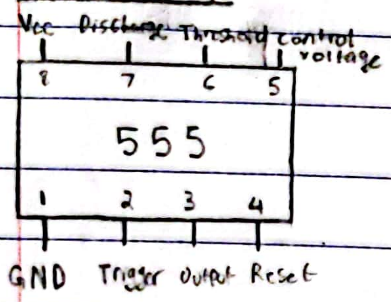
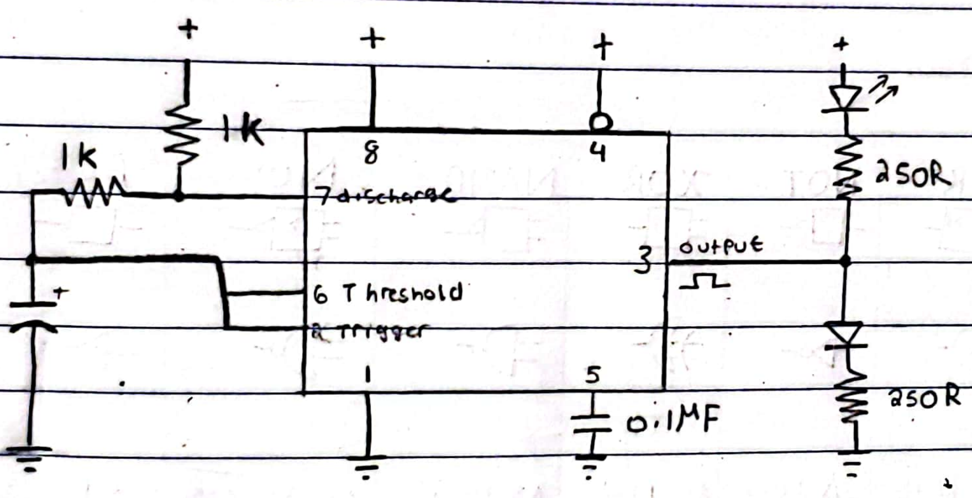
555 - IC Timer Schematics

