

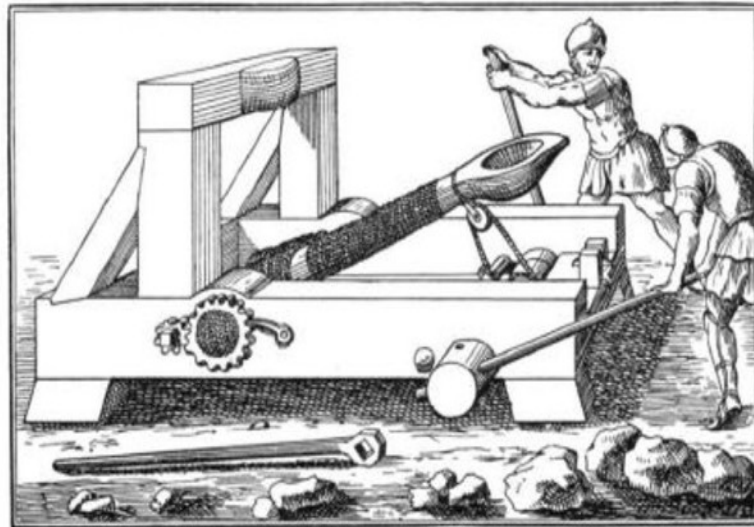


**DEPARTMENT
OF
ELECTRONICS AND COMMUNICATION ENGINEERING**

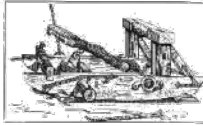


THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

**Handout/Assignment-
for
Engineering Design Project-I (UTA013)**



INSTRUCTOR INCHARGE



ASSIGNMENT - 2

Study of ICs

Exercise 1 – To verify the function tables of CD4027 and CD4081 ICs.

Hardware/Software Required

Breadboard

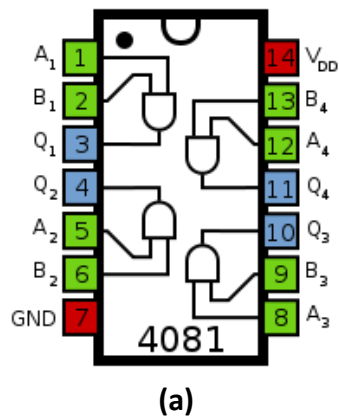
CD 4027 and CD4081

Single core connecting wires

Tinkercad Software tool (<https://www.tinkercad.com/>)

Theory

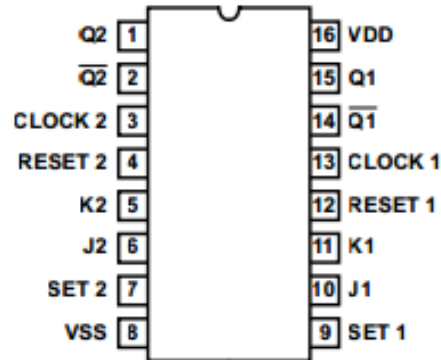
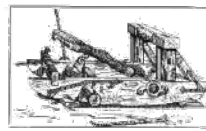
The data sheet of CD4027 and CD4081 is given below.



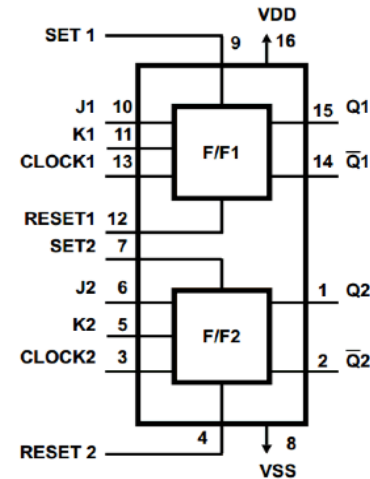
Input 1	Input 2	Output
0	0	0
0	1	0
1	0	0
1	1	1

