Embedded systems and IOT

Lab 1
Part 2

How to Properly Implement

Logic Circuit

on Breadboard

without Implementation Errors

(Lab Guide)

Sources of Implementation Errors

ICs are not well fitted

ICs Broken Pins

Wrong Pins Enumeration

Wrong Polarity (specially LEDs)

Missed Connections

Connections to Wrong ICs Pins

No Power is Supplied to ICs

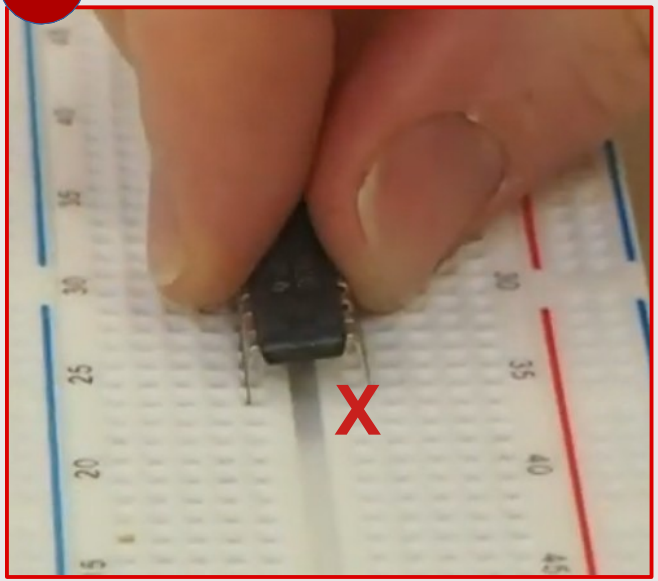
Float Inputs (Not connected Pins are wrongly assumed as Logic “0”)

ICs are not well fitted

Fit ICs on the Breadboard

For Brand New ICs, Adjust Pins spacing in order to be smoothly fitted in breadboard

1



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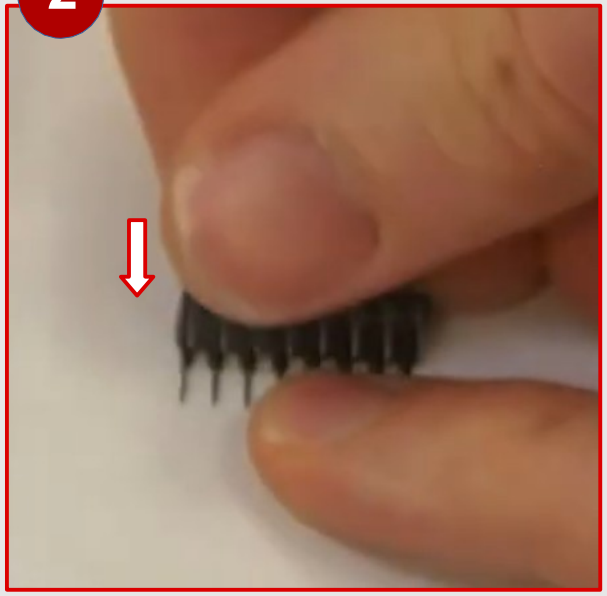

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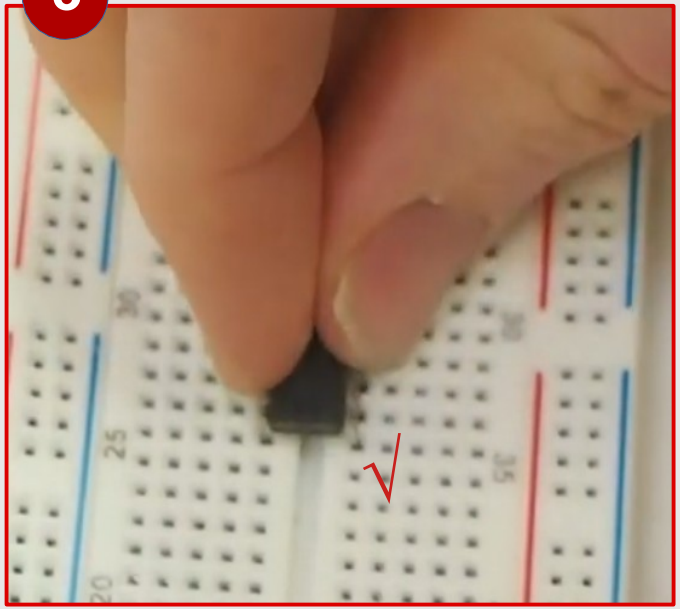
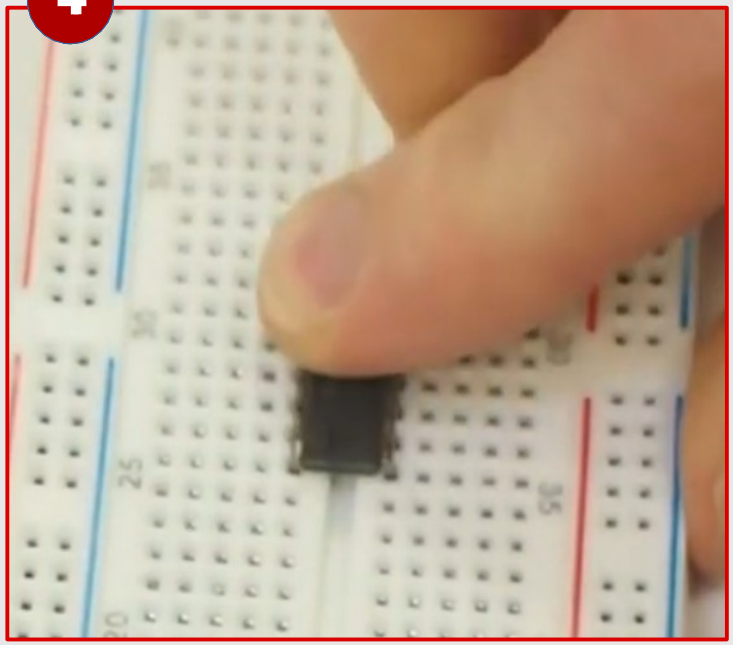


Fit ICs on the Breadboard

Push from both sides to make sure all pins are fitted

4



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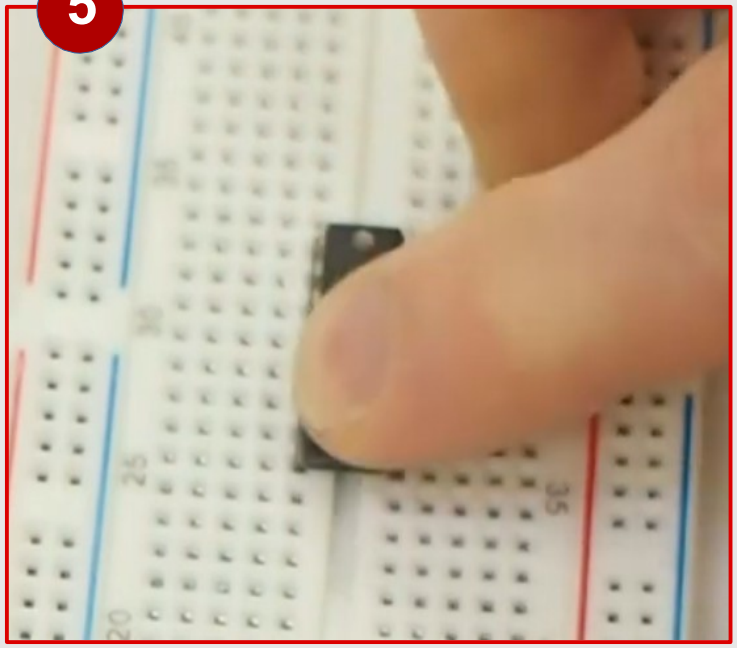
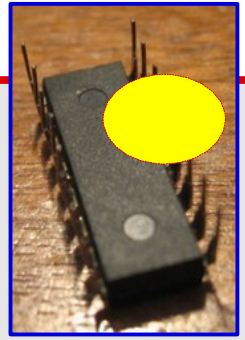
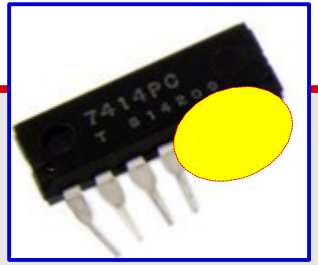


