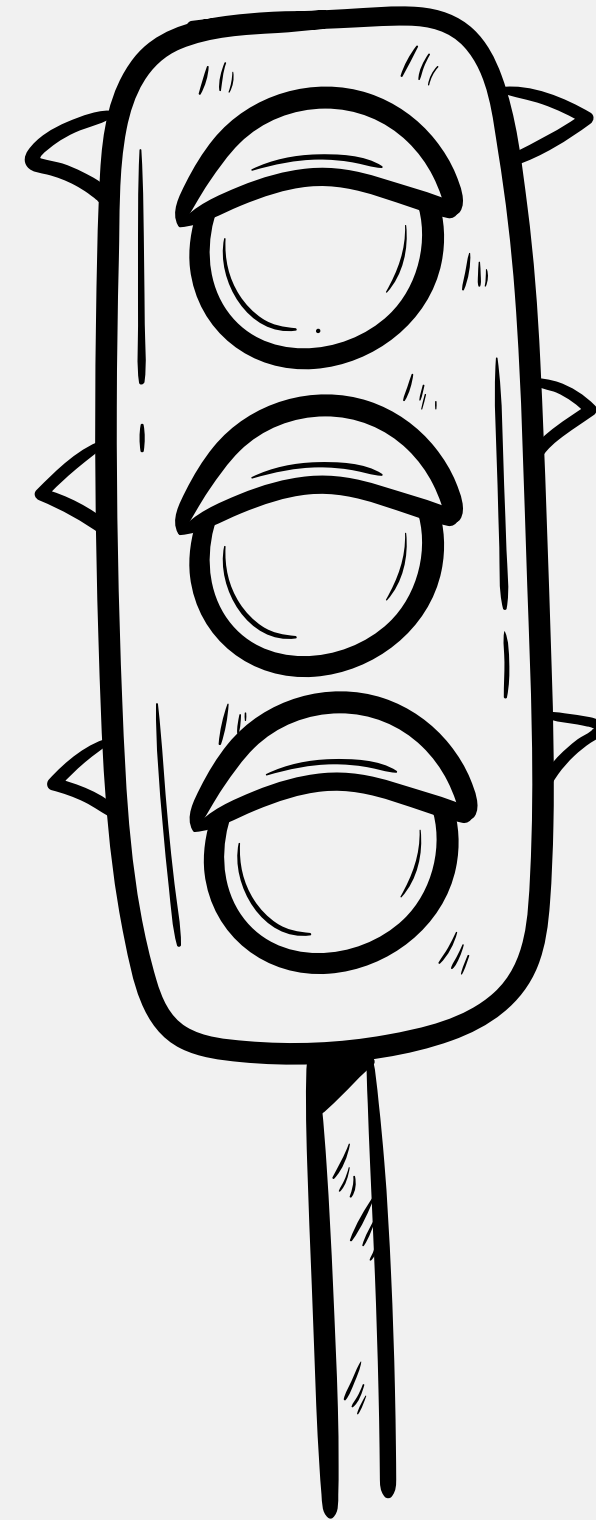


Traffic Light

Logic Design for a T-Junction Traffic light system.



The Problem

- Traffic jams



- Accidents



- Long commute time



Goals

01

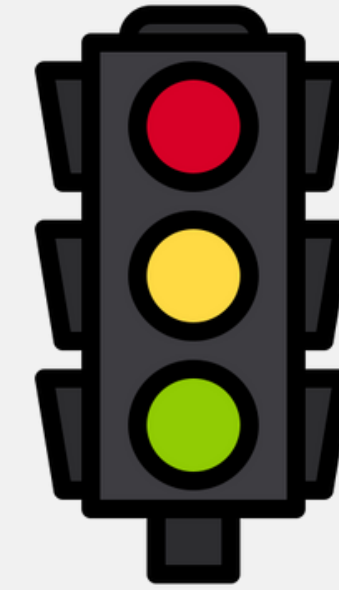
interrupts the heavy traffic at intersections to allow other vehicles or pedestrians to cross it.

02

help in reducing the severity and frequency of various types of accidents or crashes.

03

help in providing a continuous movement of traffic at a certain speed in a given route or way.