(b)

Figure 1: Datasheet of CD4081 IC (a) pin diagram (b) functional truth table












(a)

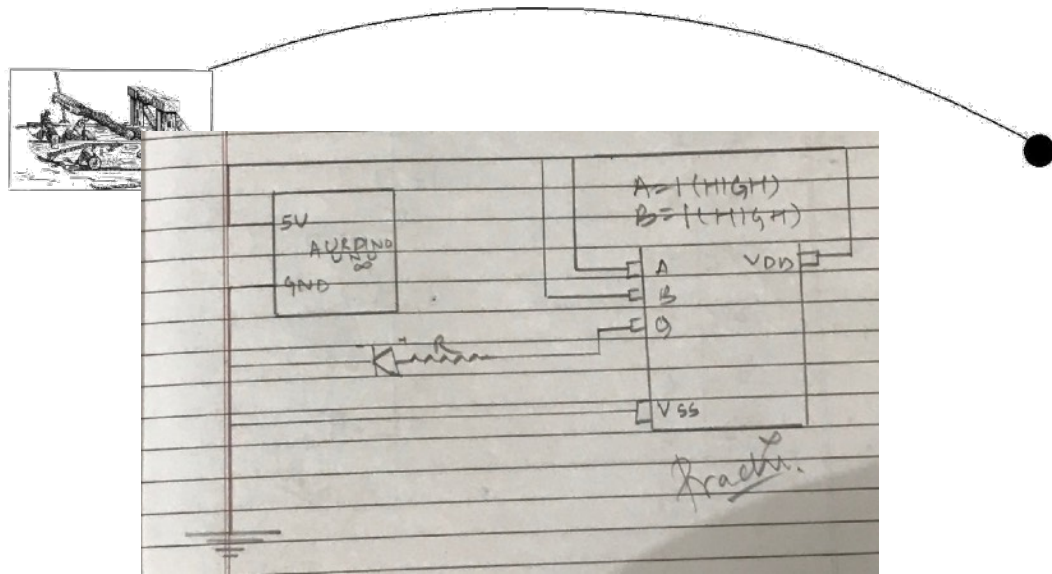


(b)

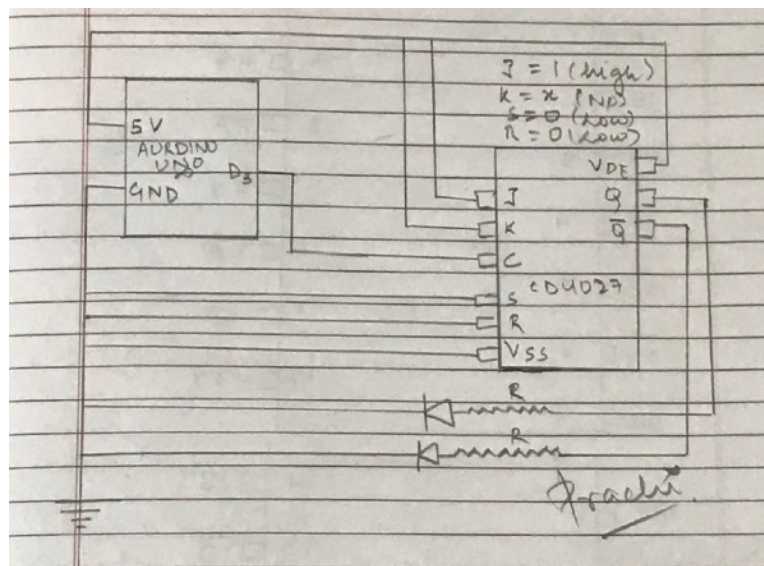
Figure 2: CD4027 IC (a) pin diagram (b) Internal architecture

Trigger	Inputs		Output				Inference
			Present State		Next State		
CLK	J	K	Q	Q'	Q	Q'	
	x	x	-		-		Latched
	0	0	0	1	0	1	No Change
			1	0	1	0	
	0	1	0	1	0	1	Reset
			1	0	0	1	
	1	0	0	1	1	0	Set
			1	0	1	0	
	1	1	0	1	1	0	Toggles
			1	0	0	1	

Schematic:
CD4081



CD4027



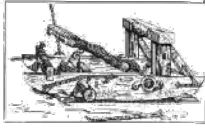
Reflections (Conclusions):

We got to know the verification of the truth table using AND and JK flip flop through hardware component.

