Vid-01:

Multimeter: → Capable of measuring all important parameter (Current, voltage, resistance).

→ Red probe changed

→ Voltage and resistance are in same socket.

Voltage measure:

red probe → Positive side

black " → neg side.

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Vid-2: Dimming all kinds of LEDs!

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PWM → Pulse Width Modulation.

Analog right-function can generate. square signals. voltage between 0 to 255 v

use potentiometer.

~~PWM pin 3~~

Vid-3: Programming an Attiny Home made Arduino; Shield:

affordable → Attiny-85 → also efficient.

8 Kbytes-flash memory-

Pin 4 → ground

" 8 → VCC

" 5 → I/O Pin 2, 3, 5, 6, 7 → IO numbering

0 and 1 PWM signal.

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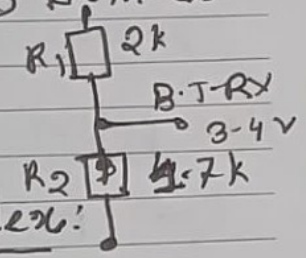
Vid-4: Arduino + Bluetooth + Android = Awesome.

have to use voltage divider to convert 5 volt to 3.3 volt.

two resistors.

52 Terminal APP.

RGB LED → 1 anode, 3 cathods.



TX → Transit Pin.

RX → Recieve Pin

Vid-5: How to Multiplex:

5 anode rows right 10 cathode columns down.

→ Controlling Multiple LEDs, individually.

→ Arduino UNO

→ Fewer pins required, effieient control on multiple displays, ideal for clocks, Timers and counters.

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vid-6: Standalone Arduino Circuit.

→ test your circuit on a breadboard.

4 component:

→ One 16 Mega hertz clock crystal and

→ two 22 Picofarad capacitors. to generate the external clock signal

→ One 10 KΩ resistor (connects between reset pin of ATmegan and 5 volts)

3 ways to change the code.

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Vid-07: 7 segment display

- Kind of old-school are not often used in modern consumer electronics but they are very useful in building small which only outputs a couple numbers or letters-like clock, temperature sensor or the voltage and the current of a power supply.

Use 2.1 volt.

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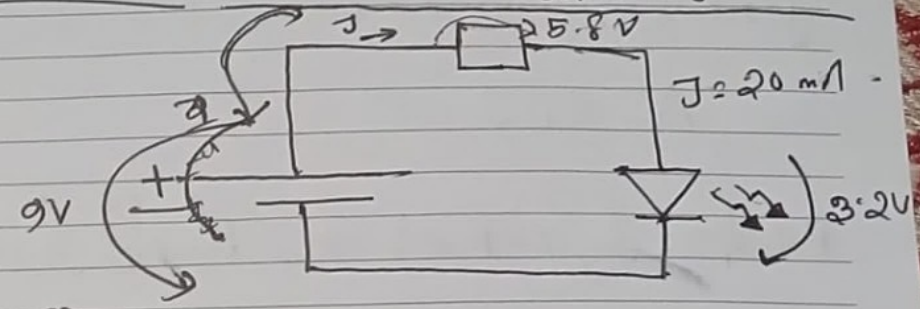
Vid-08: LED and Current limiting resistor:



$$\sum_{k=1}^{n} V_k = 0$$

$$9.V = 3.2V + U_R \qquad R = \frac{V}{R}$$

$$U_R = 5.8V.$$

The best way to use LED is not in a constant voltage mood but a constant current mood.

Vid-09: Diode & Bridge Rectifier

diode prevents the circuit from being destroyed in any issues. diode is inductive, no diode is perfect.

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generate wasted power.

AC → DC.

$P = \frac{1}{T} \cdot \int_0^T i^2 R\,dt \rightarrow J^2R = \frac{1}{T}\int_0^T i^2R$

$J = \sqrt{\frac{1}{T}\int_0^T i^2\,dt} \Rightarrow i = \hat{i}\sin(\omega t)$

$J = \frac{\hat{i}}{\sqrt{2}}$

Bridge Rectifier:

convert neg sin wave to positive sin wave.

more useful.

Vid-10: Digital to Analog converter:

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Components: Arduino Uno.
- R-2R Resistor Ladder.
- Operational Amplifier (Op-Amp)
- Power supply.

- Used in Audio generation, signal processing, educational purposes.

This project offers a practical introduction to DACs, showcasing how digital values can be transformed into analog signals using basic components.

Vid 11: Sending SMS with Arduino

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Max - 6 volts. | 3.3v.

Left → Ground
Right → Module (input).

TX → TXD0
RX → RXD0

Vid-12: Coils / Inductors: (P-1)

more current, more EMF

Induce a voltage, if a conductor moves ~~and~~ inside the magnetic field.