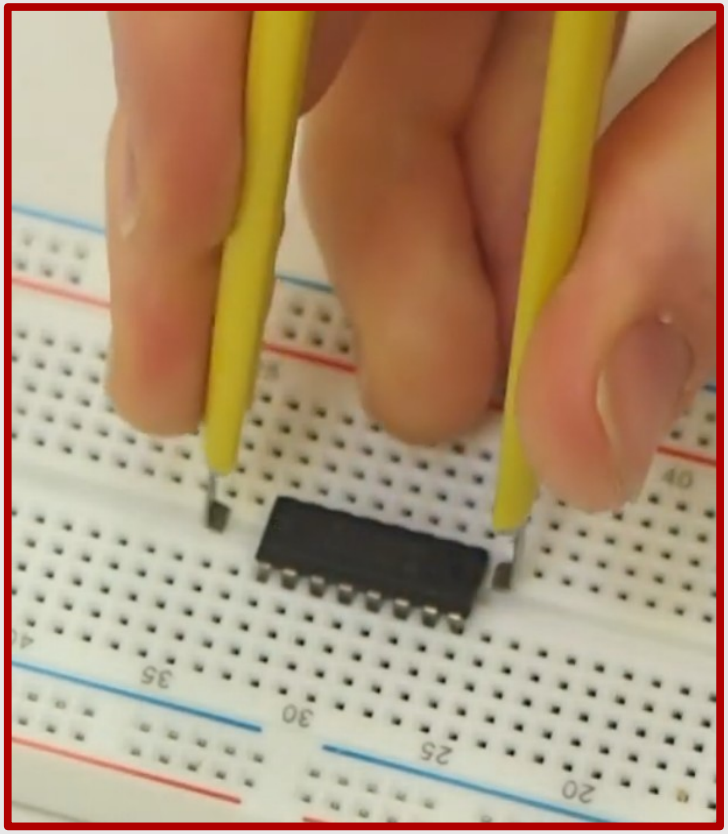
ICs Broken Pins

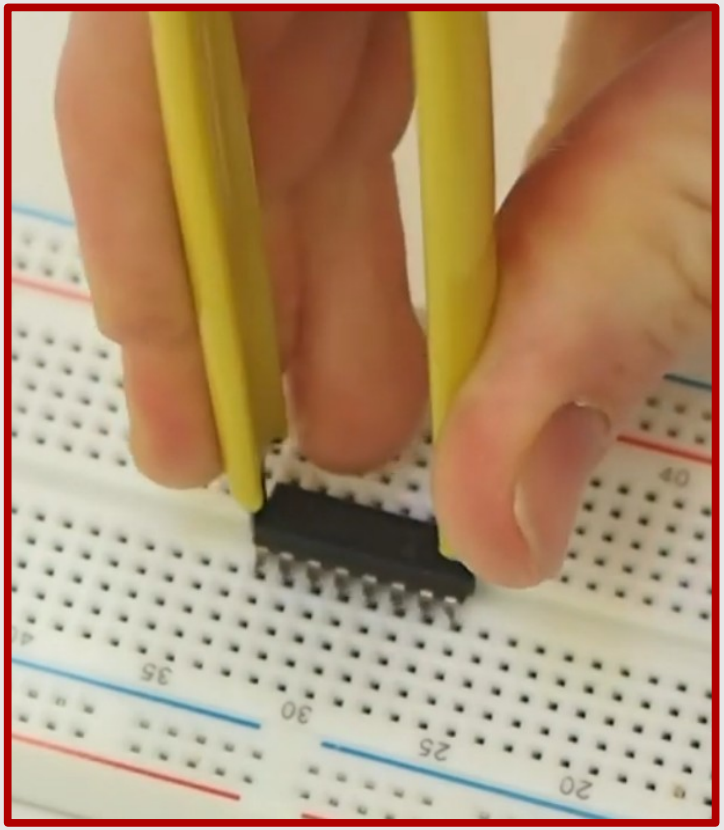
Take care during Pull Up the ICs from Breadboard





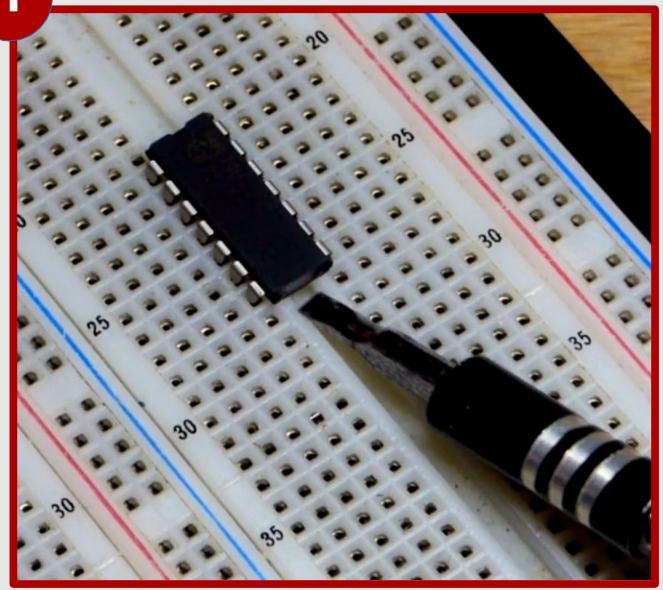
Use Proper Tool to Pull Up Chips from Breadboard

