vèdio(01)

R = 4/1 , , R ≈ 68 KΩ

red probe (+) side
black " (-) side

vèd(-02) : controlling brightness of LED:

PWM → Pulse width Modulation.

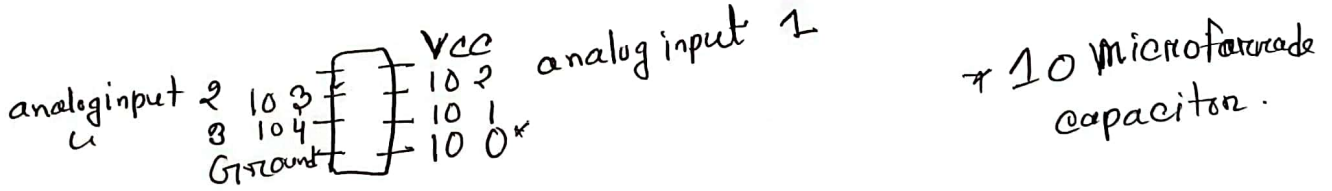
~~4V to 3.2 volt. LED (green)~~.

~~50%~~ LED → off/on very fast.

vèd(03) audino.cc → 1.0.5 version → download.

ATtiny board data.

Ori. source: highlowtech.org.



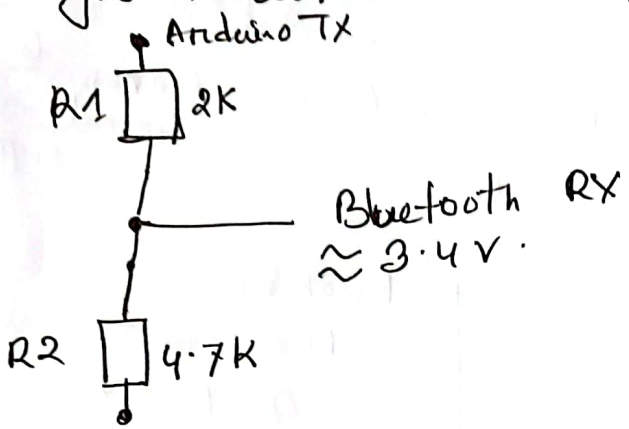
* 10 microfarade capacitor.

pin 13 → 10 2
" 12 → 10 1
" 11 → 10 0
" 10 → Reset
5 V → Vcc
GND → Ground.

Vid 21: OpAmp Comp...

Vèd. - 04: Arduino + Bluetooth + Android = Awesome.

logic levels: 3.3V, 5V. TX = Transmit Pin
RX = Recieve Pin.



- R --> Pin8
- G --> Pin9
- B --> Pin10
- + --> 5V

Vèd-05: ~~1 RGB~~ Multiplex:

*1 RGB LED counts as 3 LEDs.

54 digital I/O pins.

$\boxed{\text{double cathods}}$
5 anode
5 cathode

Row one 8
Row two 7
Row Three 6
Row Four 5
Row Five 4.

Vid-06: Standalone Arduino Circuit!

4 components!

→ 16 ~~Mhz~~ MHz clock crystal

→ 22 pF capacitors (2) → Generate external clock signal.

→ 1 10kΩ resistor

→ 5 V.

Connections!

9, 10 → crystal

7, 20, 21 → 5 V

8, 22 → ground.

Problems!

→ No reset switch

→ Only 5 V input

→ No USB → serial conversion.

→ No short circuit, over voltage protection

~~2nd way!~~

Reset → A15

DP0 (RX) → A14

DP 1 (TX) → A13

DP 2 → A12

DP 3 → A11

DP 4 (PWM) → A10

5V → GND

GND → 5V

Crystal → 5V

" → DP13

DP 5 (PWM) → DP 12

DP 6 (PWM) → DP11 (PWM)

DP 7 → DP 10 (PWM)

DP 8 → DP9 (PWM)

2nd way!

TX → Pin 3
RX → " 2
Reset → " 1.

N.B/
No microcontroller is plugge in

Then,
TX → TX
RX → RX
Reset → Reset.