We understood set, preset & toggling condition in J/K flip flop.

We learnt how to use IC to give different output.

Prachi



ASSIGNMENT - 2

Study of Sensors

Exercise 2

- A. Demonstrate the working of IR sensors and receiver and display output using LED.
- B. Use the two pair IR sensors of Mangonel to combine the two sensors output into one signal.

Hardware

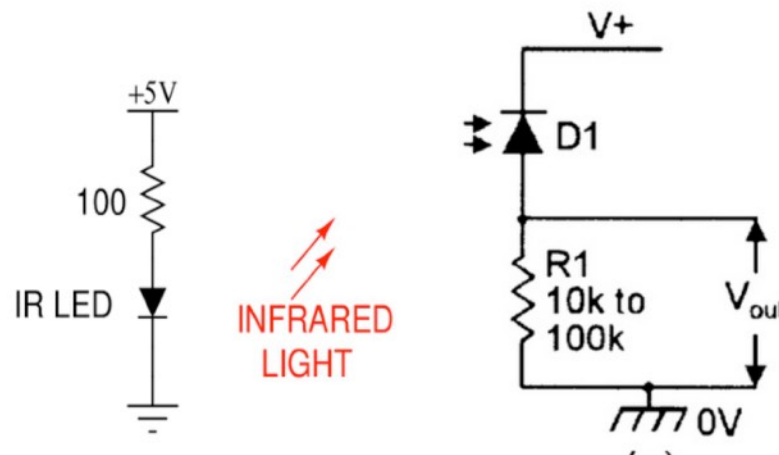
Bread Board, Power supply

Resistances and LED

IR transmitter and Receiver(Photodiode), Single core connecting wires

Theory

The figure below shows an IR pair in which IR LED emits infrared light which is received by photo diode D1 and the output voltage across resistor R1 is high. When we block the flow of light then the output voltage becomes low.



Reflections (Conclusions):



learnt biasing in photocensor.

IR sensor helped to understand properties of transmitter & receiver.

IR sensor even works without arduino coding by playing arduino in USB port. *Prachi*