Before Traffic light

With Traffic light

Common traffic jams

Continuous flow of traffic

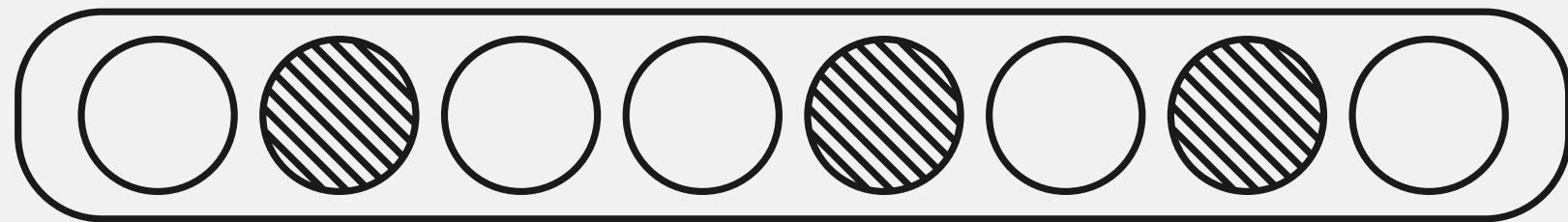
Very high risk of accidents

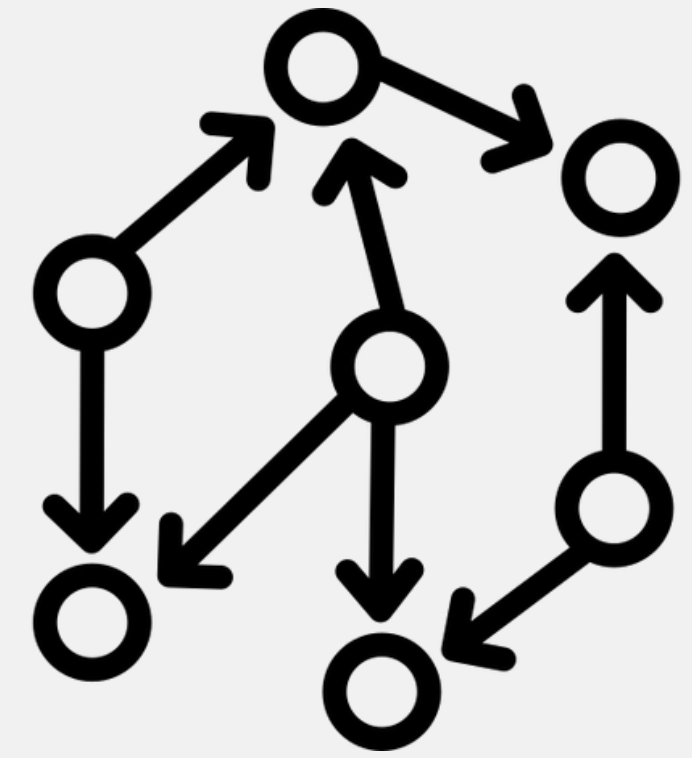
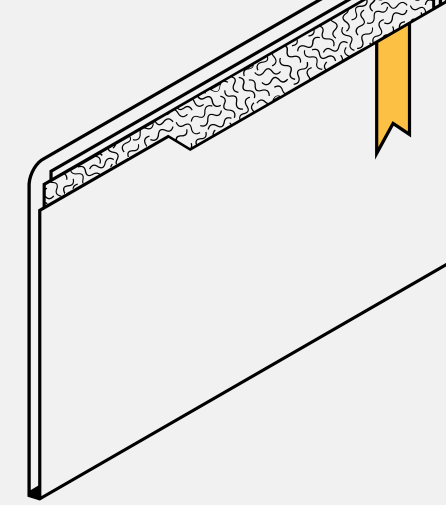
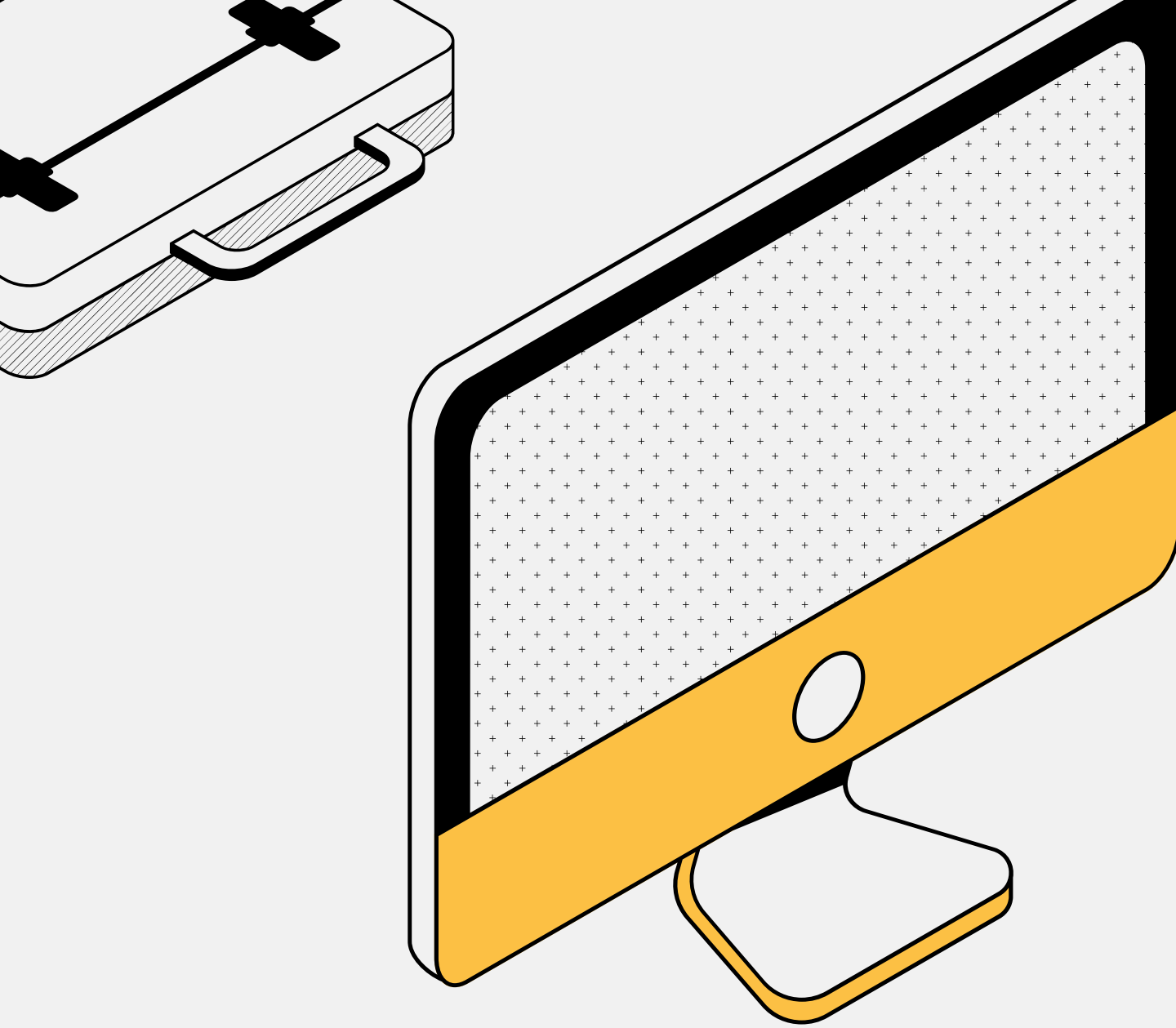
Very little accidents

Longer commute times

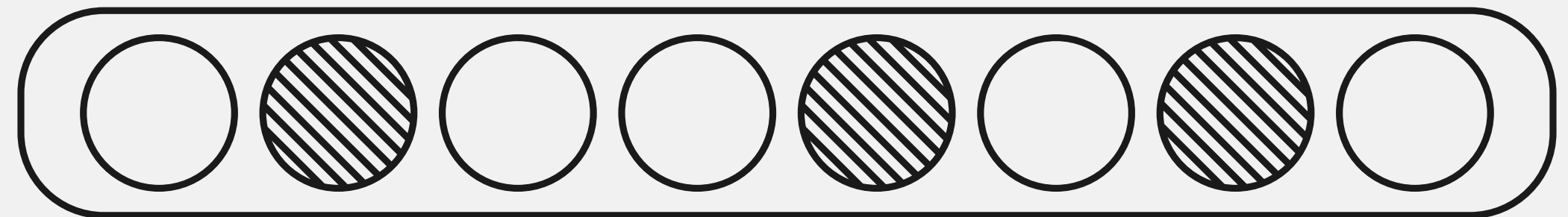
Shorter commute times

Design model

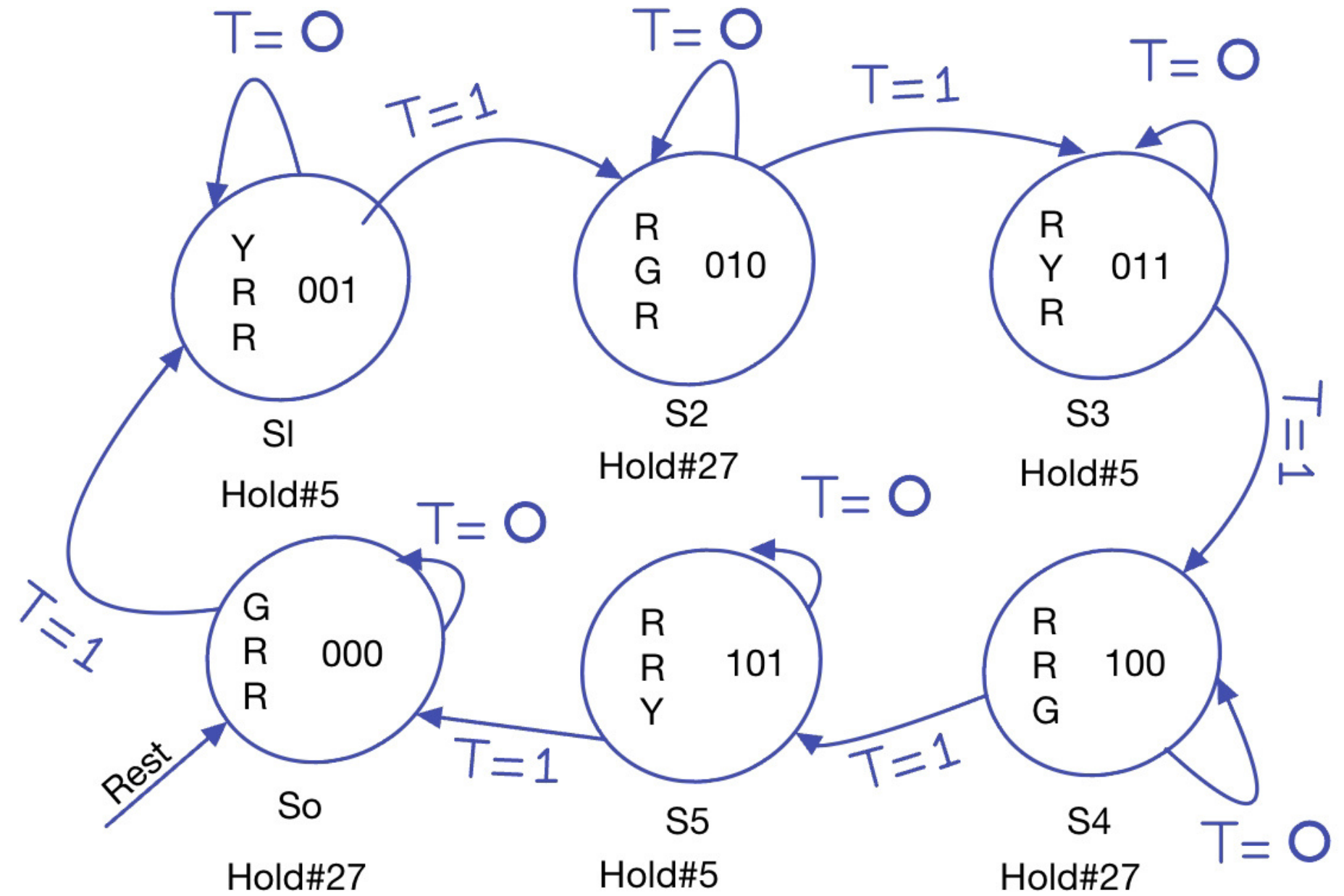
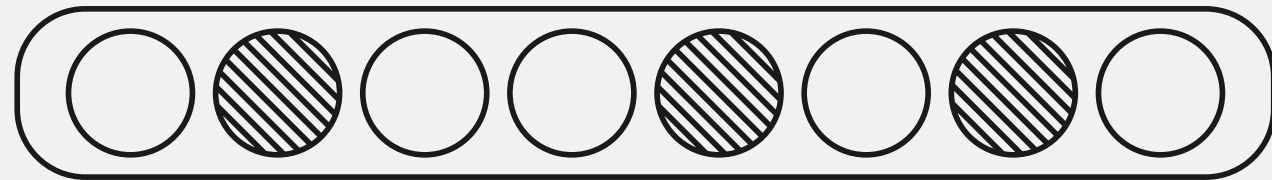