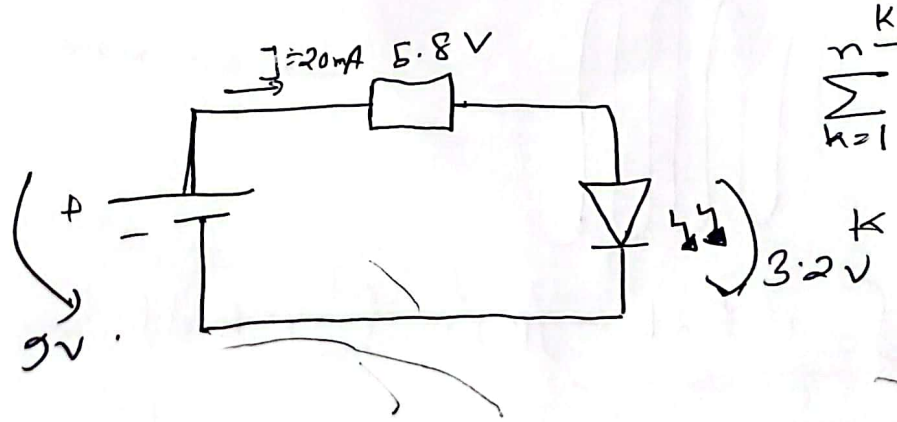
Ved - 07: Segment display:

2.1 V. 220Ω resistor.

7 segment display driver.

Pin 23 → 5 V
Pin 24 → 5V
} 4.7 kΩ rest

Ved - 08: LEDs and current limiting resistors:



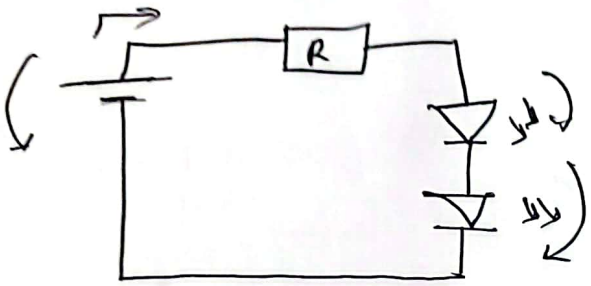
KCL:

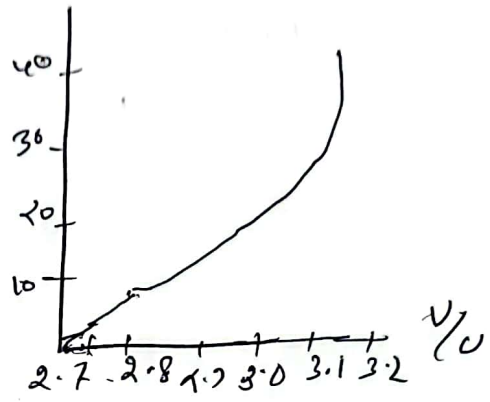
$$\sum_{k=1}^{n} V_k = 0$$

$9V = 3.2V + U_R$

$U_R = 9V - 3.2V = 5.8\,V$

$R = \frac{U}{I}$





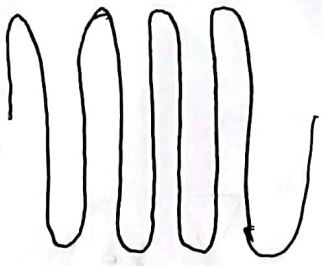
* One big resistor can't be used.

Ved-09: Diodes and Bridge rectifier.

Positive – ~~and~~ anode
ground → cathode

diode ⇒ AC → DC.