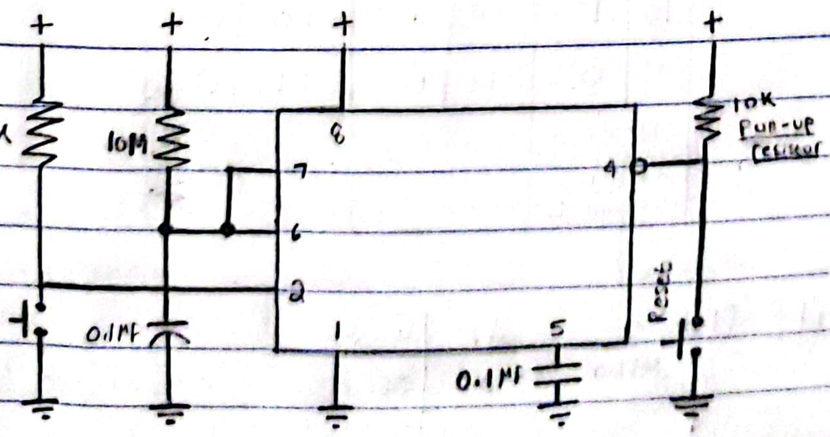
555 Chip



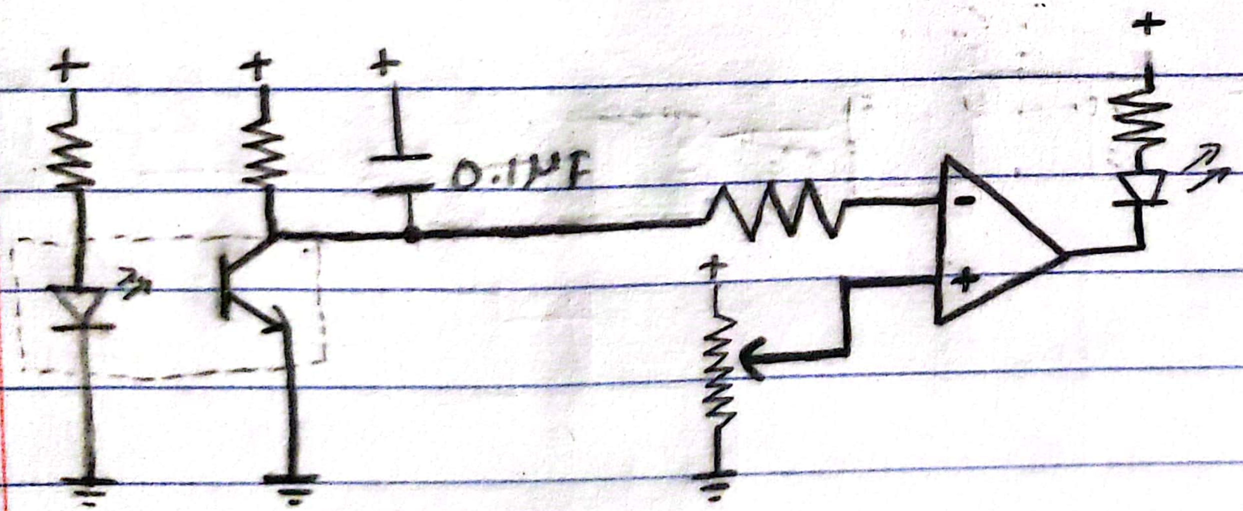
Aystable Timer (555)



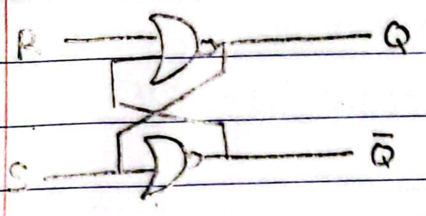
Mono Stable Timer (555)



Op-Amp Schematic (1 Sensor. Schematic can be rebuilt to have 2 sensors)

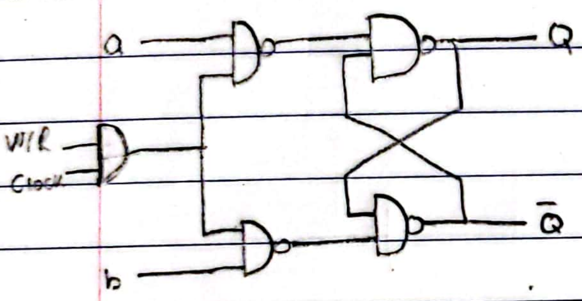


R.S (NOR) Flip-flop



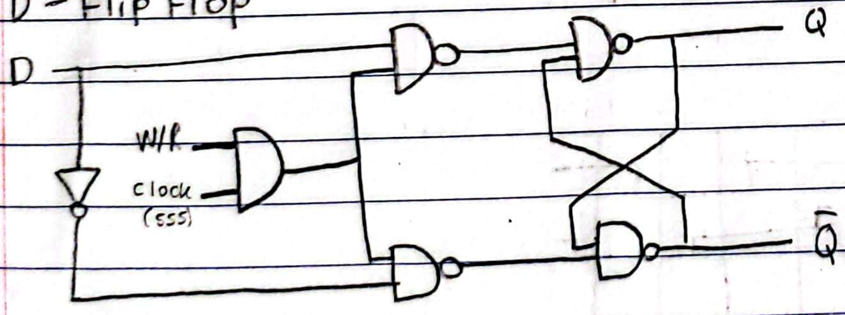
AB	$Q\bar{Q}$
00	No change (stored
01	10 set
10	01 Reset
11	error

R.S- flip flop (Nand)



Clock	AB	$Q\bar{Q}$	Clock	W/R	
0	XX	No change	X	0	0
1	00	No change	0	1	0
1	01	reset	1	0	0
1	10	set	1	1	1
1	11	error			