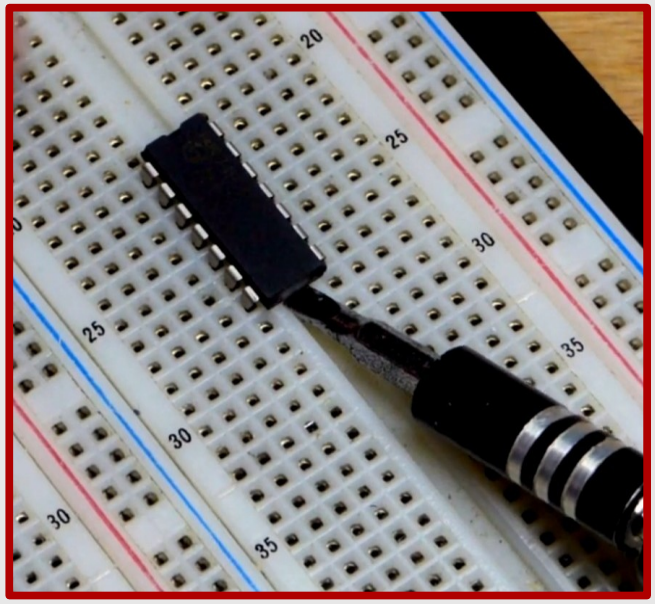




Use flat small screw driver

1

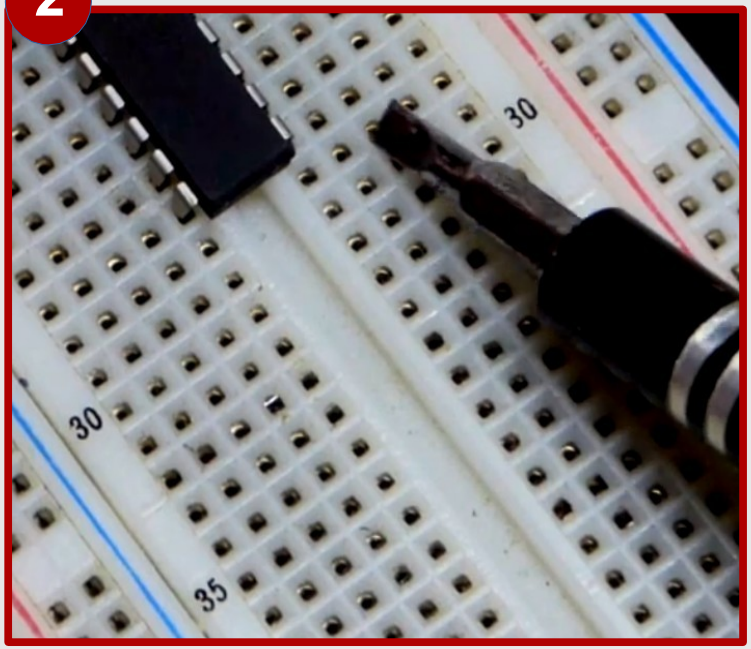


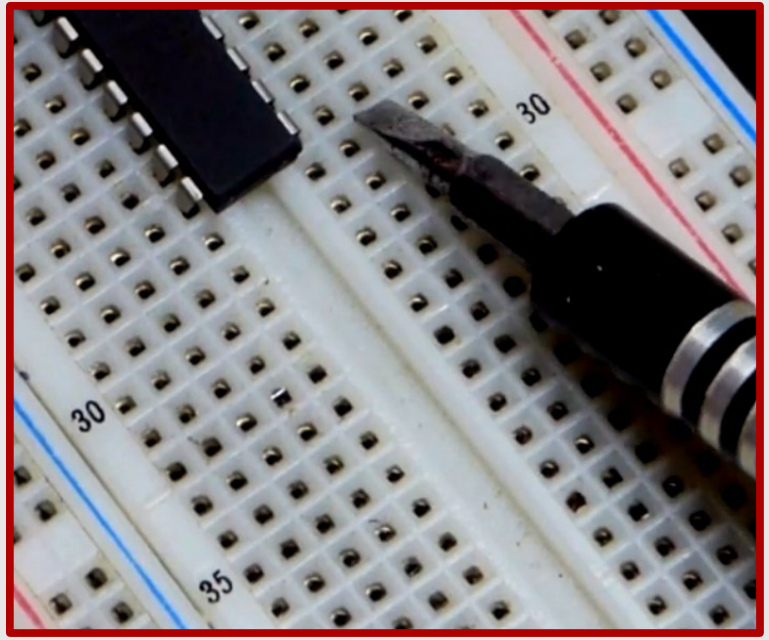


Use flat small screw driver

Twist the screw driver with care

2

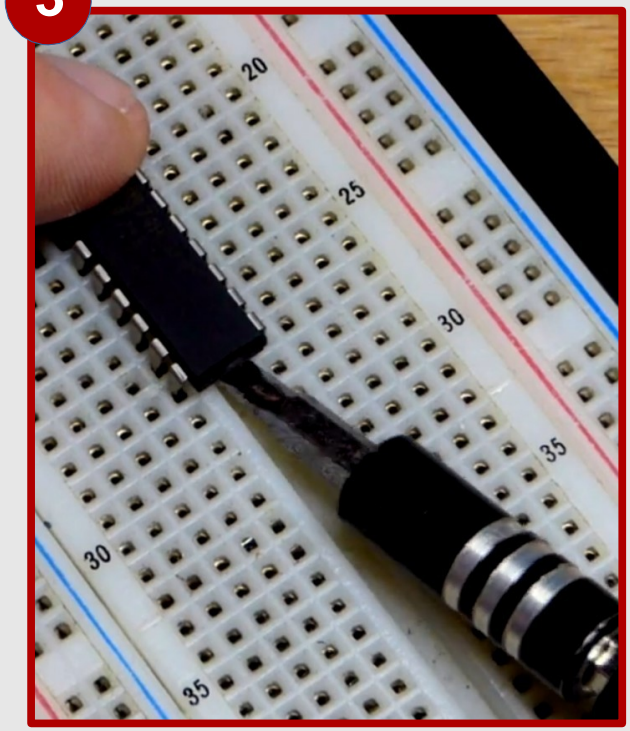


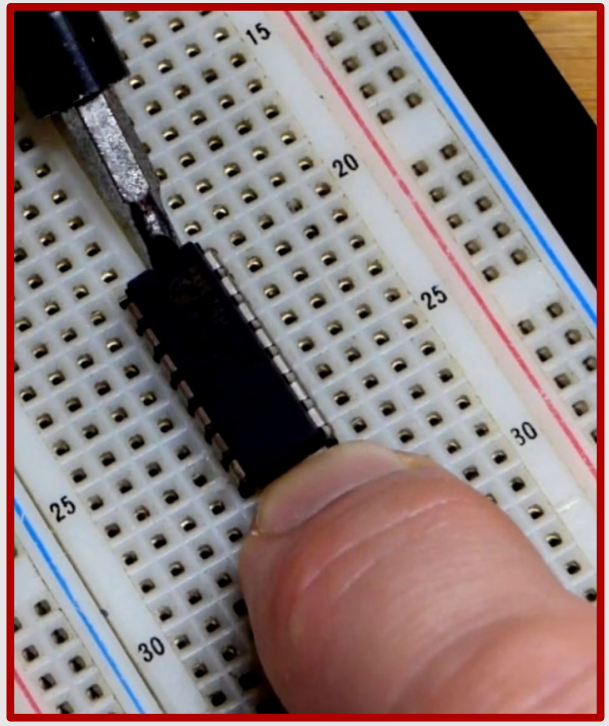


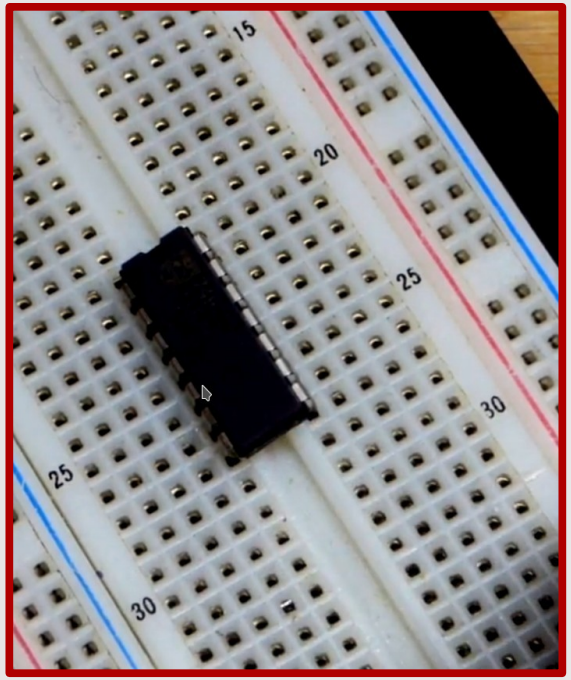
Use flat small screw driver

Repeat from Both Sides – Use fingers for support

3



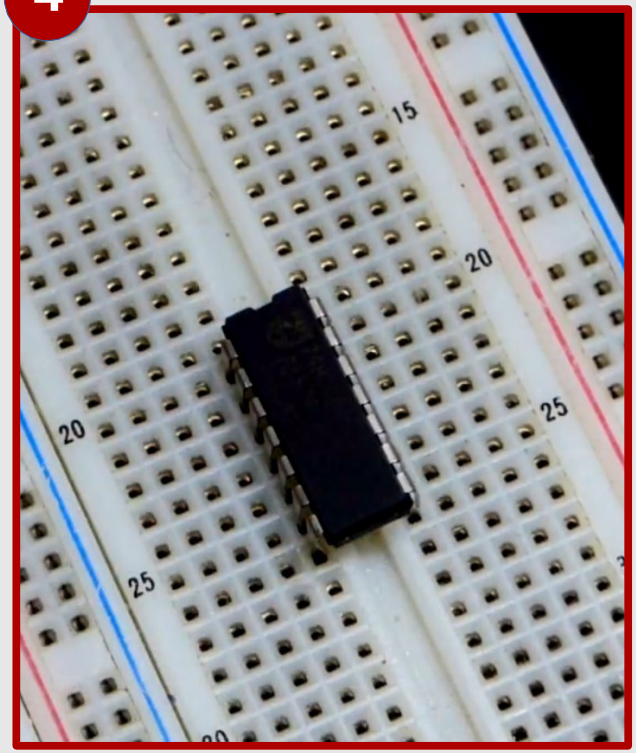