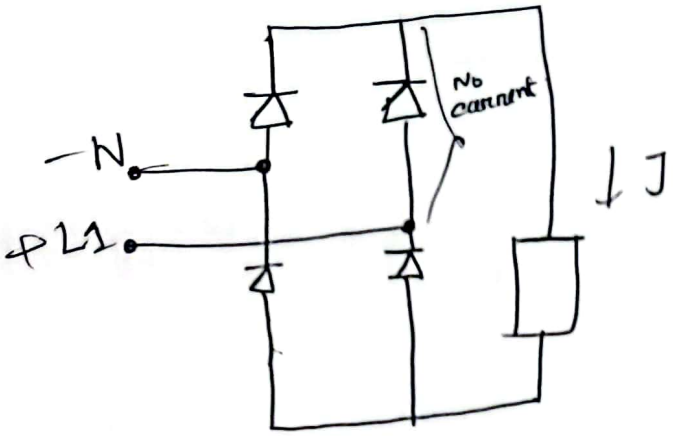
Transformer: 220 volt to 15 volt.



→ sin wave.

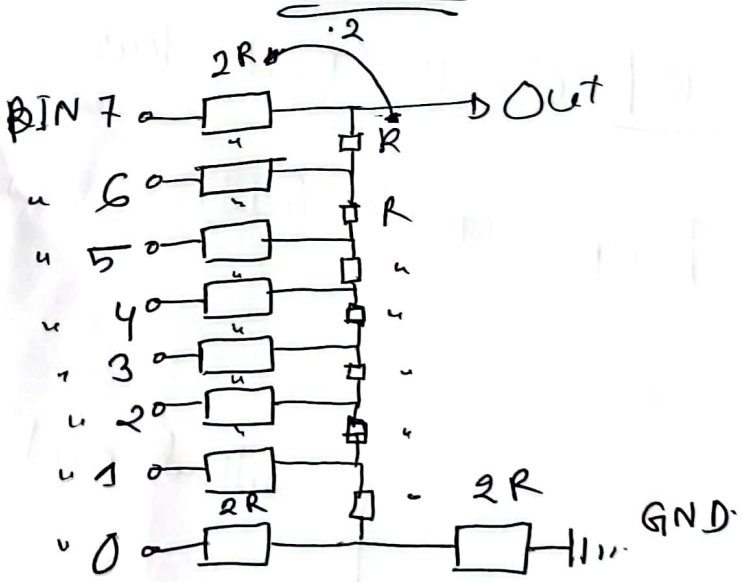
$P = \frac{1}{T}\int_0^T i^2 R\,dt \rightarrow I^2 R \quad I = \frac{1}{T}\int_0^T i^2 R\,dt$.

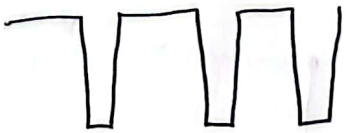
$I = \sqrt{\frac{1}{T}\int_0^T i^2\,dt} \rightarrow i = \hat{i}\sin(\omega t)$



Ved – 10: Digital to Analog Converter (DAC)

8 bit = 2^8 = ~~2 2~~ = 256





Vid 11| Sending SMS with Arduino: TC 35 GSM Module

Max - 6 volt.

Left → GND
Right → Module (input)

TX → TX DO
RX → RX DO
GND → GND

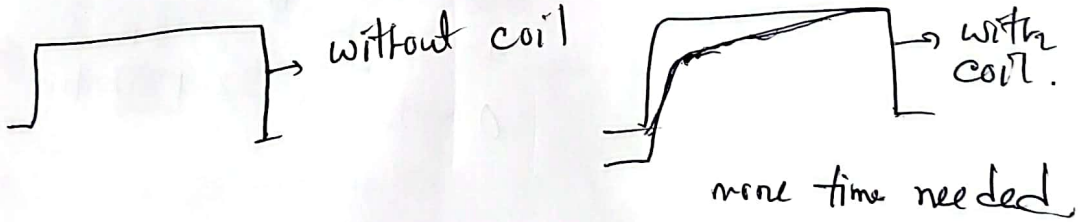
3.3 V.

