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.

Video: 13

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.

Video: 31

Components used: Schottky Diode, Zener Diode.

- **Schottky diode:**
  - Converts AC to DC in power supplies.
  - Works in forward direction.
- **Zener diode:**
  - Works in reverse direction.

This video is about the difference between Schottky diode and Zener diode.

Video: 32

Components used: Relay, Optocoupler.

- **Relay:**
  - Turn ON/OFF big machines using a small control signal.
  - Control lights, fans, or appliances remotely.
- **Optocoupler:**
  - Isolate Arduino from AC signals.
  - Control a relay or transistor safely.
  - protect one part of a circuit from high voltages.

This video is about the basics of relay and optocoupler.

Video: 33

Components used: strain gauge

- **Strain gauge:**
  - It helps in testing strength, safety, and pressure in machines or structures.
  - A strain gauge measures stretching or compression.

This video is about how we can use strain gauge to measure weight.

Video: 34

Components used: Two-position controller, PID controller.

- **Two-position controller:**
  - It turns the system ON when the value is below the setpoint, and OFF when above.

- Used for simple systems like water tanks, fridges.

- **PID controller:**
  - Used for complex systems like robotics, aircraft, motor speed control, process automation.

Video: 35

Components used: Schmitt Trigger

- **Schmitt Trigger:**
  - To remove noise from input signals.

This video is about the basics of Schmitt trigger.