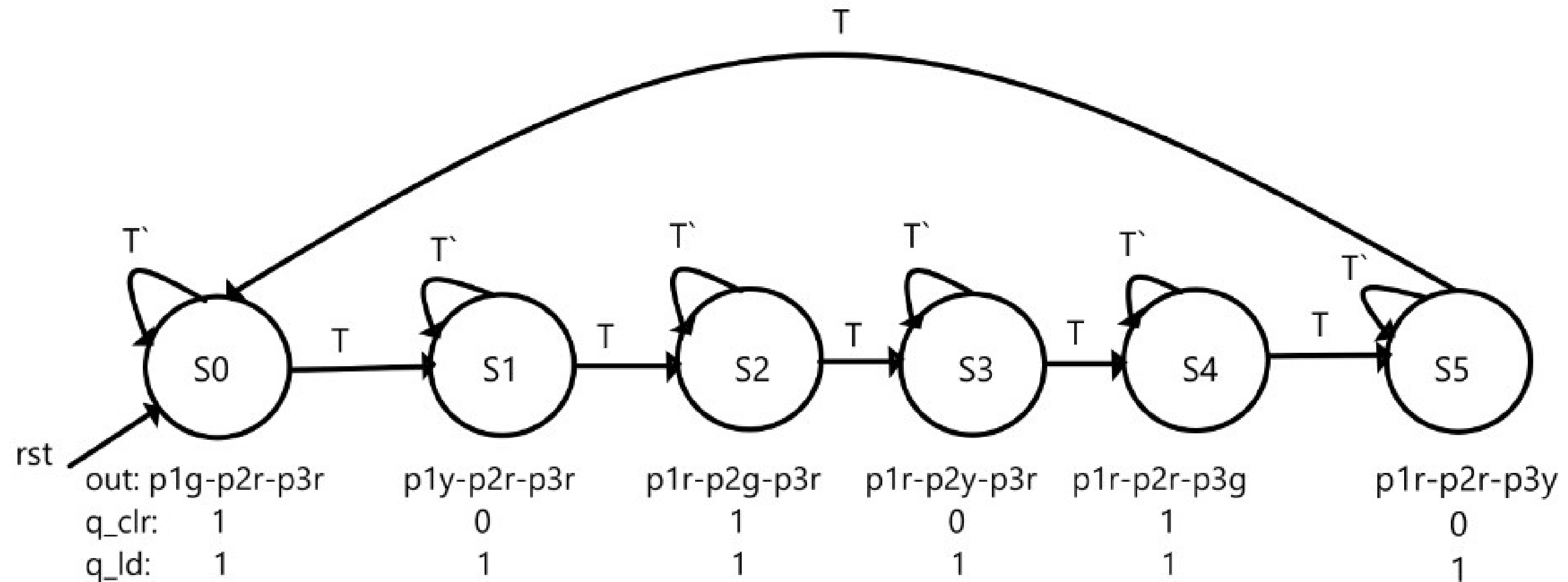
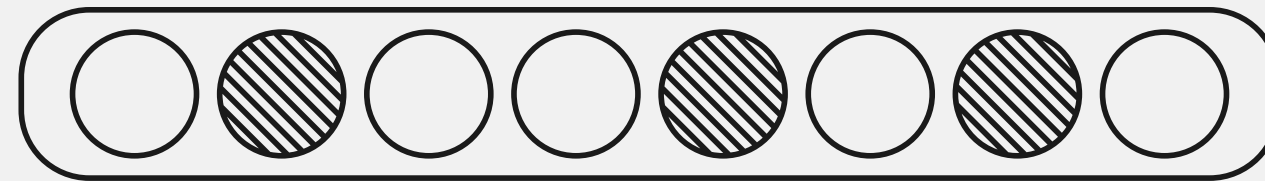
The Finite State Machine Controller



State Diagram

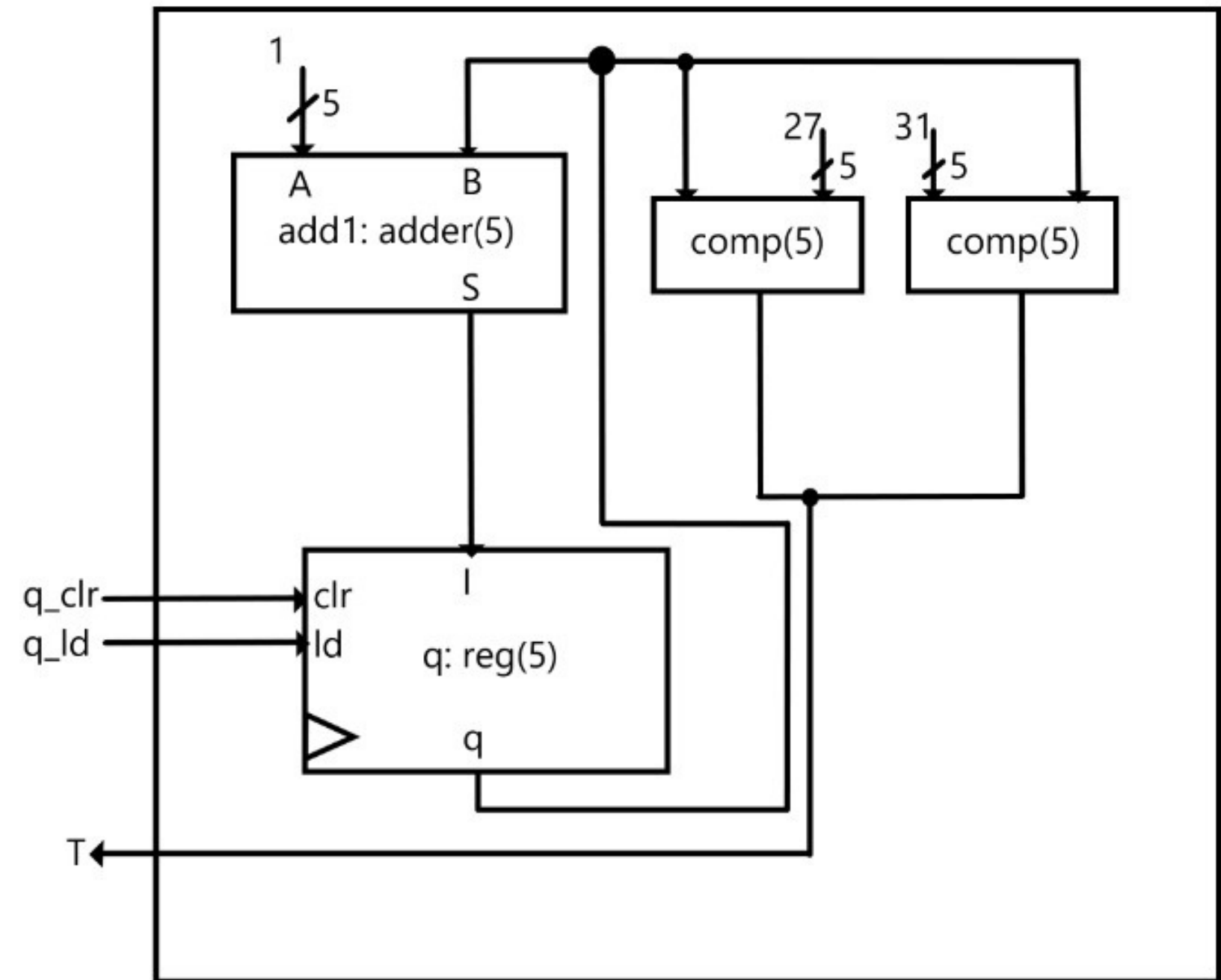
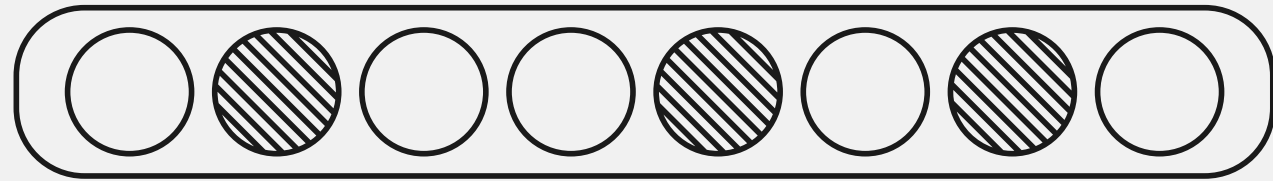