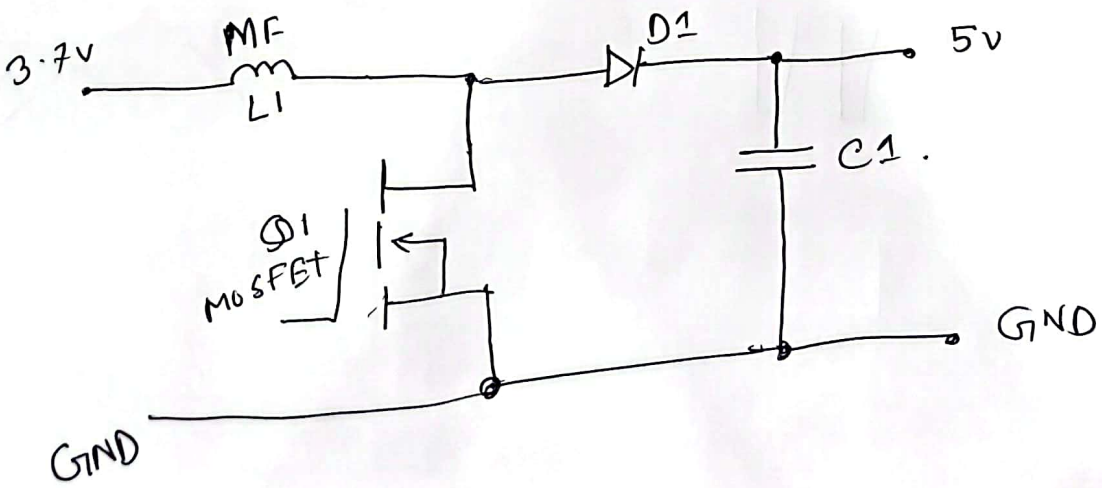
Vid - 12| Coils / Inductors.

current flow generates MF.

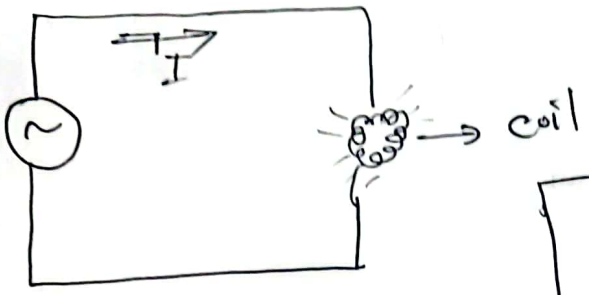
Current ↑ ↑ MF (megnatic field)

RLC meter





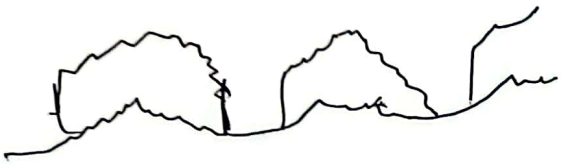
d _ Vid -13| Coils / Inductors: Reactance:



Freq Inductance

$$X_L = 2\pi f L$$

Inductive Reactance

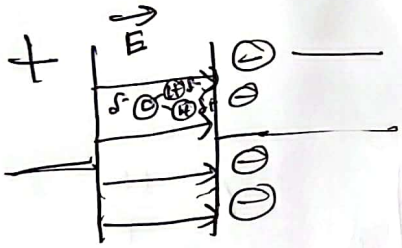


ocilattions.

vid - 14| capacitors: (⊣⊢).

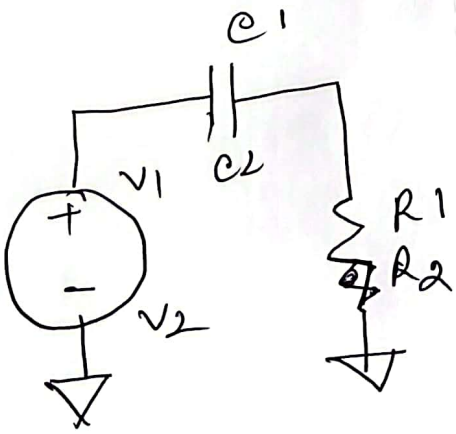
$W = Q \cdot U$

$W = C/2\, U^2$.



