in circuits to convert DC to AC (inverters), or AC to DC (controlled rectifiers).
- **TRIAC:**
 - The TRIAC controls how much of the AC waveform is allowed through to the light.
 - By rapidly switching AC on and off, a TRIAC regulates the average power to heating elements.
 - TRIACs are used to control timing and power delivery in appliances.

This video is about the basics of thyristor and TRIAC.

Video: 22

Components used: transistor, LED, resistor, multimeter.

- **Transistor:**
 - A small input current at the base (BJT) or gate (FET) controls a larger current between collector-emitter or drain-source.
 - When a control signal is applied, the transistor turns “on” or “off” the current path.
 - Logic gates like AND, OR, NOT are built from combinations of transistors.
 - A transistor acts as a switch or PWM controller to control motors.

This video is about the basics of transistor.

Video: 24

Components used: stepper motor, Arduino.

This video is about stepper motor.

Video: 25

Components used: servo, potentiometer, diode, capacitor.

- **Servo:**
 - Used in robotic grippers, humanoid robots, and automation.
 - Moves hands in analog clocks with precision.

This video is about the servo motor.

Video: 26

Components used: timer IC, digital oscillator, potentiometer.

- **Timer IC:**
 - Used to turn a device ON or OFF after a specific time delay.
 - Used in circuits for buzzers, alarms, or indicator LEDs.

This video is the basics of timer IC.

Video: 29

Components used: solar panel.

- **Solar panel:**
 - converts sunlight (solar energy) into electrical energy using photovoltaic (PV) cells.
 - Charges batteries in solar lamps, inverters, and devices.
 - Operates pumps in agriculture and irrigation.
 - Powers automatic street lights and garden lamps.

This video is about the basics of solar panel.

Video: 30

Components used: microcontroller timer, Arduino.

- **Microcontroller timer:**

- It is used to pause the program for a fixed amount of time.
- It is used to control speed of motors, brightness of LEDs, etc.
- It is used to measure speed of a wheel using sensor, or read signal from ultrasonic sensor.

This video is about the basics of microcontroller timer.