**Video 7: 7 segment display**

**Component Name**: 7-Segment Display

* It is an electronic device which is used for displaying numbers and some alphabets.
* It contains 7 LEDs and each LEDs can be controlled with or without Arduino.
* Multiplexing can be used to control the animations.
* It is used in digital clocks and watches, Scoreboards, counters.

**Video 8: About LED and resistor**

**Component Name**: Light Emitting Diode (LED)

* An LED is a semiconductor device that emits light when current passes through it.
* It allows current to flow in one direction (forward-biased) and blocks it in the opposite direction (reverse-biased).
* It consumes lesser power and can be found in various color.
* It is used in every lighting device.

**Component Name**: Current Limiting Resistor

* It is used for controlling the flowing current.
* It is used in series with LEDs and prevents excessive current.
* The value of resistor is calculated based on the supply voltage and the current we want.
* It is used in any LEDs for the safety, otherwise the LEDs can be burned.

**Video 9: Diodes and Bridge Rectifiers**

**Component Name**: Diode

* It allows the current in forward bias and blocks in reverse bias.
* It prevents the damage from reverse polarity.
* It converts the Alternating Current to Direct Current.
* For efficient AC to DC conversion, Bridge rectifier is introduced. It is a combination of 4 diodes in a circuit.
* This setup is effective without the use of center-tapped transformer.
* Diodes can be seen in AC/DC Adapters, Chargers etc.

Video 10: Digital to Analog Converter (DAC)

* Using R-2R Ladder DAC, which requires only two values of resistors and repetitive combinations.
* It produces the Ramp, triangular and sine wave from the linear wave. Which converts the 8bit DAC.
* Using Arduino and the analogWrite function does the same process for DAC which is also 8bit.
* Using IC DAC0800 also does the 8bit Digital to Analog conversion.
* LC low pass filter also does DAC. It makes the wave smoother.
* This process used in audio devices.

**Video 11: Sending message to Arduino**

**Component Name**: TC35 GSM Module

* Connects and controlled by Arduino, this module can send text messages.
* This module uses AT commands to communicate.
* It has an antenna and a SIM card holder
* It is used in SMS based controlled system.

**Video 12 & 13: Inductors**

* **Inductor stores energy in a magnetic field** when electrical current flows through it.
* It **resists sudden changes in current**, making it useful for filtering and energy storage.
* It can also block high-frequency AC signals while allowing low-frequency or DC signals to pass.
* It can be found in transformers, many types of filters to remove unwanted noise, power supply circuits like DC-DC converter, Inductive sensors and wireless charging systems.

Video 14: Capacitors

* A capacitor is a passive two-terminal electronic component that stores electrical energy in an electric field.
* Capacitors can charge and discharge rapidly, making them essential for various functions in electronic circuits.
* It can be used as energy storage, Signal processing, filtering etc.
* Used in sensors to measure humidity, pressure, and other physical quantities by detecting changes in capacitance.

**Video 15: Temperature measurement**

**Components:** NTC, PT100 and Wheatstone bridge

* NTC decreases its resistance as temperature increases. It can only measure around 30 degrees to 150 degrees.
* Used in household devices like oven, refrigerator etc. to monitor temperature.
* PT100 is a RTD (Resistance Temperature Detector) and its resistance increases with temperature linearly.
* PT100 is good for precise temperature and measure around 850 degrees.
* Used in Industries and labs for accurate temperature.
* A Wheatstone Bridge is an electrical circuit combination.
* It can also measure temperature and it is particularly effective in detecting small changes in resistance, such as those from temperature sensors like NTC thermistors and PT100 sensors.

**Video 16: Resistors**

* Resistor limits or regulates the flow of current in a circuit.
* It also divides voltages.
* It can convert energy into heat.
* Small amount ohms resistors are called shunt and it can be seen in multimeters.
* It is also used as fuse to protect devices
* Photoresistors used as a light detector.
* PT100 can measure temperature.
* Strain gauges are used to measure weight.

**Video 17: Oscillators (RC, LC, Crystal)**

* An oscillator is an electronic circuit that generates a periodic, oscillating signal, typically in the form of a sine wave or square wave. It converts DC to AC.
* It is used in Clocks, timer, microcontrollers, Audio equipment etc.
* RC oscillator uses resistor and capacitor. It is suitable for low frequency like audio frequency.
* LC oscillator uses inductors and capacitors. Its suitable for high frequency like radio frequency.
* Crystal oscillator is extremely accurate and stable. Can be used for both low and high frequencies. It can be seen in watch, microcontrollers etc.

**Video 18: DC & brushless DC motor and ESC**

* **Components**: DC motor, Brushless DC motors and ESC.
* DC motors uses electrical current and creates rotational energy by using brushes.
* It can be found in simple robotics devices and toys.
* Brushless DC motors rotates same as DC motors but operates brushless. It is controlled by ESC (Electronic Speed Controller).
* Those are used in Remote controlled devices like drones and vehicles.

**Video 19: I2C**

**Components**: I2C

* It enables communication between a **microcontroller** (e.g., Arduino) and an **FM radio module**
* It sends **digital commands** from the microcontroller to **tune frequencies**, **adjust volume**, or **switch modes** on the FM radio module.