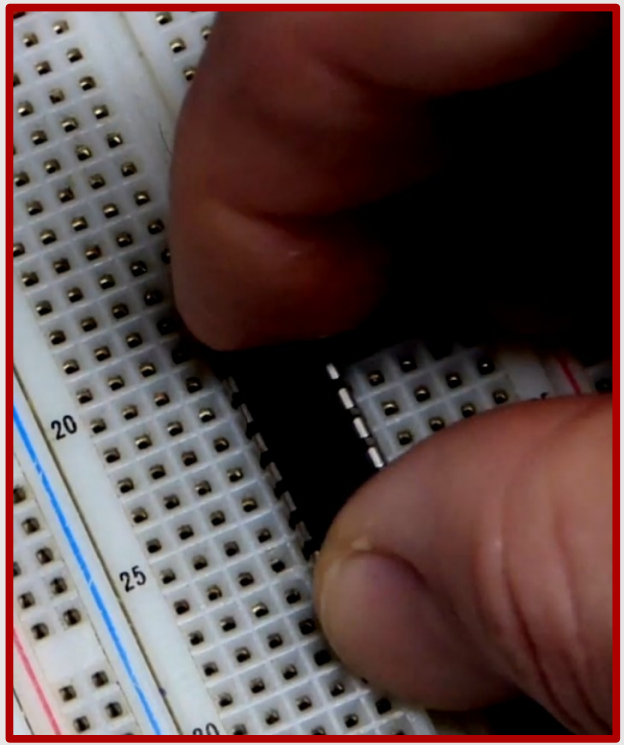


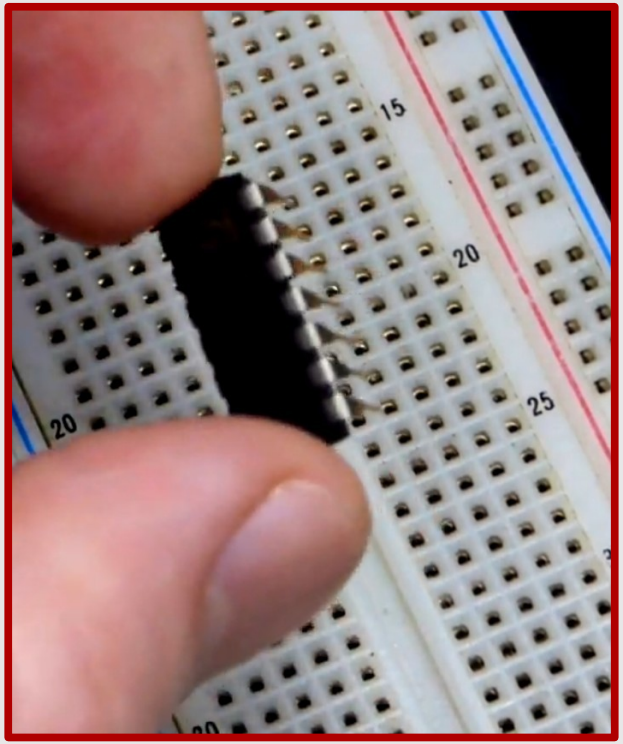
Use flat small screw driver

When being Loose , Pull-up with your fingers

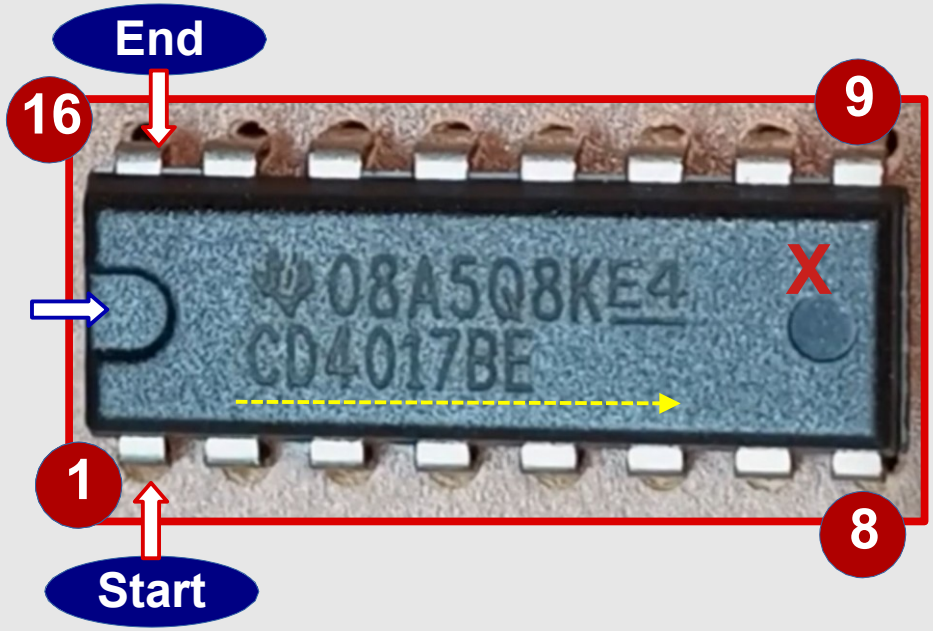
4



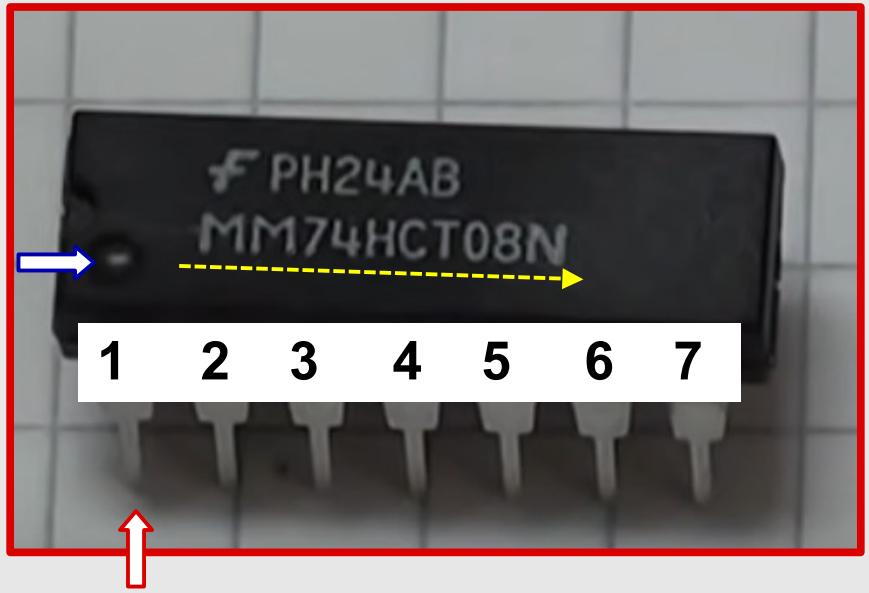


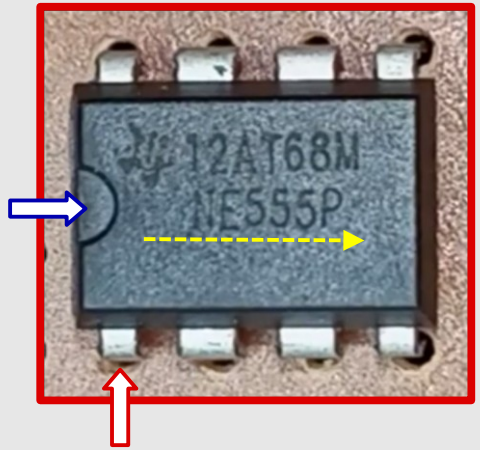


Wrong Pins Enumeration



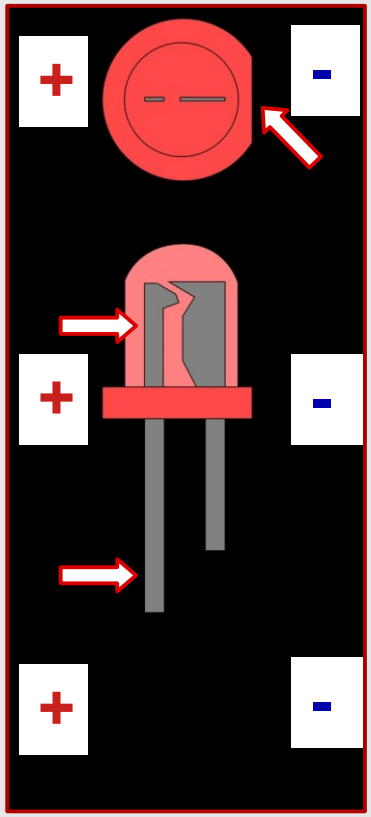
Counter clockwise

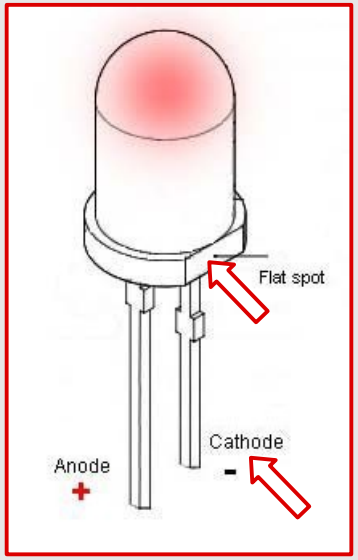


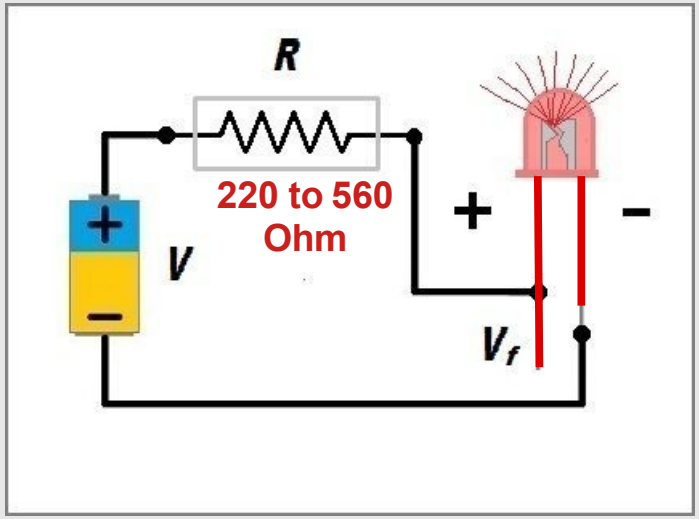


Wrong Polarity (of LEDs)