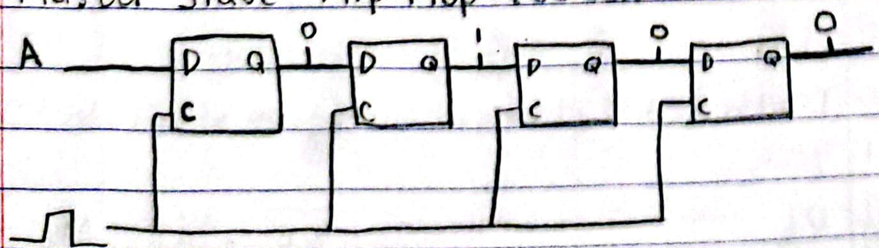
Getting rid of error Case in
D-flip flop



Clock	A	
0	X	No change
1	0	reset
1	1	set

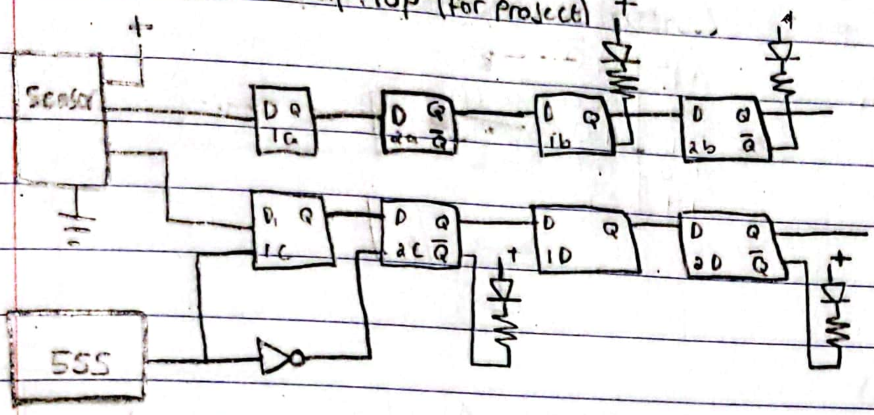
(No need for B because B is the opposite of A.)

Master Slave flip flop (to deal with racing)

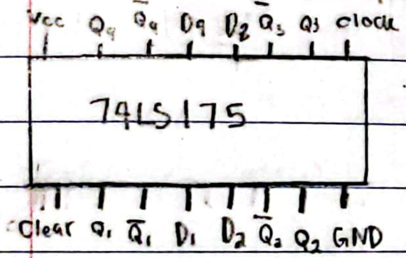


In one clock pulse, all the awnsers will get wiped. (awnser will race through when the clock pulses.

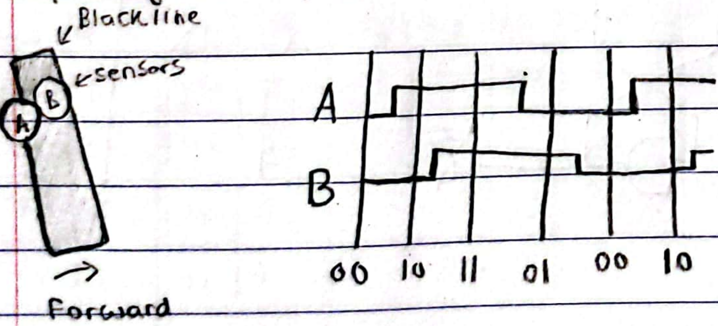
Master Slave flip flop (for project)



Master Slave flip flop (74LS175)



Spinning disk project



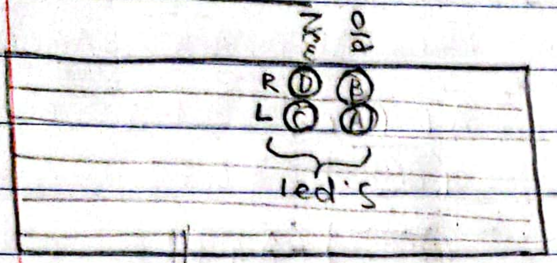
Boolean Algebra - Truth table to equation (sum of products)