Controller

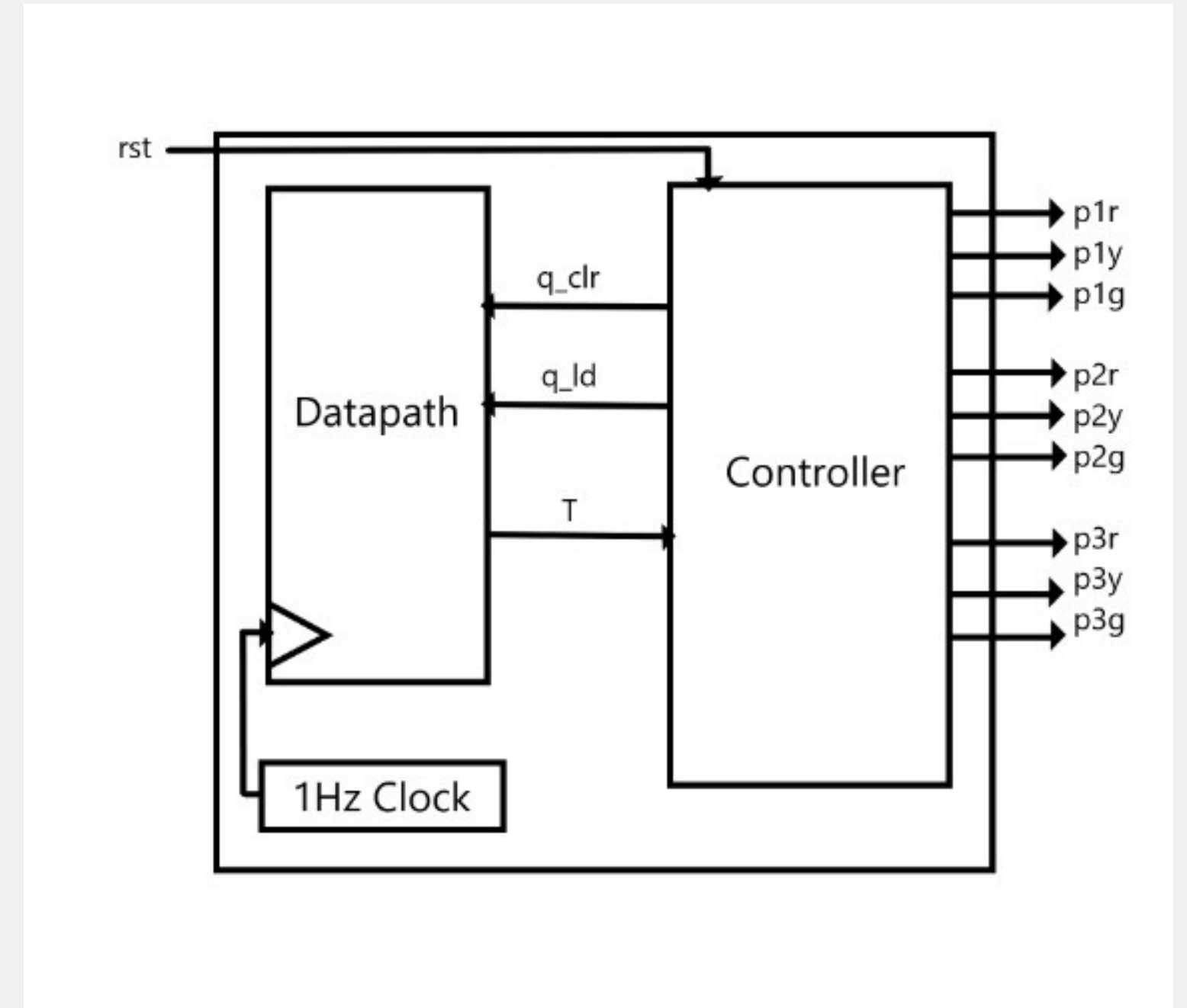
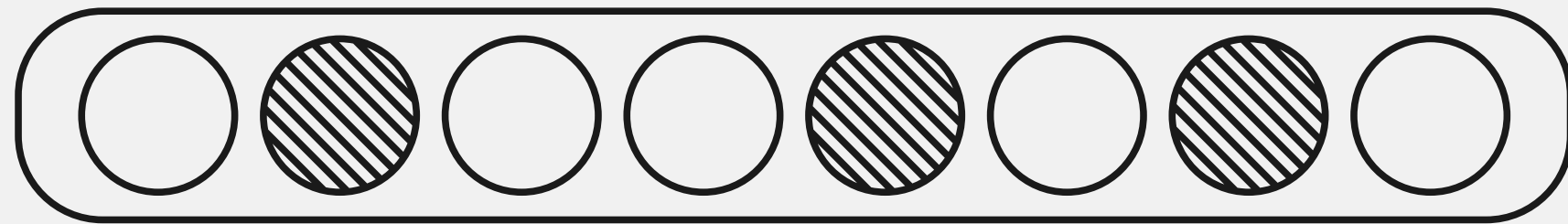


q is constantly counting but is cleared after every yellow output.

DataPath

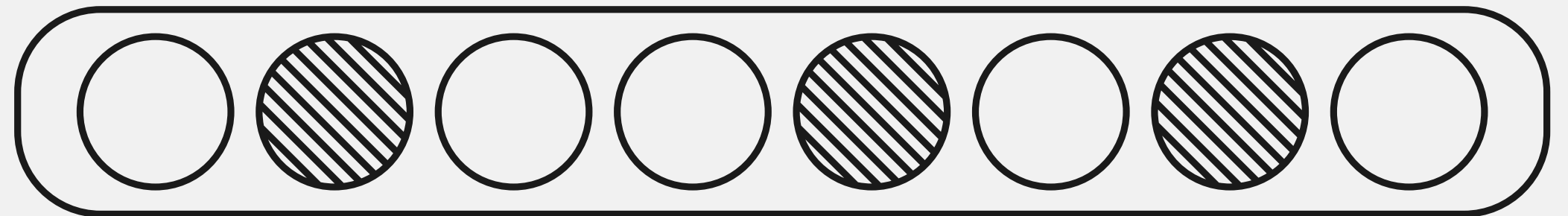


DataPath & Controller Connections



— —		—
—	— —	• •
—	— —	•
—	— —	• • •
—	— —	• •

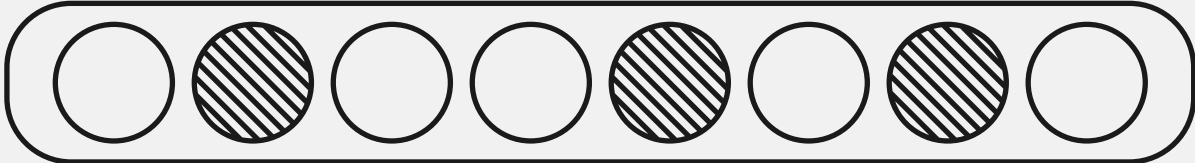
State Tables, Truth Tables & K-Maps



StateTable

State	encoding	P1	P2	P3	Delay
S0	000	Green	Red	Red	27 sec
S1	001	Yellow	Red	Red	5 sec
S2	010	Red	Green	Red	27 sec
S3	011	Red	Yellow	Red	5 sec
S4	100	Red	Red	Green	27 sec
S5	101	Red	Red	Yellow	5 sec