Led Polarity







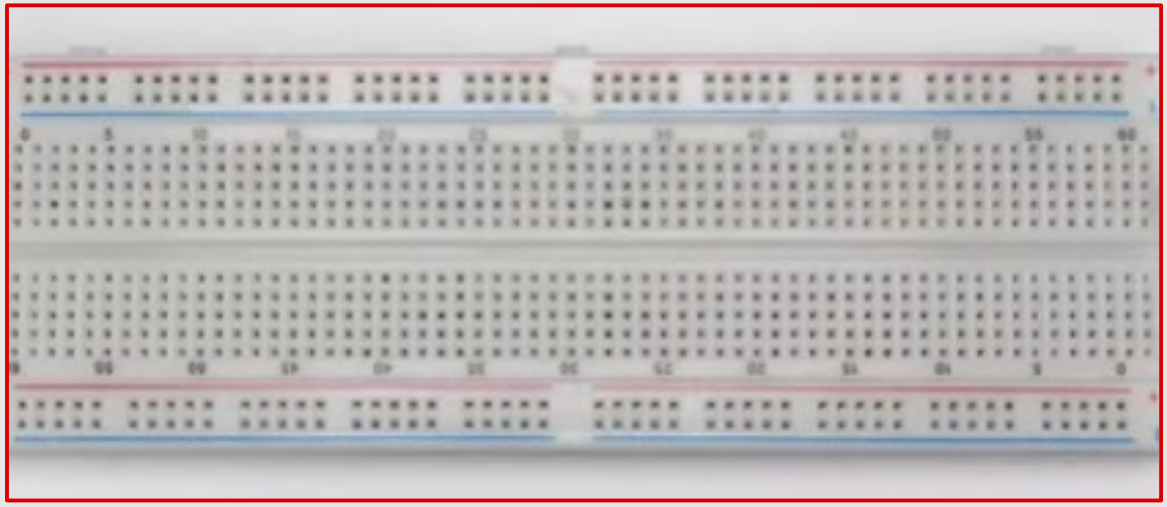
Remember to add resistor in series with LED