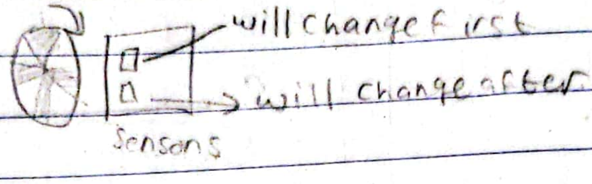
A B	y	
00	1	$\to \bar{A}\bar{B}$
~~01~~	~~0~~	
~~10~~	~~0~~	
11	1	$\to AB$

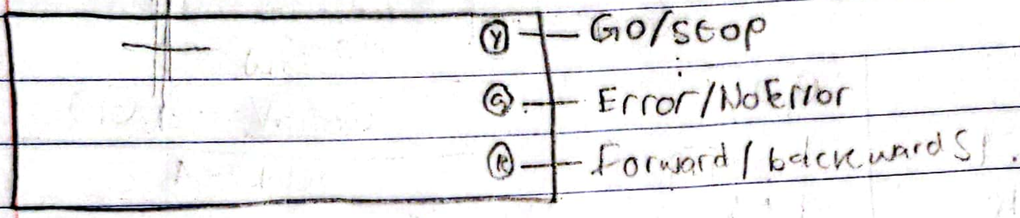
$y = \bar{A}\bar{B} + AB$

$\therefore \overline{A \oplus B} = \bar{A}\bar{B} + AB$

Board Data







Forward - light on
Error - light off
Go - light on

A B C	
0 0 0	0
0 0 1	0
0 1 0	1 → $\bar{A}B\bar{C}$
0 1 1	1 → $\bar{A}BC$
1 0 0	1 → $A\bar{B}\bar{C}$
1 0 1	0
1 1 0	1 → $AB\bar{C}$
1 1 1	0

$$y = \bar{A}B\bar{C} + \bar{A}BC + A\bar{B}\bar{C} + AB\bar{C} \quad \text{, sofp}$$
$$= \bar{A}B(\bar{C}+C) + A\bar{C}(\bar{B}+B) \quad \text{, dist.com}$$
$$= \bar{A}B(1) + A\bar{C}(1) \quad , \bar{A}+A=1$$
$$= \bar{A}B + A\bar{C} \quad , A\cdot 1 = A$$

A B C	
0 0 0	0
0 0 1	1
0 1 0	1
0 1 1	0
1 0 0	1
1 0 1	1
1 1 0	0
1 1 1	1

C \ AB	00	01	11	10
0	0	1	0	1
1	1	0	1	[illegible]

A B C D	
0 0 0 0	1
0 0 0 1	0
0 0 1 0	0
0 0 1 1	1
0 1 0 0	1
0 1 0 1	1
0 1 1 0	0
0 1 1 1	1
1 0 0 0	1
1 0 0 1	0
1 0 1 0	0
1 0 1 1	1
1 1 0 0	1
1 1 0 1	0
1 1 1 0	0
1 1 1 1	1

1, 2, 4, 8, 16, 32

Karnaugh maps

CD \ AB	00	01	11	10	
00	1	1	1	1	$\rightarrow \bar{C}\bar{D}$
01	0	1	0	0	
11	1	1	1	1	$\rightarrow CD$
10	0	0	0	0	

$\bar{A}BD$

$$Z = CD + \bar{C}\bar{D} + \bar{A}BD$$
$$= (\overline{C \oplus D}) + \bar{A}BD \text{, xor}$$