MF of plain wire is weak.

Lenz law: a current will always oppose the change if produces.

Vid 13: Coils/Inductors (P-2)

Reactance Bangladesh Bank

Power oscillates between voltage source and load which strain

~~For~~ example: power grids, also known as reactive power.

$$J = \frac{4}{X_L \downarrow}$$

bigger frequency, more reactance

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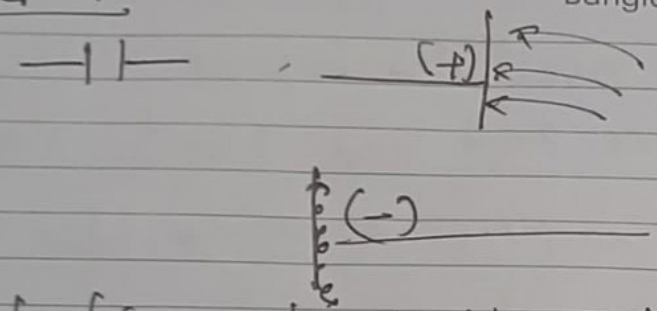
vid-14:



Didectric material like water increases capacitance.

Electrolytic Capaciton → metal sheet with dielectric

Reversing polarity destroys.

* Basic capaciton → metal sheet with dielectric substance in the middle.
* Increasing capacitance → bringing the plates closer, using dielectric.
* switching operation → Create diff signals. using resistor creates capacitive reactance X_C in AC

$$X_C \sim \frac{1}{fc}$$

$$X_C = \frac{1}{2\pi fC}$$, creates phase shift.

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vid-15: Temperature Measurement

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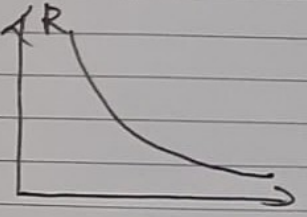
* NTC = Negative Temperature Coefficient thermistor -
* Resistors → decrease value as temp rises.



* PT - 100 , 0°C → 100Ω.

Resistance increases with higher Temp max → 850°C. * Voltage offset

* Wheatstone Bridge → Temp calculating via the change resistance
* 10-turn potentiometer / pre-made tranimitter.
* Voltage drop → analog input.
* LCD Connect → shows temp
* LM 35 → IC (0-1.5V, 0°-15
* Thermal inertia.

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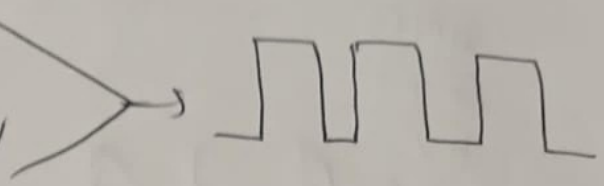
Ved - 17: Oscillators : RC, LC. Crystal.

using 2 capacitors, alternating 2 resistors.
2 logic AND, 1 logic OR.

→ 100 nF capacitor.
680 Ω res.
150 kΩ potentiometer



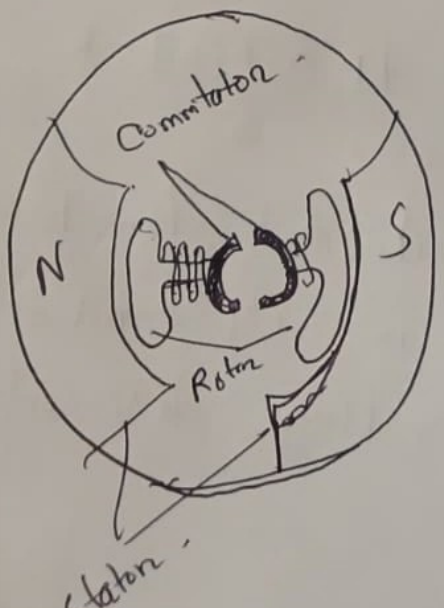
$$|X_C| = |X_L|$$

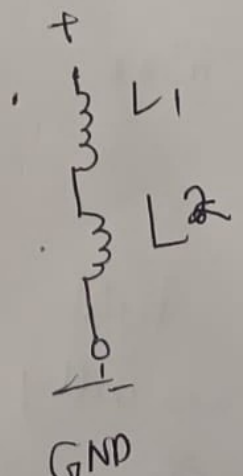
$$\frac{1}{\omega C} = \omega L$$

$$\frac{1}{LC} = \omega^2$$

$$\frac{1}{\sqrt{LC}} = \omega.$$

Ved - 18: Electronic Basics (DC & Brushless DC Motor & ESC).