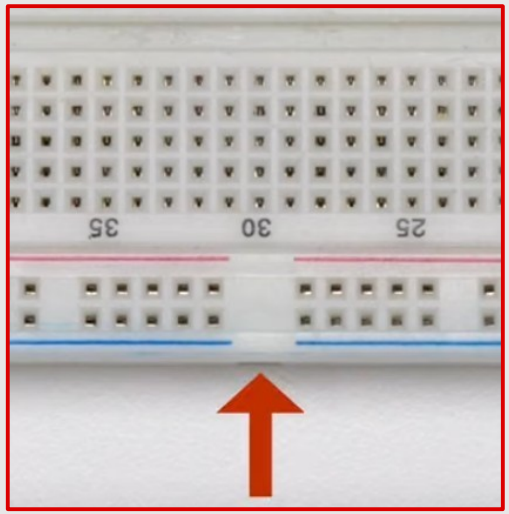
How to Implement a Given design

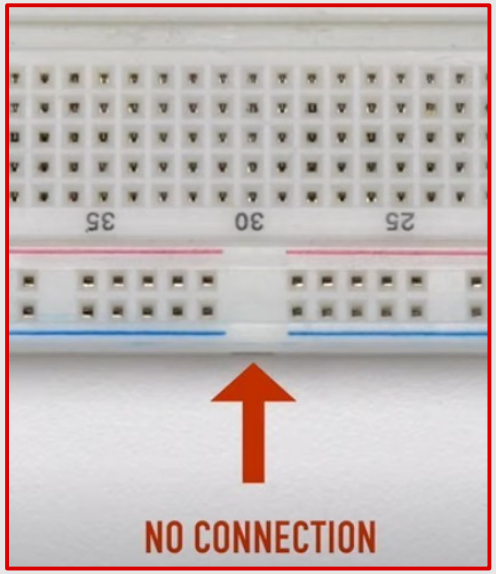
without errors

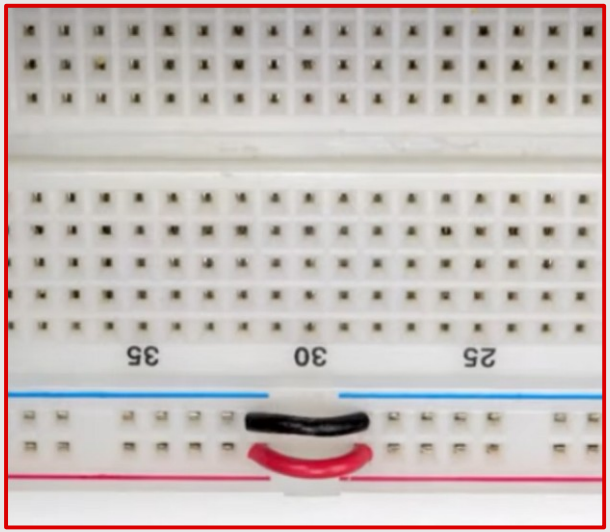
NO Missed Connections

NO Connections to Wrong ICs Pins





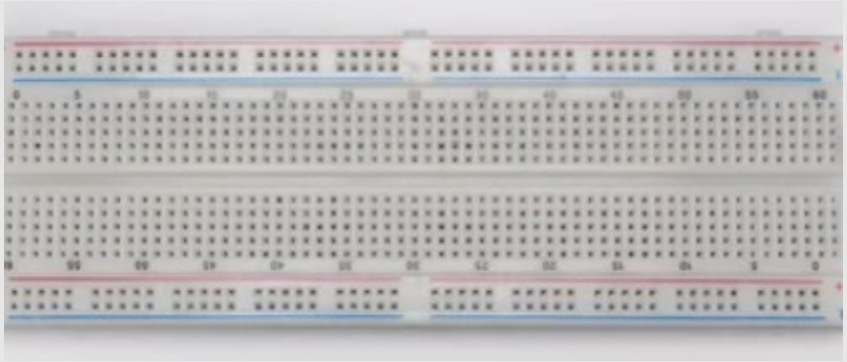


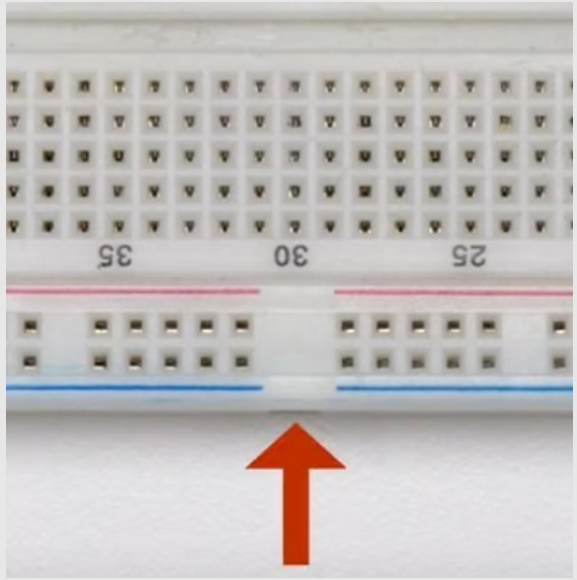


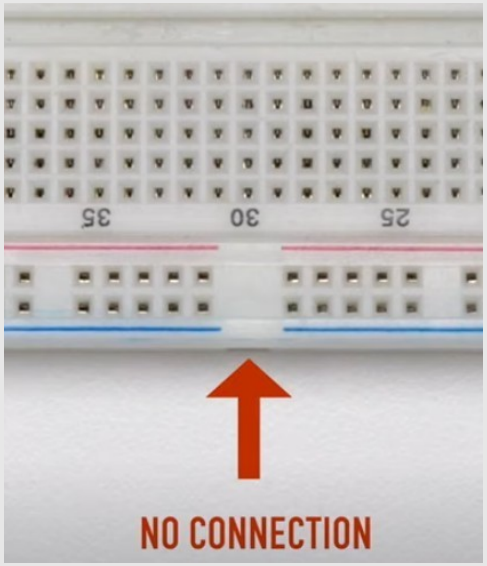
You have to connect

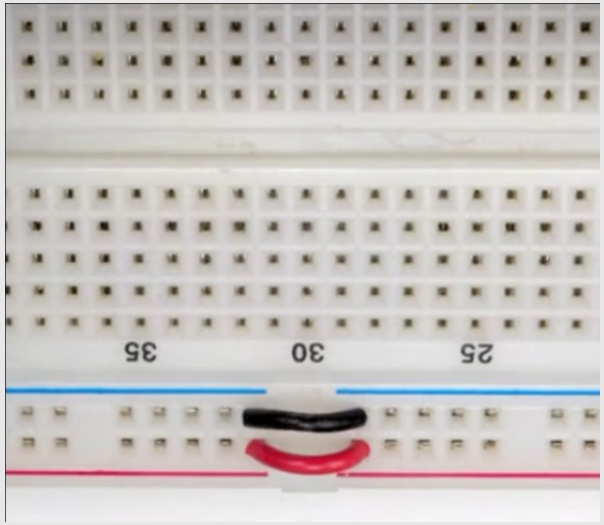
The two segments

Manually




35
30
25


35
30
25
NO CONNECTION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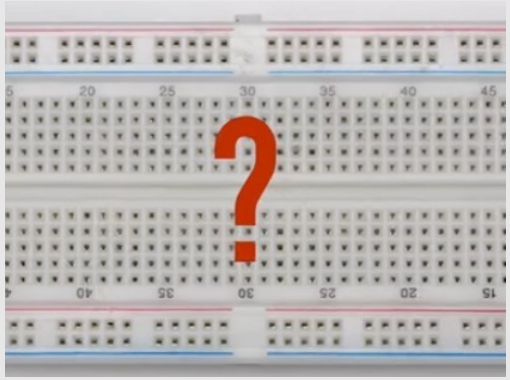
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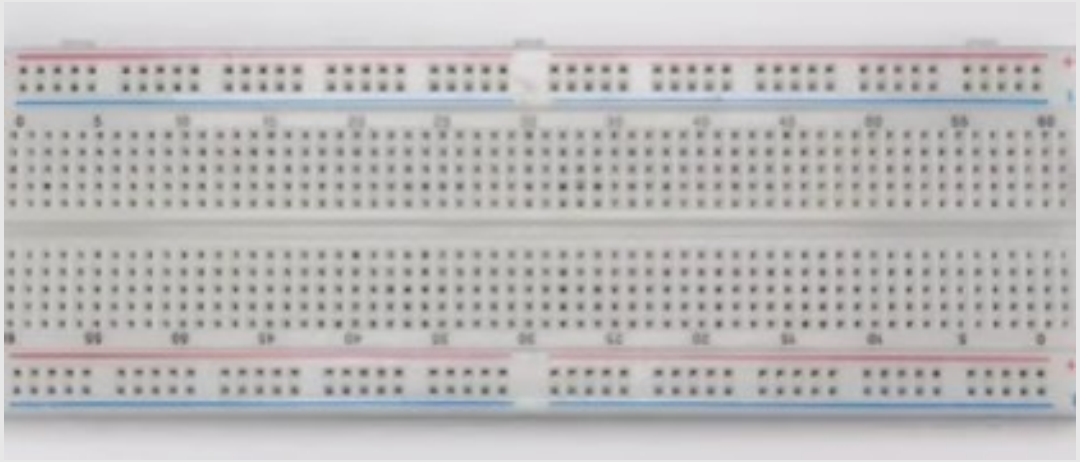
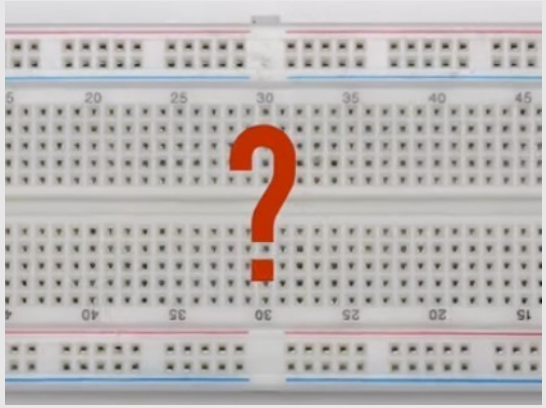
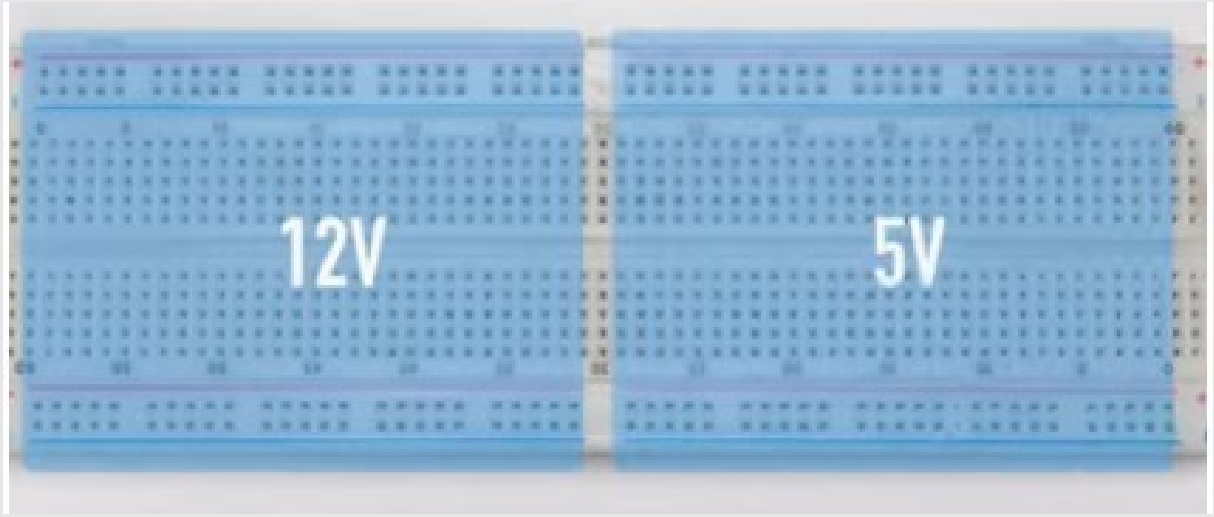






Flexibility to use

TWO different Voltages

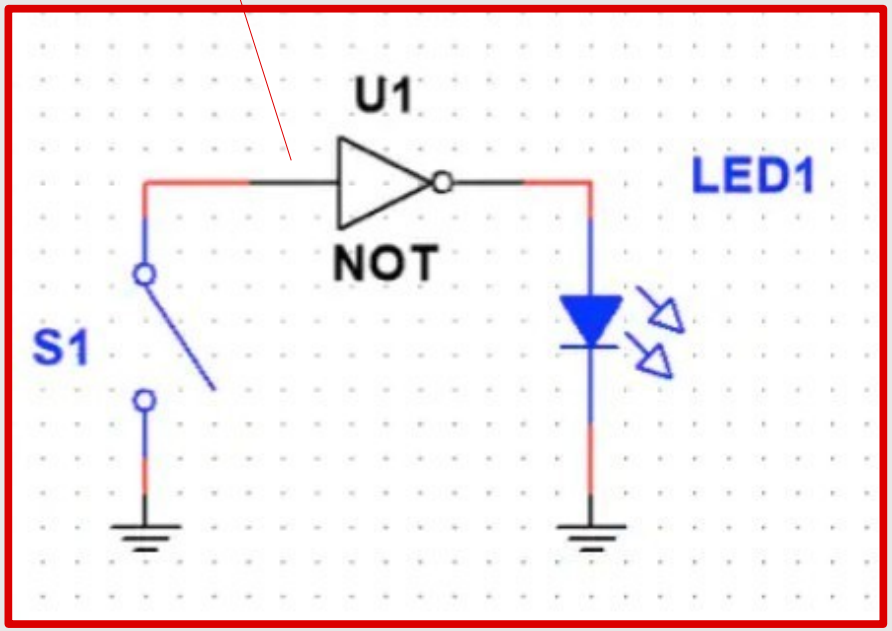
Float inputs

(Not connected Pins are wrongly assumed as Logic “0”)