$\bar{A}B$ ACE

DE \ ABC	000	001	011	010	110	111	101	100
00	1	0	1	1	0	0	0	1
01	1	0	1	1	0	1	1	0
11	0	0	1	1	0	1	1	0
10	1	0	1	1	0	0	0	1

$\bar{A}\bar{B}\bar{C}\bar{D}$

$\bar{B}\bar{C}\bar{E}$

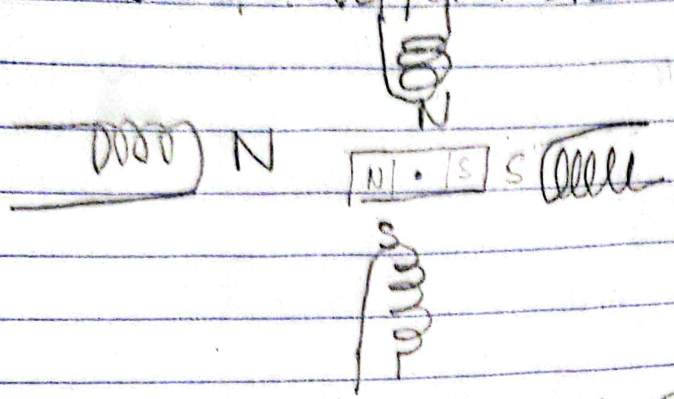
$$\bar{A}\bar{B}\bar{C}\bar{D} + \bar{B}\bar{C}\bar{E} + \bar{A}B + ACE \text{, sop}$$
$$= \bar{B}\bar{C}(\bar{A}\bar{D} + \bar{E}) + \bar{A}B + ACE \text{, dnc}$$

steps to determine top

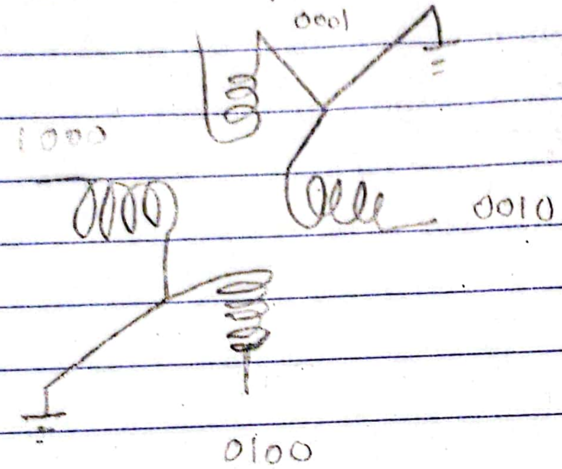
0 | 0 1 1 0

0000 0001 | 0011 0010 0110 0111 0101 0100 1100 1101 1111 1110 1010 1011 1001 1000