$$X_C = \frac{1}{2\pi F C}$$

Capacitor reactance

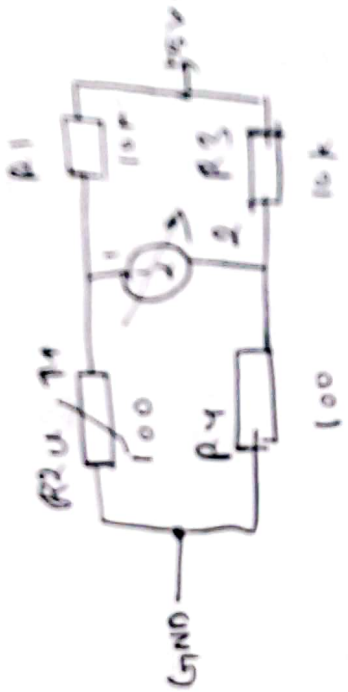


... (Operational Amplifier)

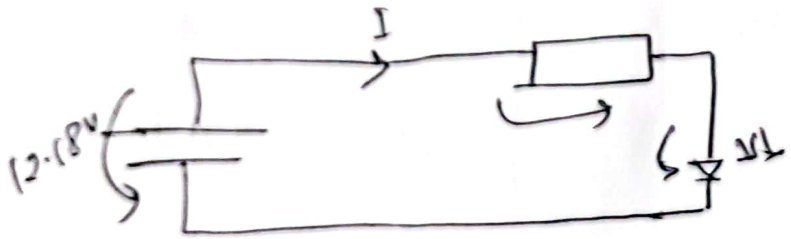
Vid - 15 | Temp measurement NTC, PT100, wheatstone bridge

$U = RI$

~~+1°C : R = 100Ω (1+~~



Vid - 16 : Resistor :

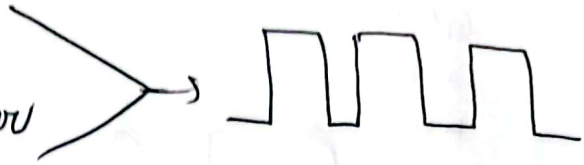


$R = \frac{U}{I}$

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



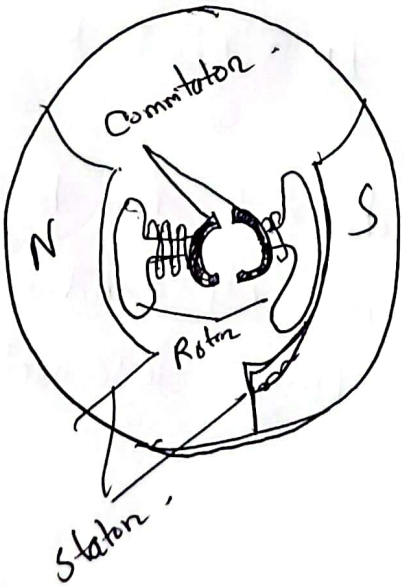
$$|X_C| = |X_L|$$

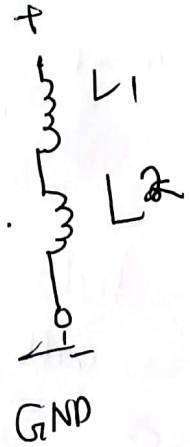
$$\frac{1}{\omega C} = \omega L$$

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

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

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

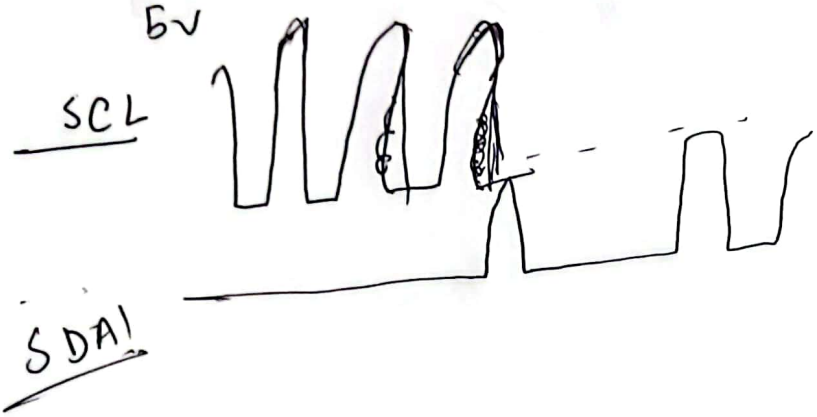




Vid - 191 I2C and its using:

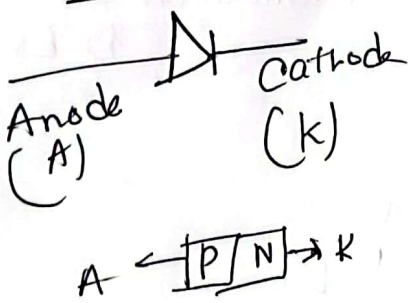
Voltage:	Binary state (0,1)
GND (0 V) →	0
5V →	1

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

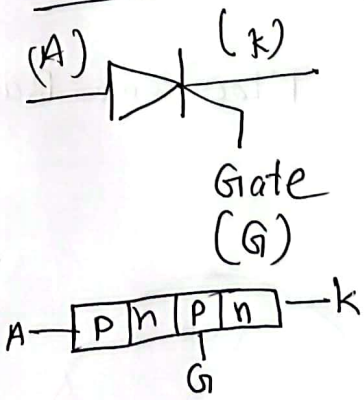


Vid 20] Thyristor, Triac, Phase Angle Control,

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 opams, ~~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.

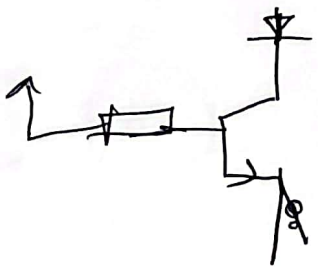
Rule # 3:

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%.

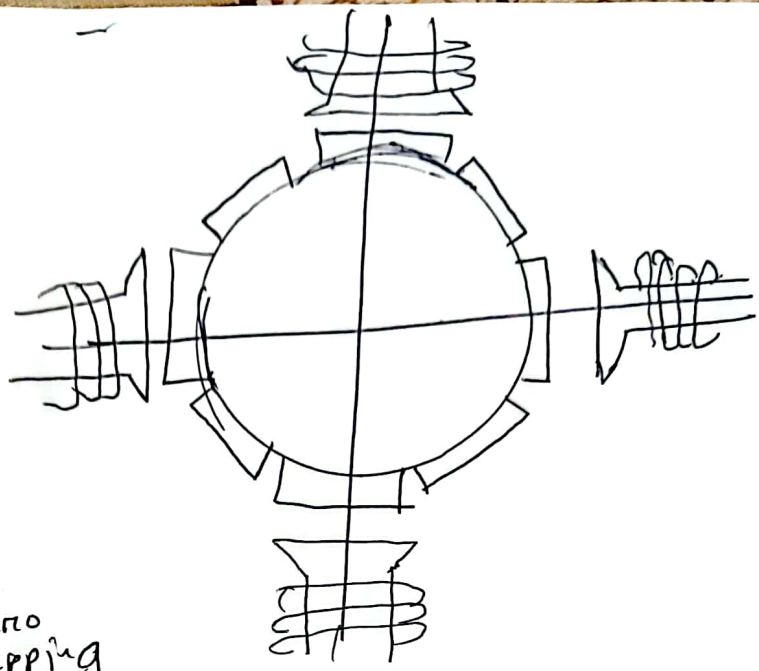
MOSFET → n-channel → common (3 pin Gate drain source) → 10kΩ.
MOSFET → p-channel

cathode → drain
anode → supply voltag
GND → Gate

ved 24) Stepper Motors and the uses?