State Transition Table

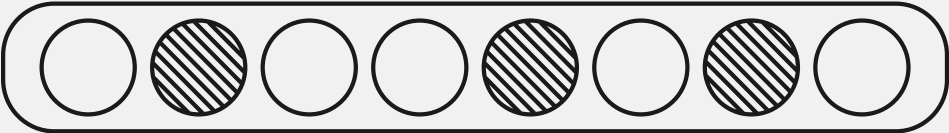


ps	Next State		Output
	T =0	T=1	
s0	s0	s1	p1g p2r p3r
s1	s1	s2	p1y p2r p3r
s2	s2	s3	p1r p2g p3r
s3	s3	s4	p1r p2y p3r
s4	s4	s5	p1r p2r p3g
s5	s5	s0	p1r p2r p3y

present state			Input	Next State		
a	b	c		a^	b^	c^
0	0	0	0	0	0	0
0	0	0	1	0	0	1
0	0	1	0	0	0	1
0	0	1	1	0	1	0
0	1	0	0	0	1	0
0	1	0	1	0	1	1
0	1	1	0	0	1	1
0	1	1	1	1	0	0
1	0	0	0	1	0	0
1	0	0	1	1	0	1
1	0	1	0	1	0	1
1	0	1	1	0	0	0



Next State



		C, T			
		00	01	11	10
A, B	00	0	0	0	0
	01	0	0	1	0
	11	x	x	x	x
	10	1	1	0	1

		C, T			
		00	01	11	10
A, B	00	0	0	1	0
	01	1	1	0	1
	11	x	x	x	x
	10	0	0	0	0

$a^ = BCT + A\bar{C} + A\bar{T}$

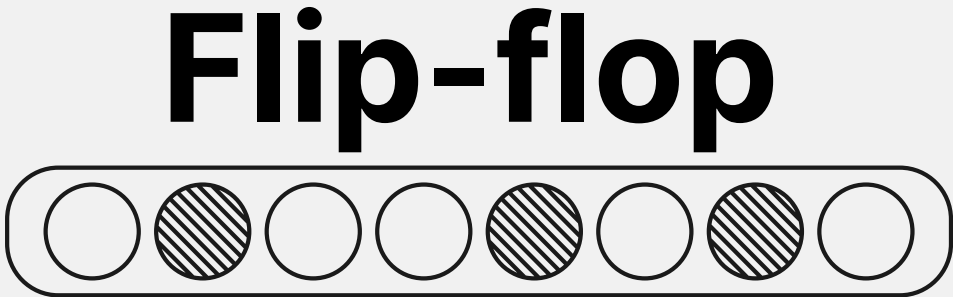
$b^ = \bar{A}\bar{B}CT + B\bar{C} + B\bar{T}$

C, T

		00	01	11	10
A, B	00	0	1	0	1
	01	0	1	0	1
	11	x	x	x	x
	10	0	1	0	1

$C^ = \bar{C}T + C\bar{T}$

present state			Input	flip-flop		
a	b	c	T	d1	d2	d3
0	0	0	0	0	0	1
0	0	0	1	0	0	1
0	0	1	0	0	1	0
0	0	1	1	0	1	0
0	1	0	0	0	1	1
0	1	0	1	0	1	1
0	1	1	0	1	0	0
0	1	1	1	1	0	0
1	0	0	0	1	0	1
1	0	0	1	1	0	1
1	0	1	0	0	0	0
1	0	1	1	0	0	0



Flip-flop

C, T

		00	01	11	10
A, B	00	0	0	0	0
	01	0	0	1	1
	11	x	x	x	x
	10	1	1	0	0

$$b1 = BC + A\overline{C}$$

C, T

		00	01	11	10
A, B	00	1	1	0	0
	01	1	1	0	0
	11	x	x	x	x
	10	1	1	0	0

$$b3 = \overline{C}$$

C, T

		00	01	11	10
A, B	00	0	0	1	1
	01	1	1	0	0
	11	x	x	x	x
	10	0	0	0	0

$$b2 = \overline{A}\overline{B}C + B\overline{C}$$

Input				Output		
a	b	c	T	p1r	p1y	p1g
0	0	0	0	0	0	1
0	0	0	1	0	0	1
0	0	1	0	0	1	0
0	0	1	1	0	1	0
0	1	0	0	1	0	0
0	1	0	1	1	0	0
0	1	1	0	1	0	0
0	1	1	1	1	0	0
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	1	0	0
1	0	1	1	1	0	0



signal 1



		C, T			
		00	01	11	10
A, B	00	0	0	0	0
	01	1	1	1	1
	11	x	x	x	x
	10	1	1	1	1

p1r = B + A

		C, T			
		00	01	11	10
A, B	00	0	0	1	1
	01	0	0	0	0
	11	x	x	x	x
	10	0	0	0	0

p1y = $\overline{A}\overline{B}C$

		C, T			
		00	01	11	10
A, B	00	1	1	0	0
	01	0	0	0	0
	11	x	x	x	x
	10	0	0	0	0

p1g = $\overline{A}\overline{B}\overline{C}$

Input				Output		
a	b	c	T	p2r	p2y	p2g
0	0	0	0	1	0	0
0	0	0	1	1	0	0
0	0	1	0	1	0	0
0	0	1	1	1	0	0
0	1	0	0	0	0	1
0	1	0	1	0	0	1
0	1	1	0	0	1	0
0	1	1	1	0	1	0
1	0	0	0	1	0	0
1	0	0	1	1	0	0
1	0	1	0	1	0	0
1	0	1	1	1	0	0



signal 2



		C, T			
		00	01	11	10
A, B	00	1	1	1	1
	01	0	0	0	0
	11	x	x	x	x
	10	1	1	1	1

p2r = \overline{B}

		C, T			
		00	01	11	10
A, B	00	0	0	0	0
	01	0	0	1	1
	11	x	x	x	x
	10	0	0	0	0

p2y = B C

		C, T			
		00	01	11	10
A, B	00	0	0	0	0
	01	1	1	0	0
	11	x	x	x	x
	10	0	0	0	0

p2g = $B \overline{C}$

Input				Output		
a	b	c	T	p3r	p3y	p3g
0	0	0	0	1	0	0
0	0	0	1	1	0	0
0	0	1	0	1	0	0
0	0	1	1	1	0	0
0	1	0	0	1	0	0
0	1	0	1	1	0	0
0	1	1	0	1	0	0
0	1	1	1	1	0	0
1	0	0	0	0	0	1
1	0	0	1	0	0	1
1	0	1	0	0	1	0
1	0	1	1	0	1	0



signal 3



		C, T			
		00	01	11	10
A, B	00	1	1	1	1
	01	1	1	1	1
	11	x	x	x	x
	10	0	0	0	0

p3r = \overline{A}

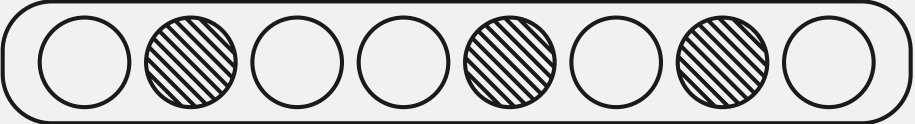
		C, T			
		00	01	11	10
A, B	00	0	0	0	0
	01	0	0	0	0
	11	x	x	x	x
	10	0	0	1	1