Vid - 191 I2C and its using:

Voltage:

GND (0 V) → 0

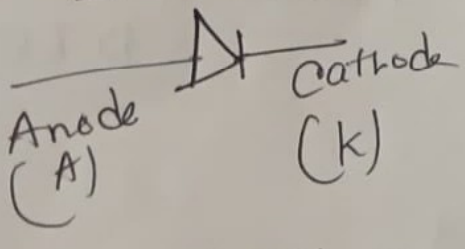
5V → 1

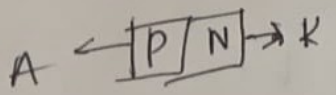
Binary state (bit)

→ Need 2 steps of voltage states to define two binary states of

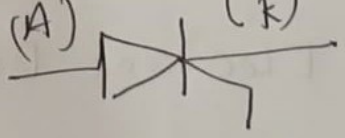
Vid 20] Thyristor, Triac, Phase Angle Control,

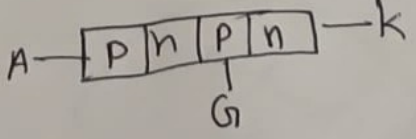
Diode





Thyristor





* LED does light up but not for long, Thy is usually stays in its conductive state even when voltage disconnects

vid 21: OpAmp (Operational Amplifier)

The first golden rule of opamps, gives the output of the opamp will always attempt everything to keep the voltage difference between the input at zero volts

⇒ + and - volts are needed.

R1 = R2.

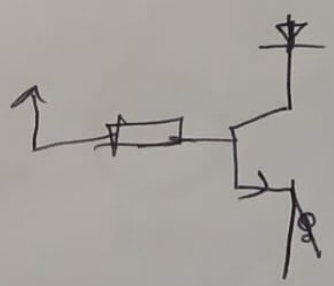
Rule # 3:

vid-22: Transistor (BJT) as a Switch

connect emitter → GND

load between the supply 3.1 V and supply V < max collector V.

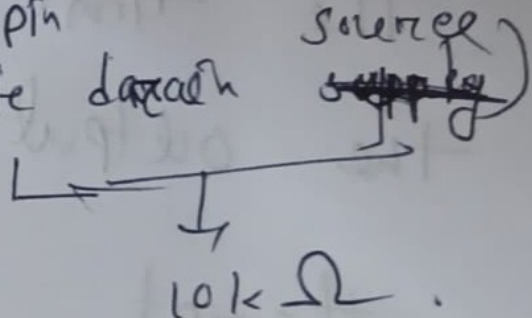
supply V



ved-23) Transistor (MOSFET as Switch)

increase efficiency to 97%.

MOSFET → n-channel → common (3 pin Gate drain source supply)
MOSFET → p-channel

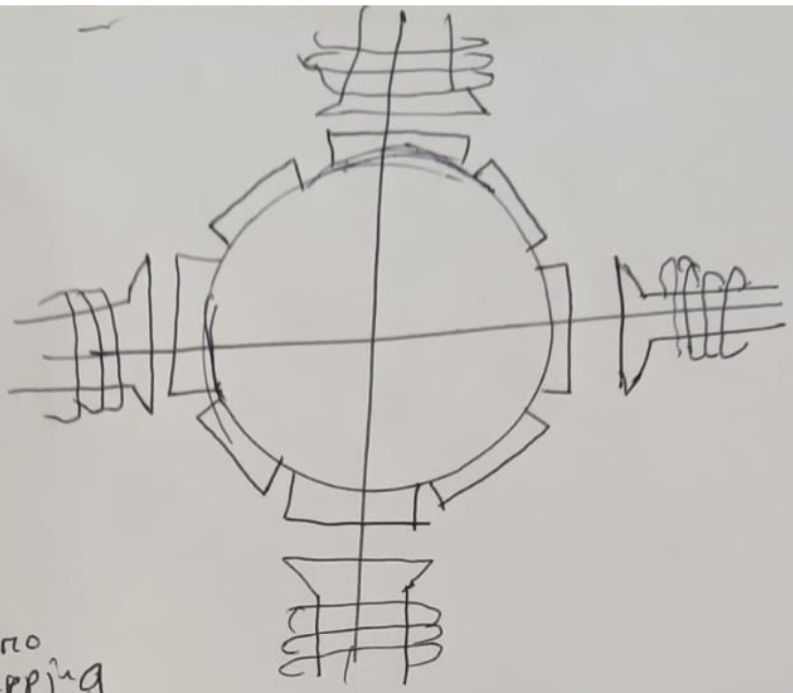


cathode → drain
anode → supply voltage
GND → Gate

ved 24) Stepper Motors and the uses!

Vid 24:

Codes:



Steps / rotations.

full → 200
half → 400
1/4 → 800
1/8 → 1600
1/16 → 3200

> micro stepping

Vid-25: Servos and uses.

VCC ≅ 4.8 ~ 7.2 V.