8 wire stepper Motor

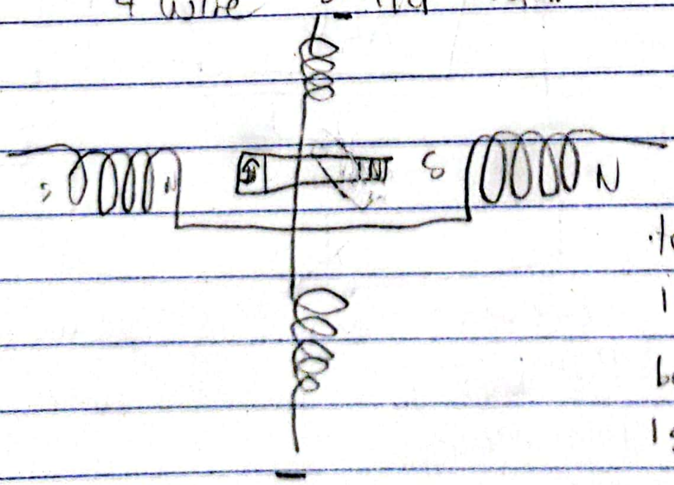


6 wire stepper Motor

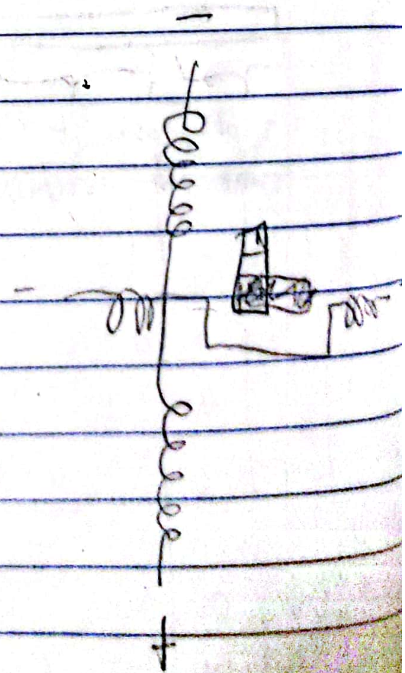


+ - - -
+ + - -
- + - -
- + + -
- - + +
- - + +
- - - +
+ - - +

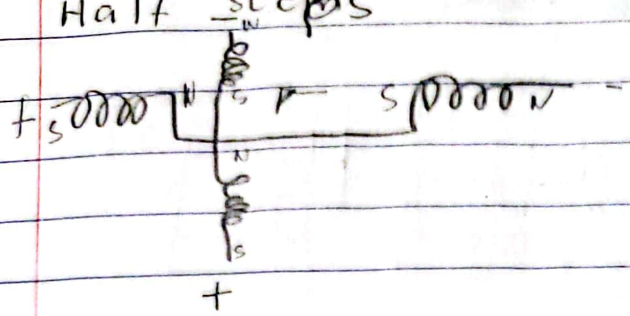
4 wire stepper motor



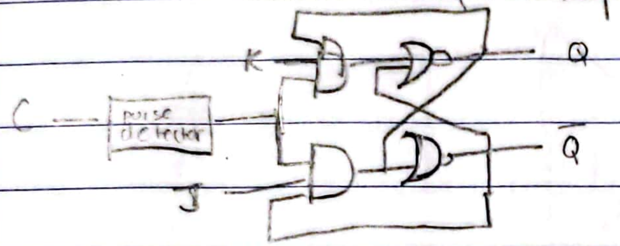
to make
it spin
backwards
1 step



Half steps



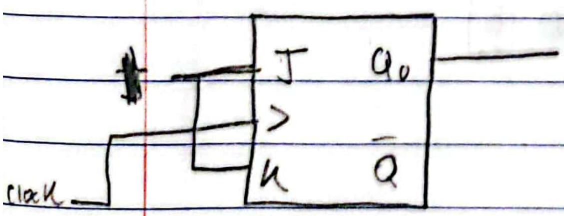
J-K flip flop



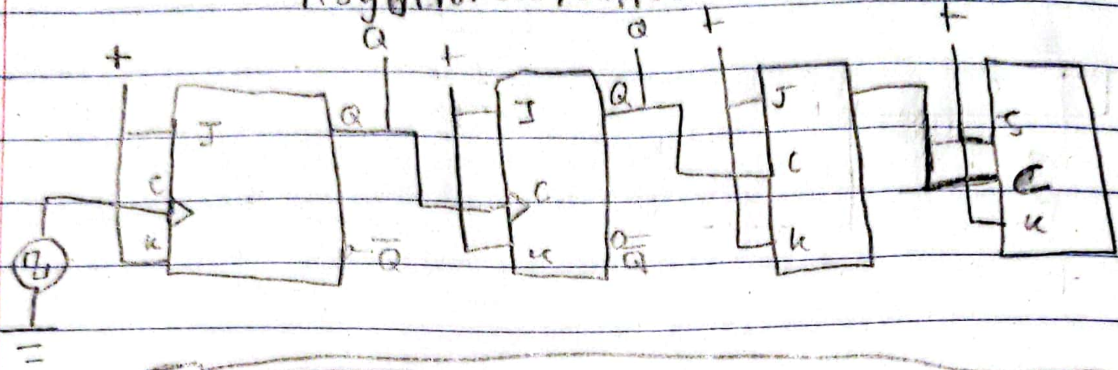
JK flip flops in toggle Mode
- with the inputs set to "1", a JK flip flop will toggle its output.