p3y = $A C$

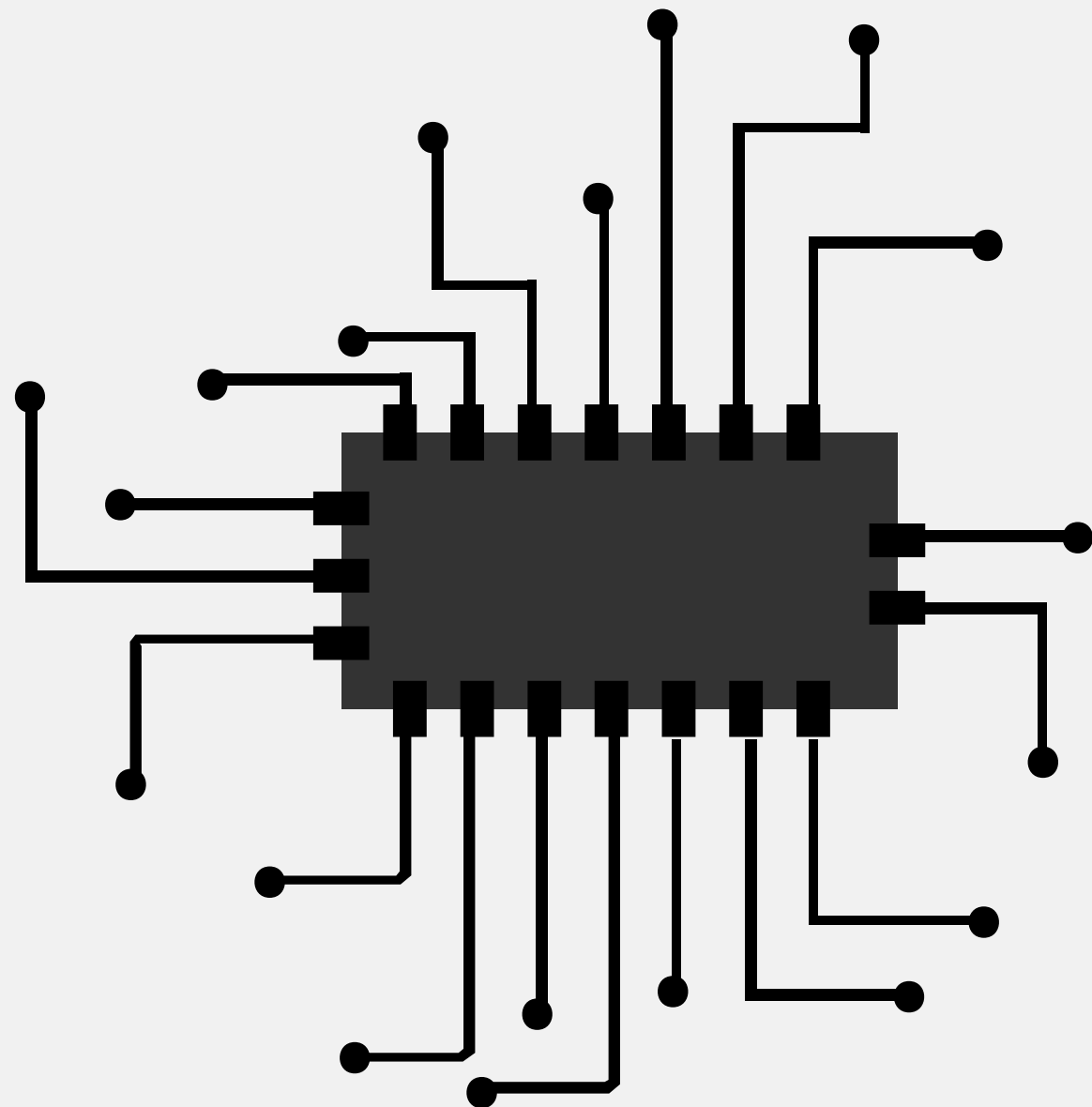
		C, T			
		00	01	11	10
A, B	00	0	0	0	0
	01	0	0	0	0
	11	x	x	x	x
	10	1	1	0	0