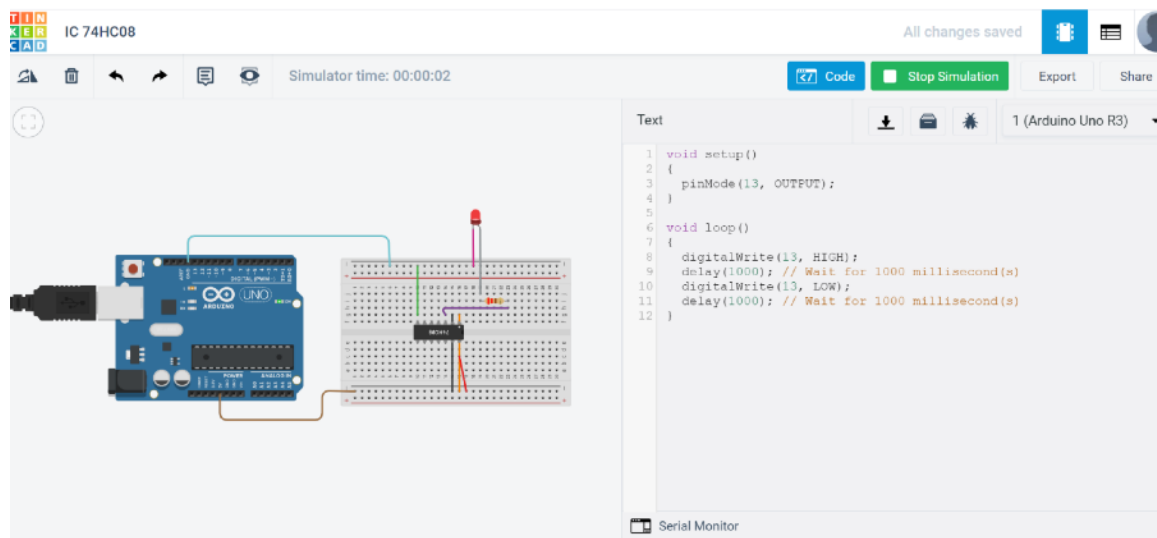
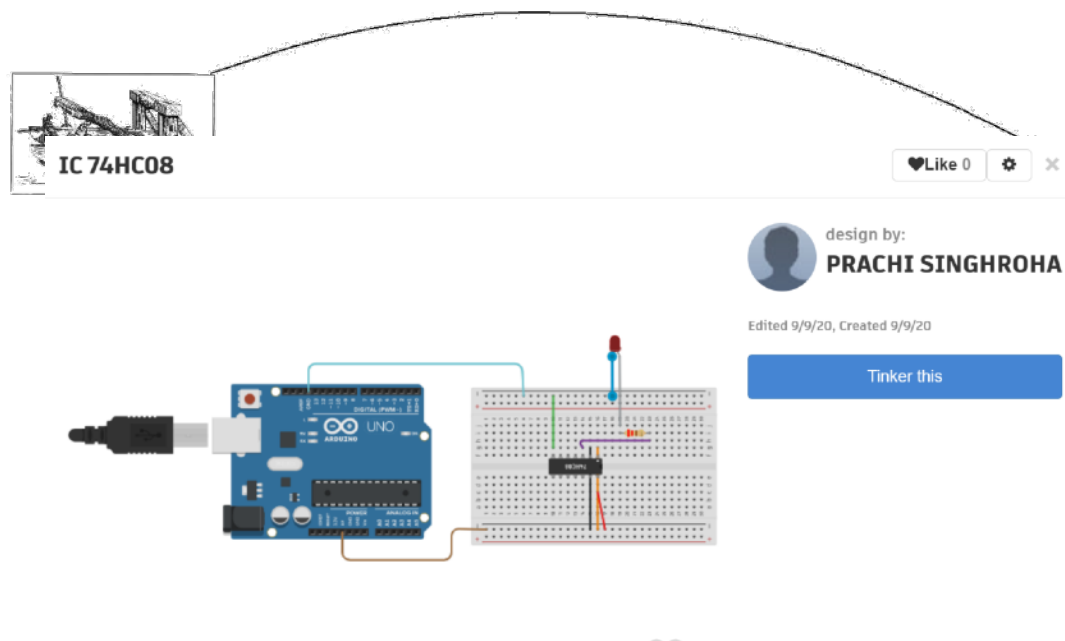
Assignment Tasks - Using Tinkercad:

1. Illustrate the pin configuration and verify the truth table of IC 74HC08.

PIN Configuration

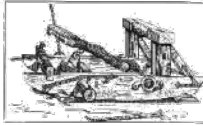
		14	VCC
1A	1	13	4B
1B	2	12	4A
1Y	3	11	4Y
2A	4	10	3B
2B	5	9	3A
2Y	6	8	3Y
GNDE	7		