Vid 24:

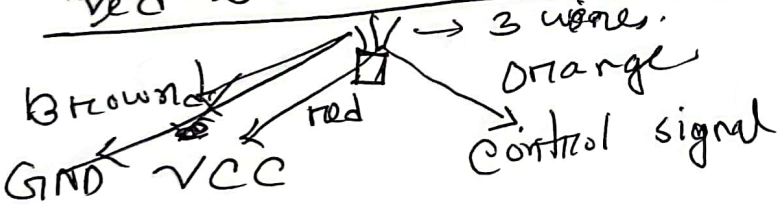
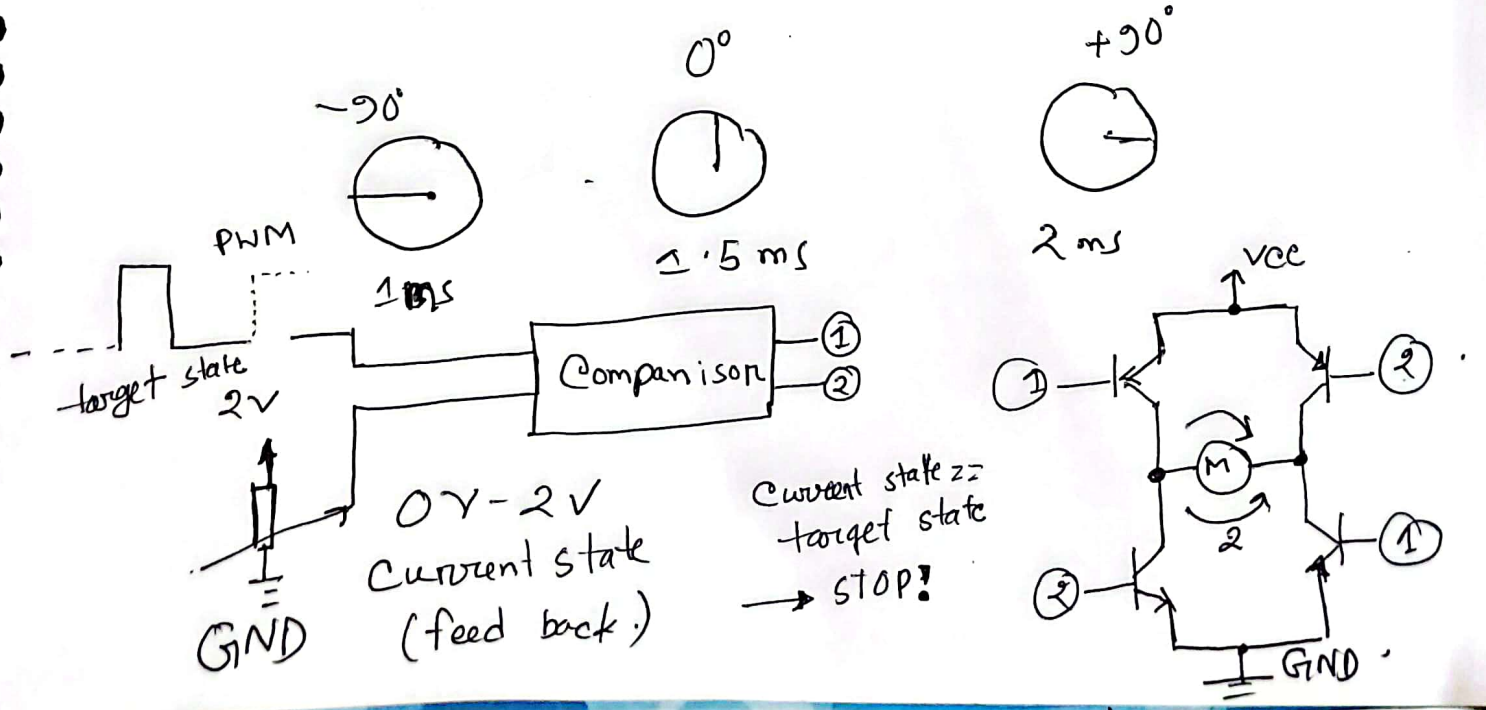
Code:



Steps / rotations.

full → 200
half → 400
1/4 → 800
1/8 → 1600
1/16 → 3201

} micro stepping

Vid-25: Servos and uses:

VCC ≅ 4.8 ~ 7.2 V.