p2g = $A \overline{C}$

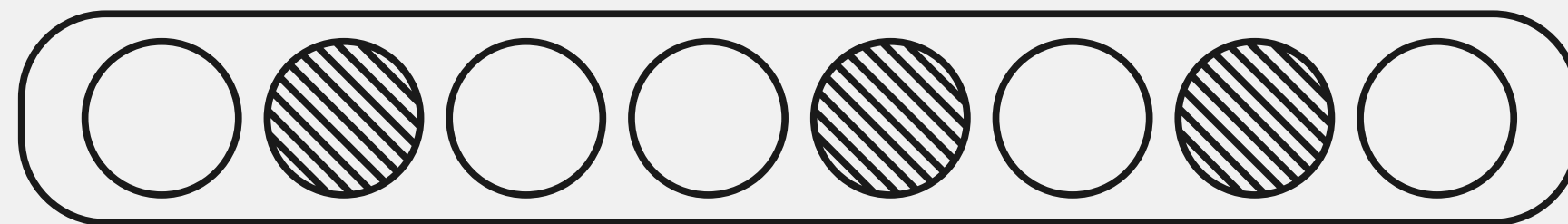
Truth Table



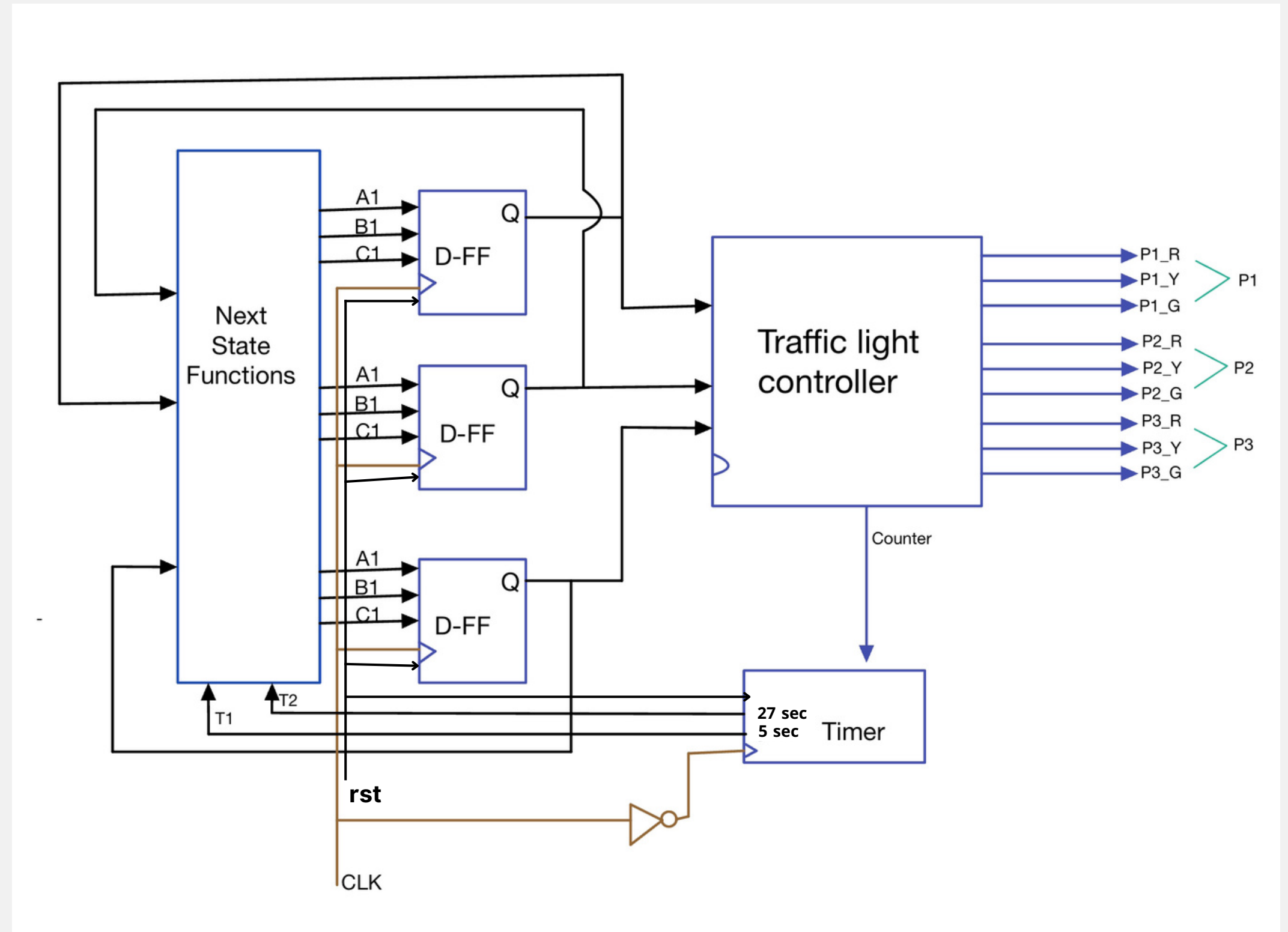
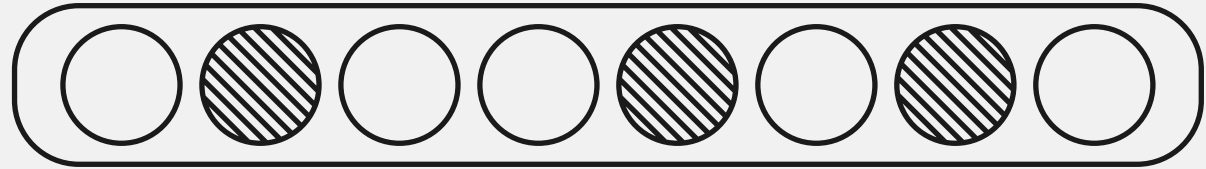
present state			Input	Next State			output									flip flop		
a	b	c	T	a^	b^	c^	p1r	p1y	p1g	p2r	p2y	p2g	p3r	p3y	p3g	d1	d2	d3
0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1
0	0	0	1	0	0	1	0	0	1	1	0	0	1	0	0	0	0	1
0	0	1	0	0	0	1	0	1	0	1	0	0	1	0	0	0	1	0
0	0	1	1	0	1	0	0	1	0	1	0	0	1	0	0	0	1	0
0	1	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	1	1
0	1	0	1	0	1	1	1	0	0	0	0	1	1	0	0	0	1	1
0	1	1	0	0	1	1	1	0	0	0	1	0	1	0	0	1	0	0
0	1	1	1	1	0	0	1	0	0	0	1	0	1	0	0	1	0	0
1	0	0	0	1	0	0	1	0	0	1	0	0	0	0	1	1	0	1
1	0	0	1	1	0	1	1	0	0	1	0	0	0	0	1	1	0	1
1	0	1	0	1	0	1	1	0	0	1	0	0	0	1	0	0	0	0
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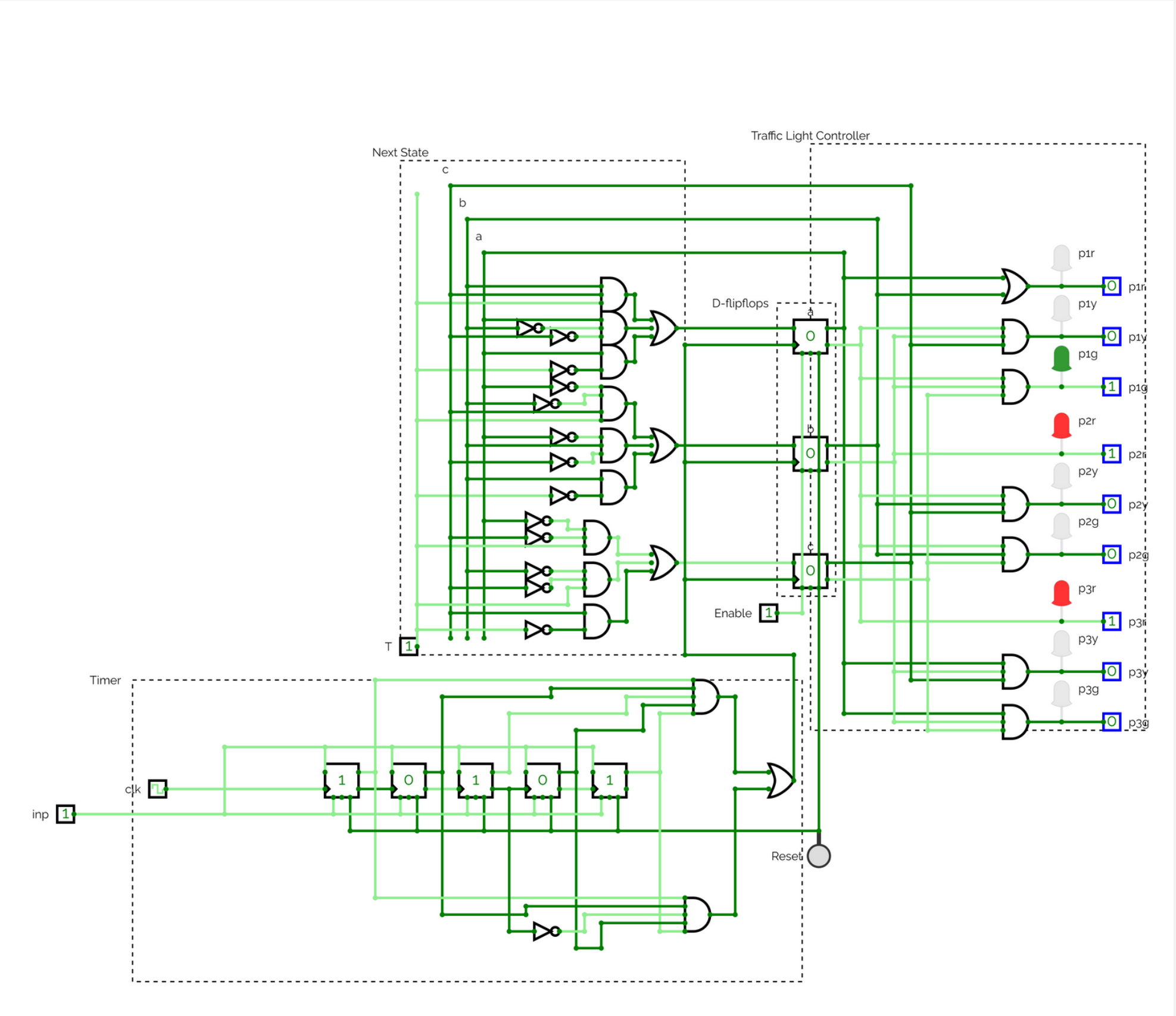
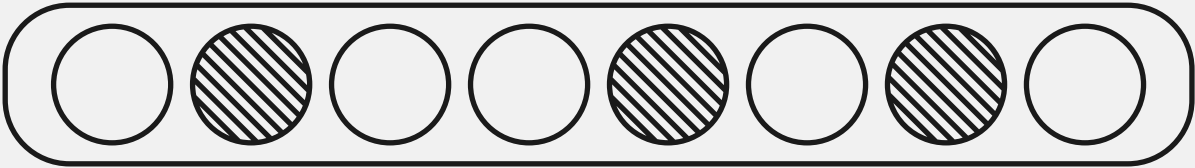
Circuit & Logic