Prachi



2. Illustrate the pin configuration and verify the truth table of IC 74HC73.

PIN Configuration



		14	13
12P	1		
		13	12
12	2		
		12	11
12	3		
		11	10
VCC	4		
		10	9
22P	5		
		9	8
22	6		
		8	7
23	7		

Prachi

Glorious Fyran

Like 0

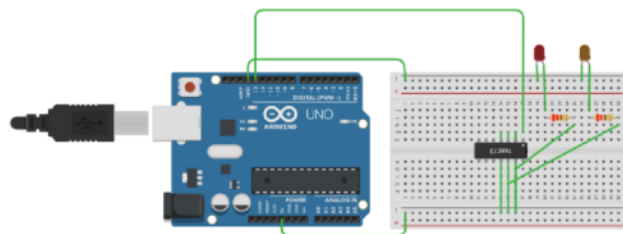


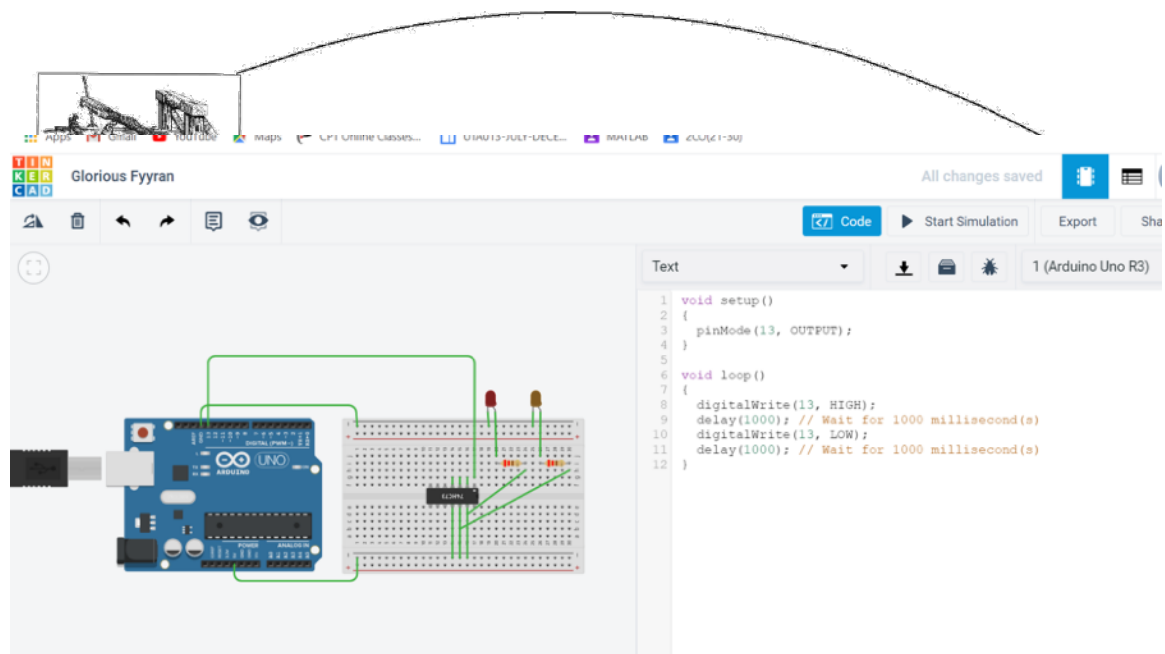
design by:

PRACHI SINGHROHA

Edited 9/9/20, Created 9/9/20

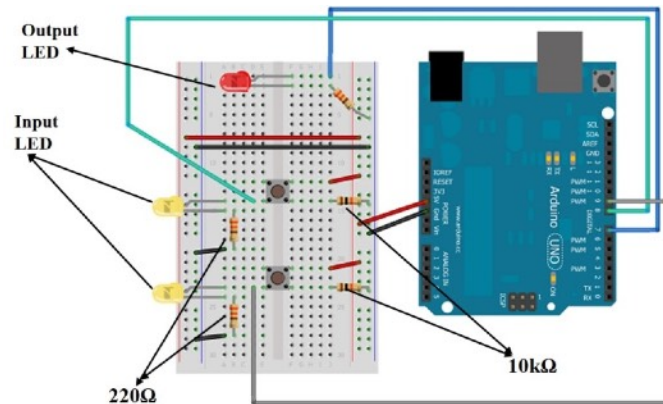
Tinker this





3. Use Arduino to simulate the behaviour of listed logic gates with the help of push buttons (Without using ICs of logic gates)
- Logic gates: AND, NAND, XOR for students with odd numbered Roll Number.
 - Logic gates: OR, NOR, XNOR for students with even numbered Roll Number.