Float and Non-float Inputs

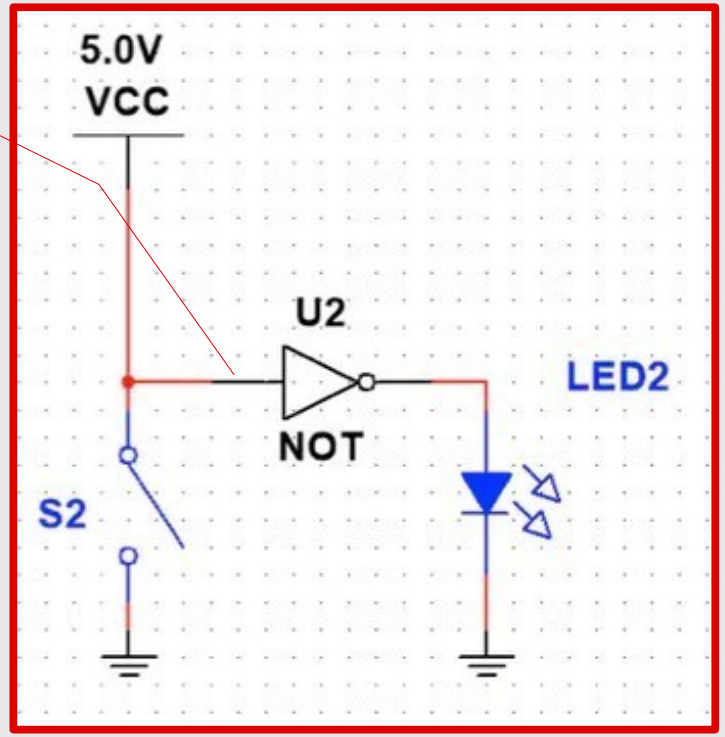
Open Switch
Float Input
(Noise Based)

Closed Switch
GND Input ==”0”



Open Switch
VCC Input ==”1”

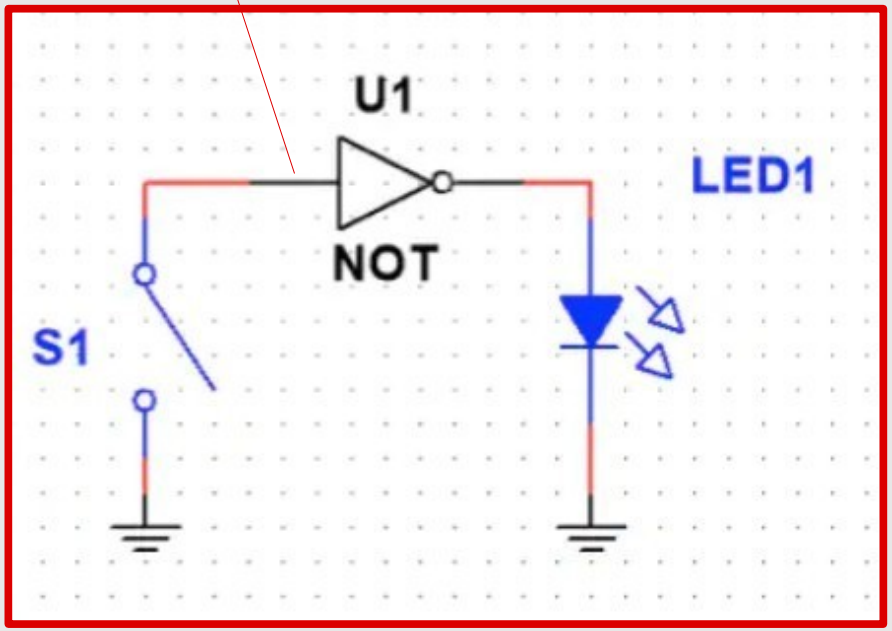
Closed Switch
GND Input ==”0”



Float and Non-float Inputs

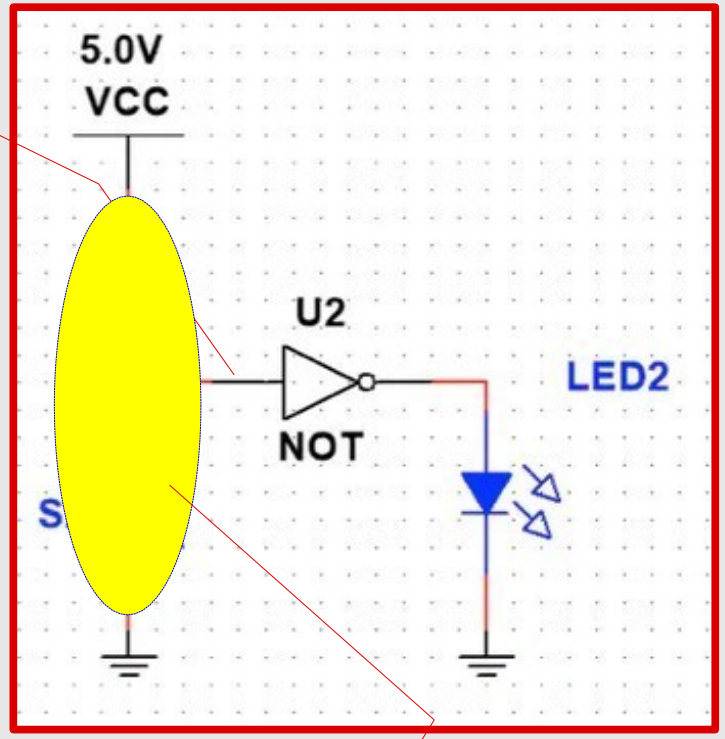
Open Switch
Float Input
(Noise Based)

Closed Switch
GND Input ==”0”



Open Switch
VCC Input ==”1”

Closed Switch
GND Input ==”0”

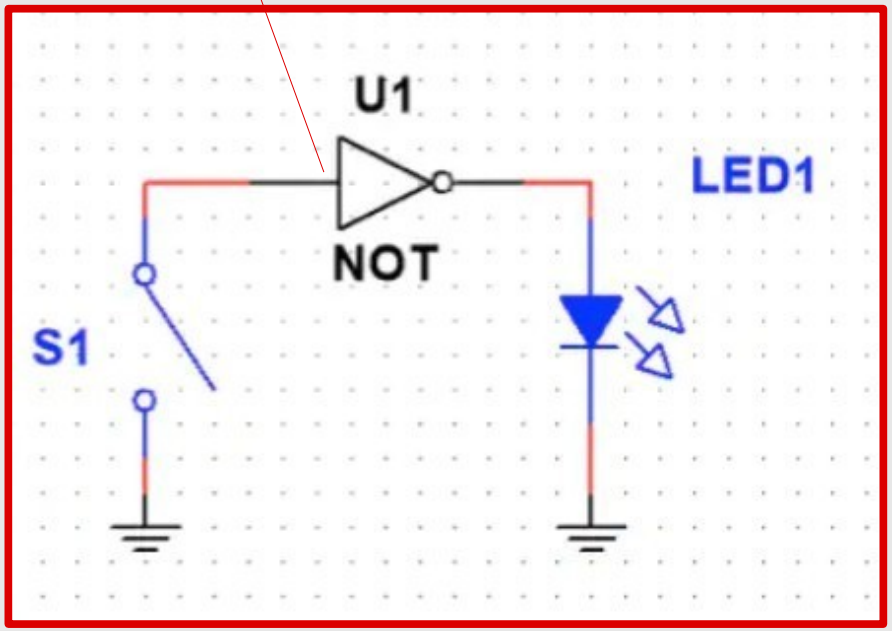


Closed Switch
==
Short
Circuit ???