- For every clock two clock pulse the output will cycle once. (0-1-0 or 1-0-1)

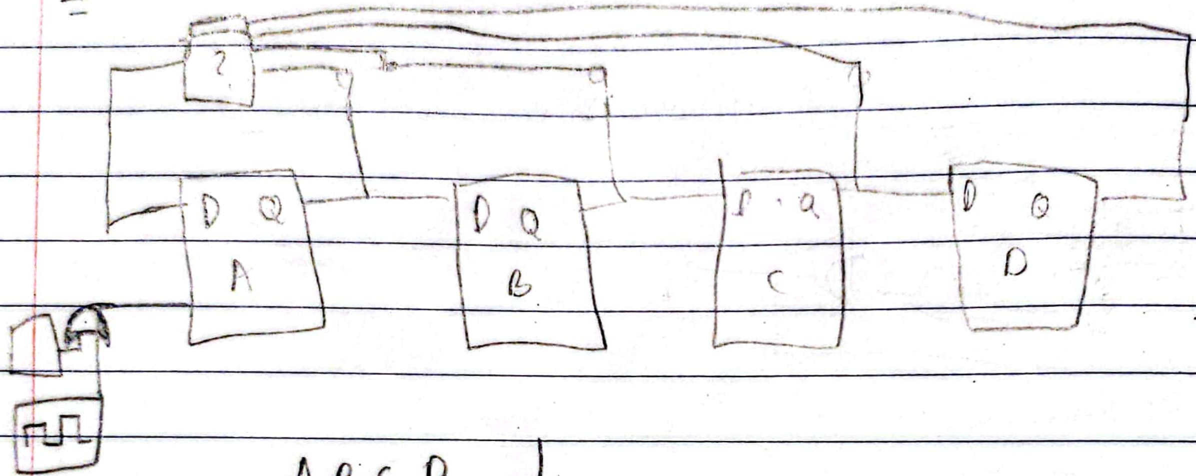
- creating a divide by two counter



Asyncromous / Ripple counter



1000
0100
0010
0001



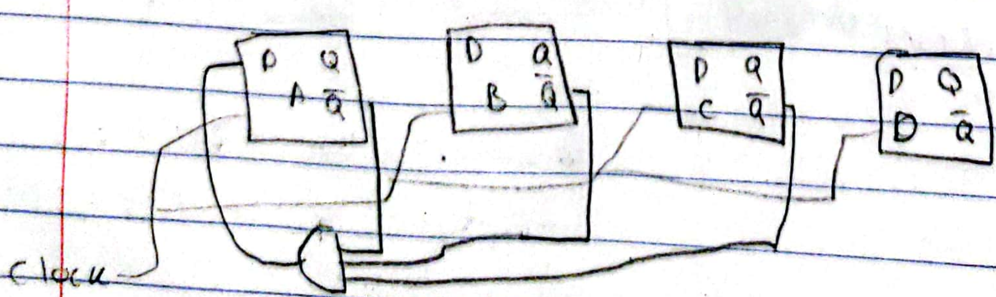
A B C D	
0 0 0 0	1
0 0 0 1	1
1000 ~~0 0 0 0~~	0
0 1 0 0	0
0 0 1 0	0
everything else	0

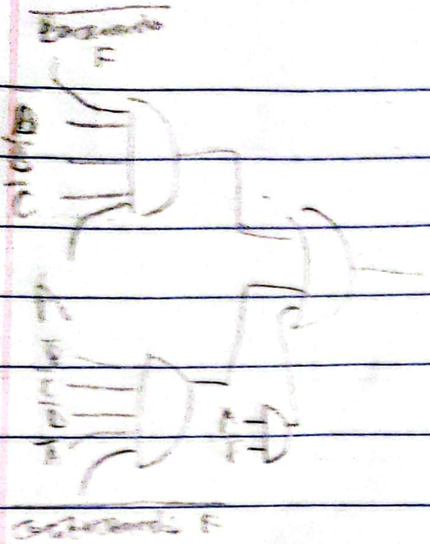
$\bar{A}\bar{B}\bar{C}\bar{D} + \bar{A}\bar{B}\bar{C}D$, SofP