Hint:



My Roll number: 101903545. Hence I'll use Arduino to simulate the behaviour of listed logic gates with the help of push buttons.

Logic gates: AND, NAND, XOR

AND

AND

Like 0



design by:

PRACHI SINGHROHA

Edited 9/10/20, Created 9/10/20

Tinker this

AND

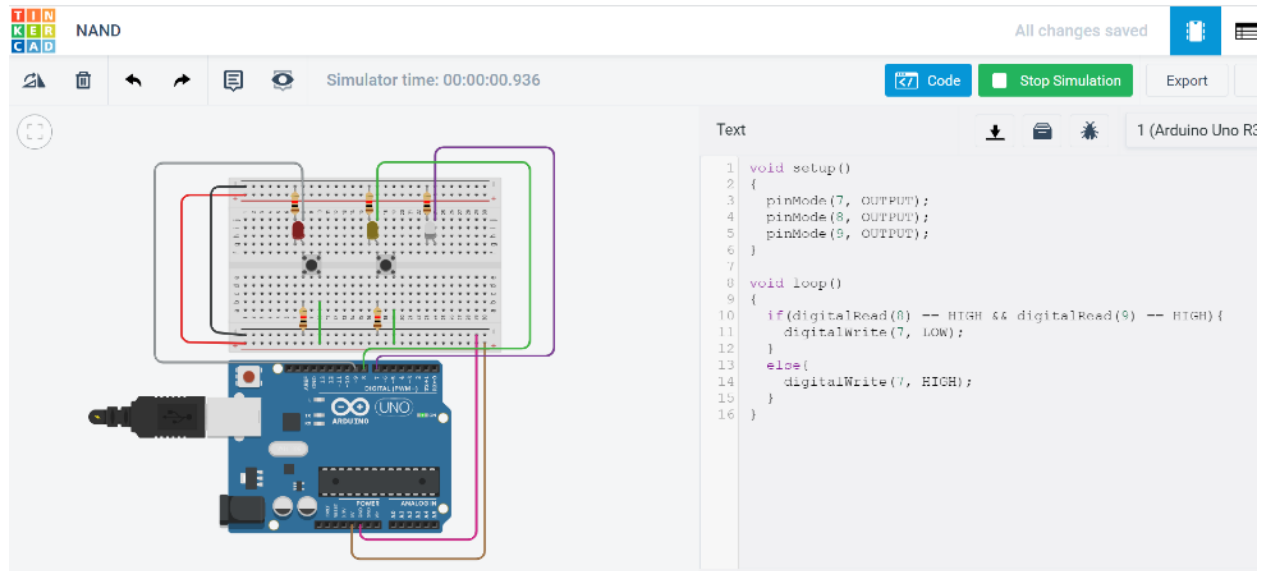
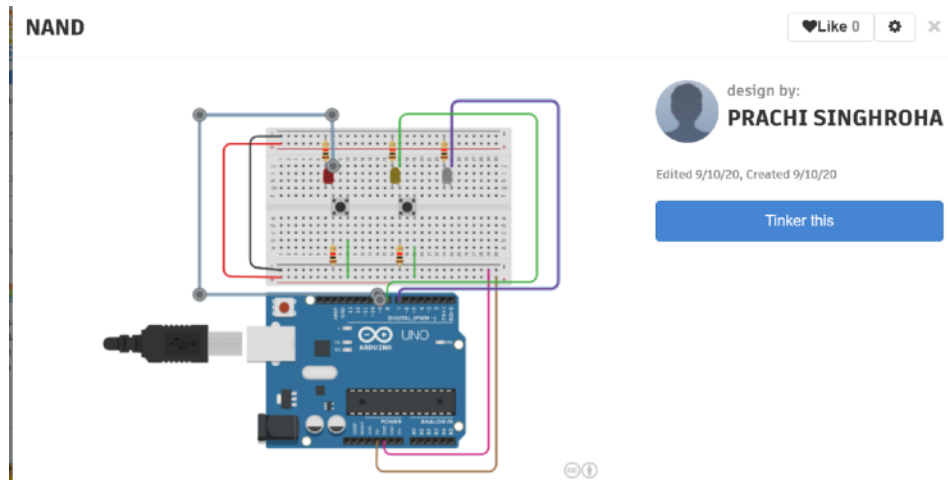
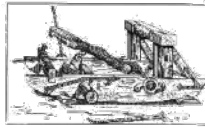
Simulator time: 00:00:02