Float and Non-float Inputs

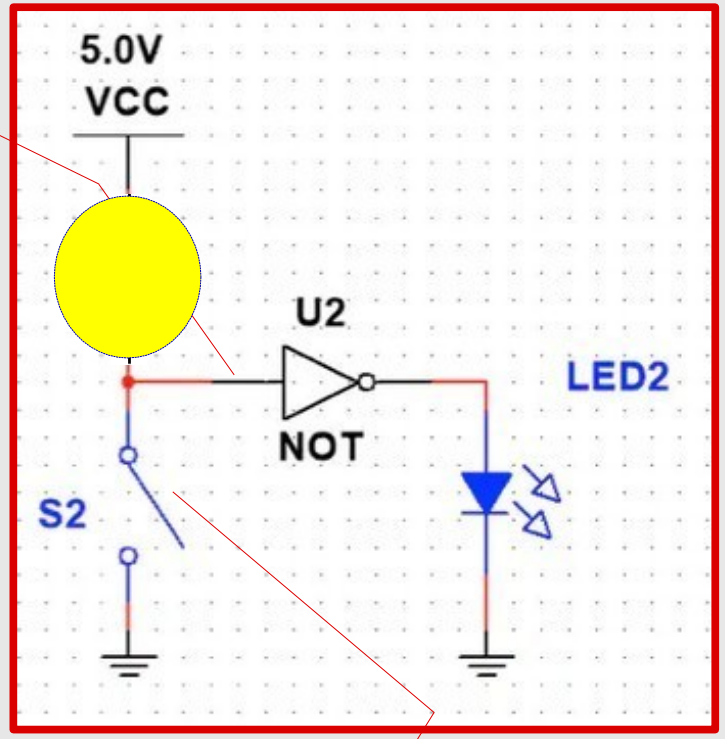
Opened Switch
Float Input
(Noise Based)

Closed Switch
GND Input ==”0”



Opened Switch
VCC Input ==”1”

Closed Switch
GND Input ==”0”

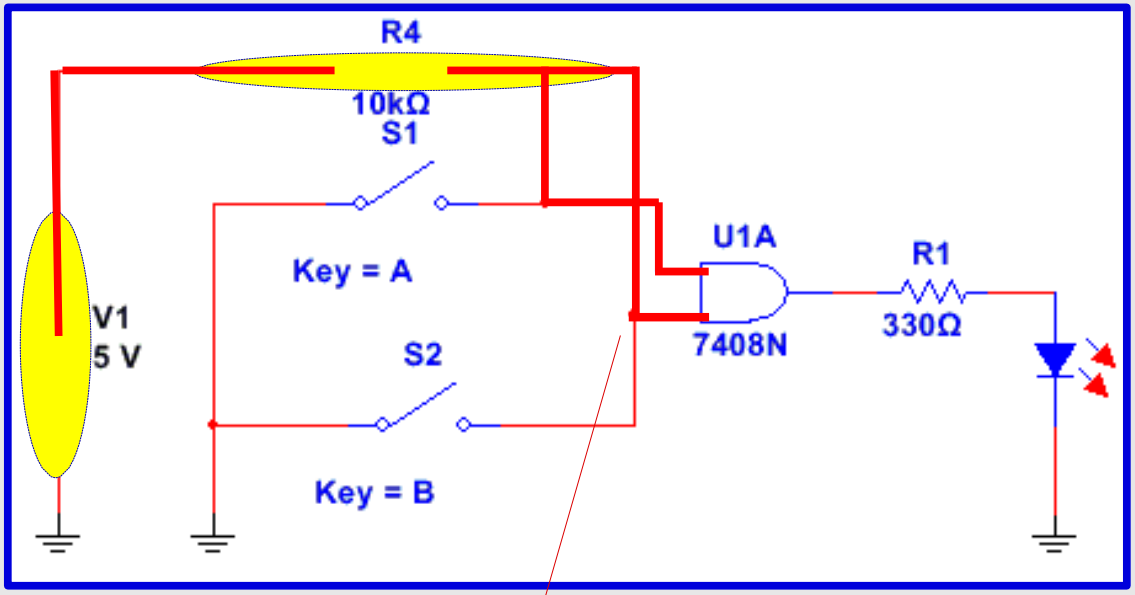


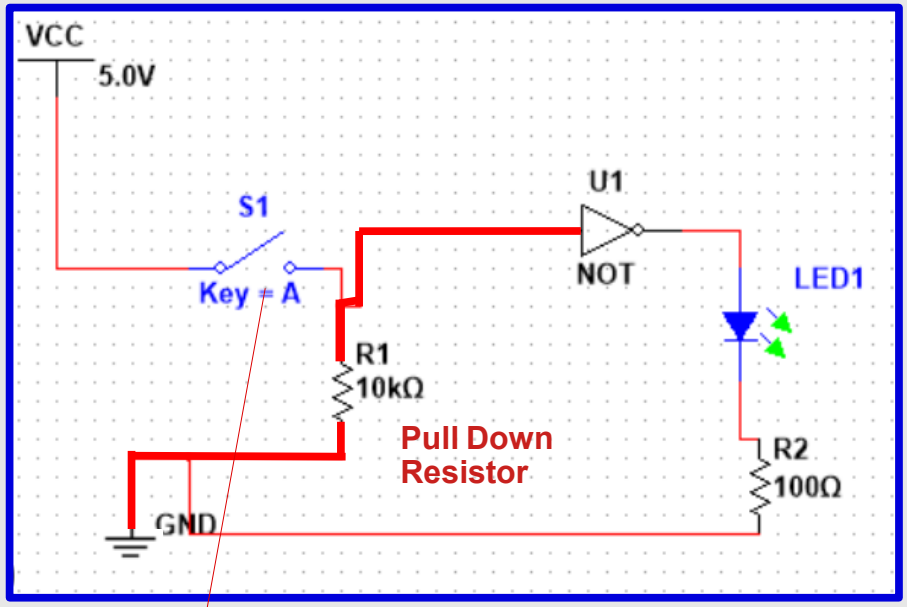
Closed Switch
==
NO Short Circuit

Float and Non-float Inputs

Pull Up and Pull Down Resistors

Pull UP Resistor





Opened Switch
VCC Input == "1"

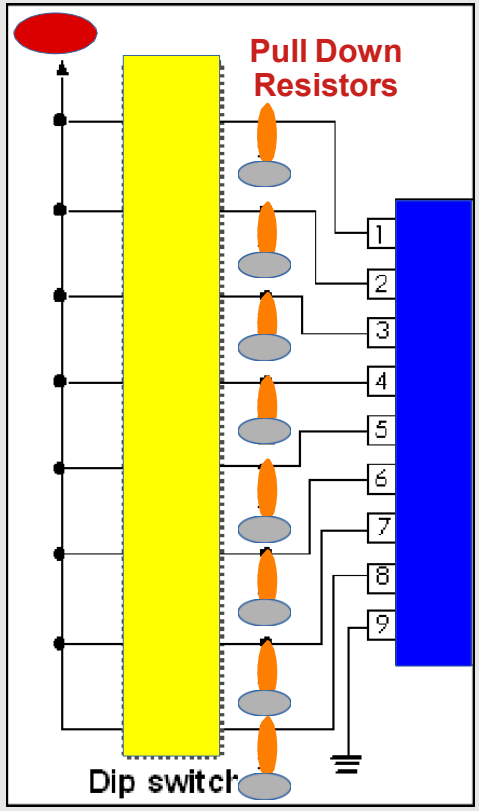
Closed Switch
GND Input =="0"

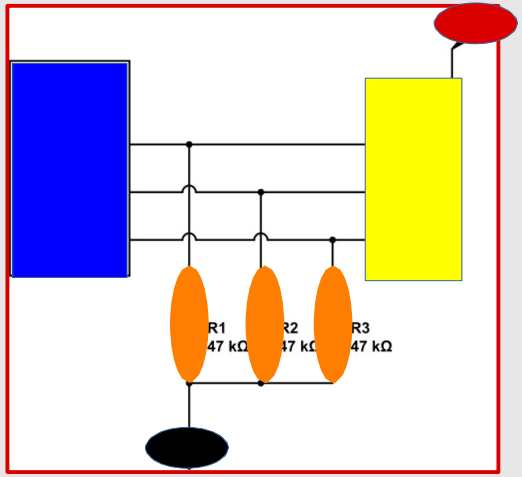
Opened Switch
GND Input == "0"

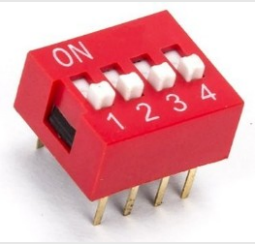
Closed Switch
VCC Input =="1"

Float and Non-float Inputs

Dip Switches with Pull Up and Pull Down Resistors







Pull UP Resistors