$\bar{A}\bar{B}\bar{C} \cdot (\bar{D} + D)$, dist

$\bar{A}\bar{B}\bar{C}$, $\bar{D} + D = 1$, $A \cdot 1 =$

Since its $\bar{A}\bar{B}\bar{C}$ we can do this





Backwards

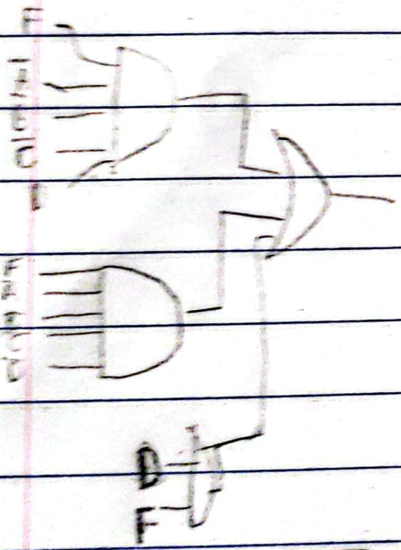
$\bar{D}\bar{B}\bar{C}A + \bar{D}C\bar{B}\bar{A}$

$\bar{F}\bar{D}\bar{B}\bar{C} +$

$\bar{F}\bar{D}\bar{B}\bar{C}A + \bar{F}\bar{D}A\bar{B}\bar{C} + AF$

$= \bar{F}(\bar{D}\bar{B}\bar{C}A + \bar{D}A\bar{B}\bar{C} + A)$

$= \bar{F}(\bar{D}\bar{B}\bar{C} + A)$



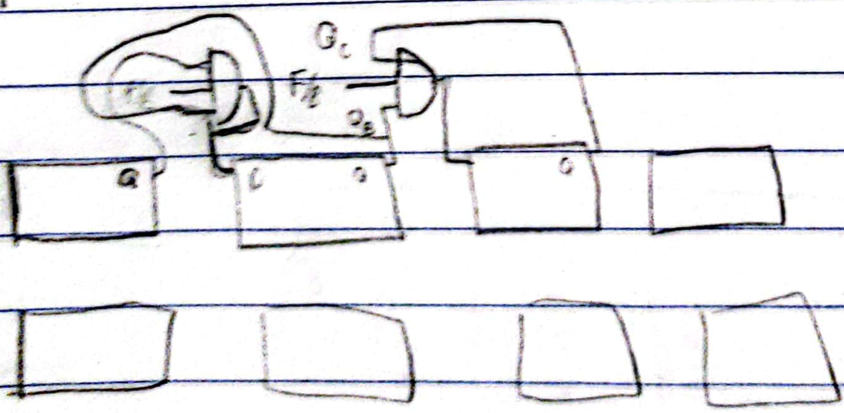
Forward

$F\bar{A}\bar{B}\bar{C}D + F\bar{A}\bar{B}\bar{C}\bar{D} + DF$

$= F(\bar{A}\bar{B}\bar{C}D + \bar{A}\bar{B}\bar{C}\bar{D} + D)$

$= F(\bar{A}\bar{B}\bar{C}(D+\bar{D}) + D)$

$= F(\bar{A}\bar{B}\bar{C} + D)$



C F

ABCD - (D) inputs table

$$D_B = FA + \bar{F}C$$

$$D_C = \bar{F}D + FB$$

$$D_A = F\bar{A}\bar{B}\bar{C} + \bar{F}B$$
$$= (\bar{B}\bar{C})(F\bar{A}) + \bar{F}B$$

$$D_D = \bar{D}\bar{C}\bar{B}\bar{F} + CF$$
$$= (\bar{C}\bar{B})(\bar{D}\bar{F}) + CF$$

Stepper motor