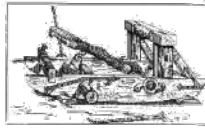
Code Stop Simulation Export Share

1 (Arduino Uno R3)

```
1 void setup()
2 {
3   pinMode(7, OUTPUT);
4   pinMode(8, OUTPUT);
5   pinMode(9, OUTPUT);
6 }
7
8 void loop()
9 {
10  if(digitalRead(0) == HIGH && digitalRead(1) == HIGH){
11    digitalWrite(7, HIGH);
12  }
13  else{
14    digitalWrite(7, LOW);
15  }
16 }
```

Serial Monitor

NAND

XOR

XOR

Like 0

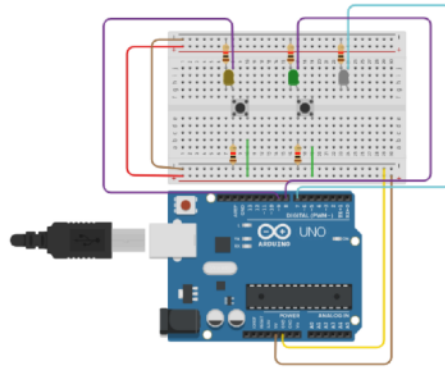


design by:

PRACHI SINGHROHA

Edited 9/10/20, Created 9/10/20

Tinker this

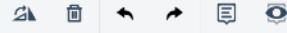


CC BY

KERN
CAD

XOR

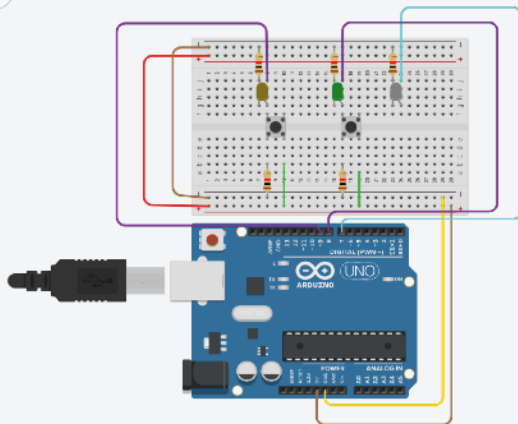
All changes saved



Code

Start Simulation

Export



Text



1 (Arduino Uno)

```
1 void setup()
2 {
3   pinMode(7, OUTPUT);
4   pinMode(8, OUTPUT);
5   pinMode(9, OUTPUT);
6 }
7
8 void loop()
9 {
10  if(digitalRead(8) == HIGH && digitalRead(9) == HIGH ||
11     digitalRead(8) == LOW && digitalRead(9) == LOW){
12    digitalWrite(7, LOW);
13  }
14  else{
15    digitalWrite(7, HIGH);
16  }
17 }
```