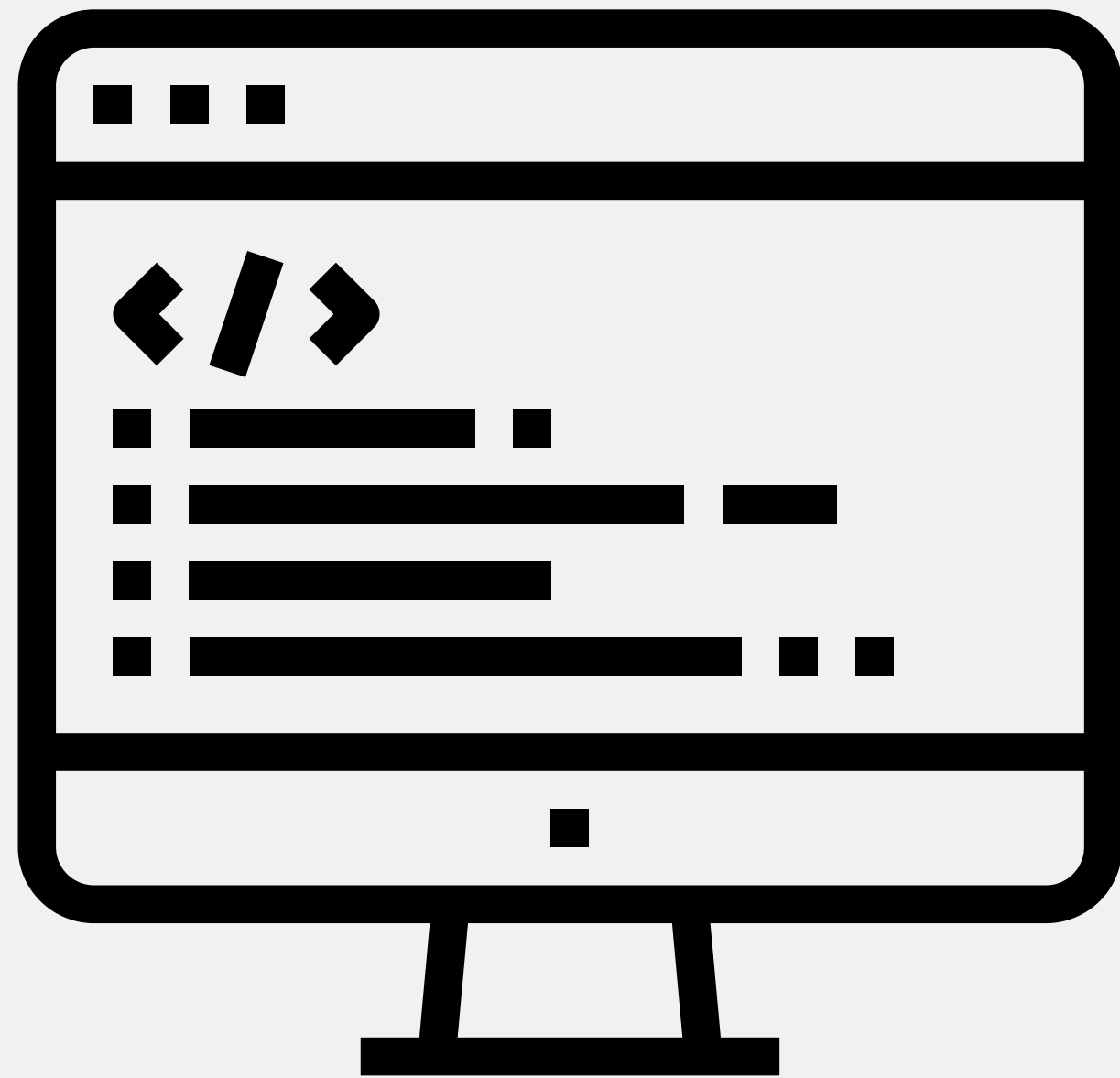


Circuit Design

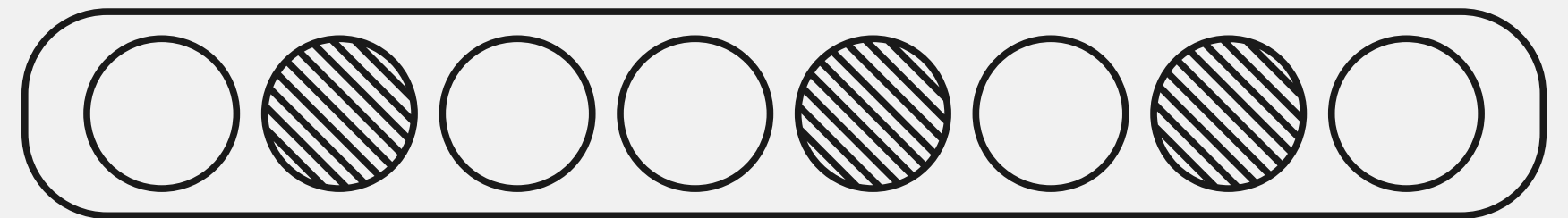


Logic Design

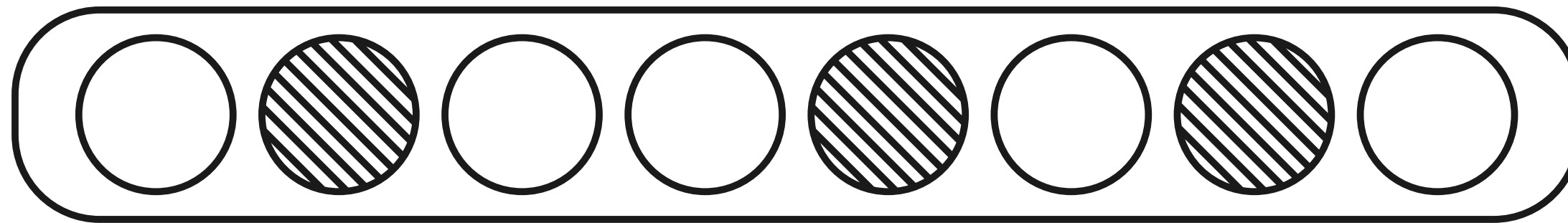




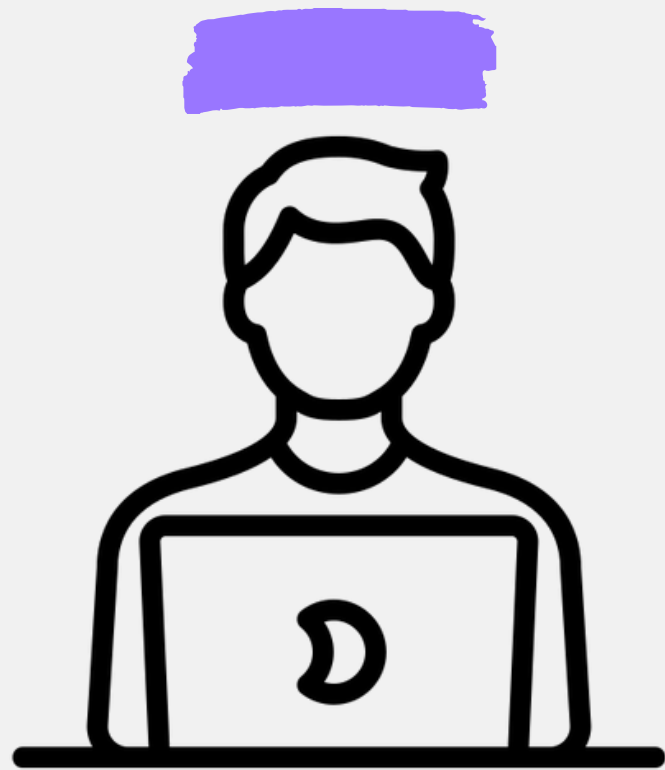
The Simulation



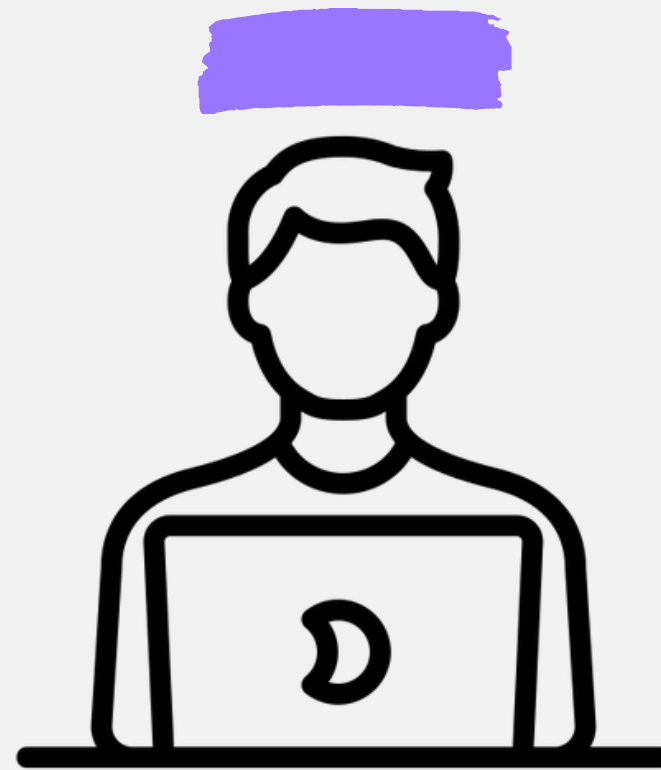
The Code



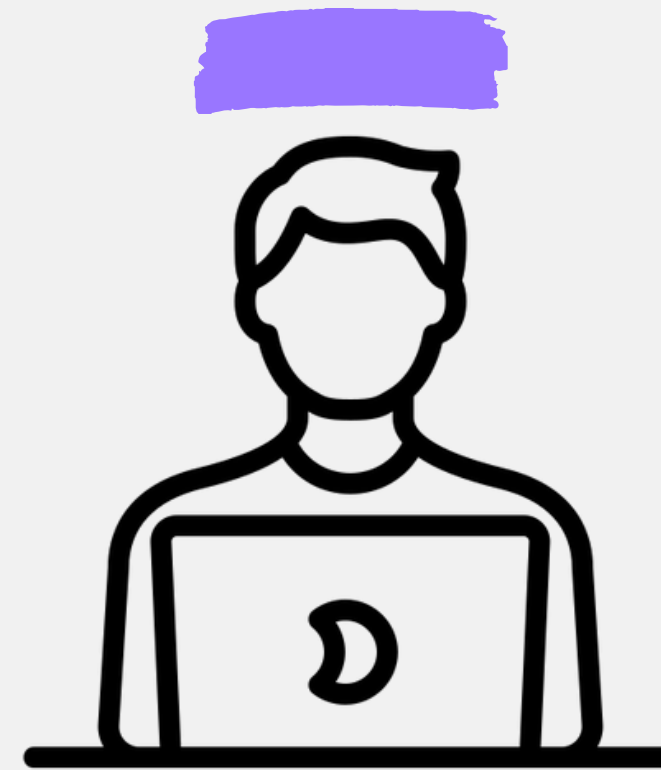
Meet the Group



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THANK YOU!

Do you have any questions for us?