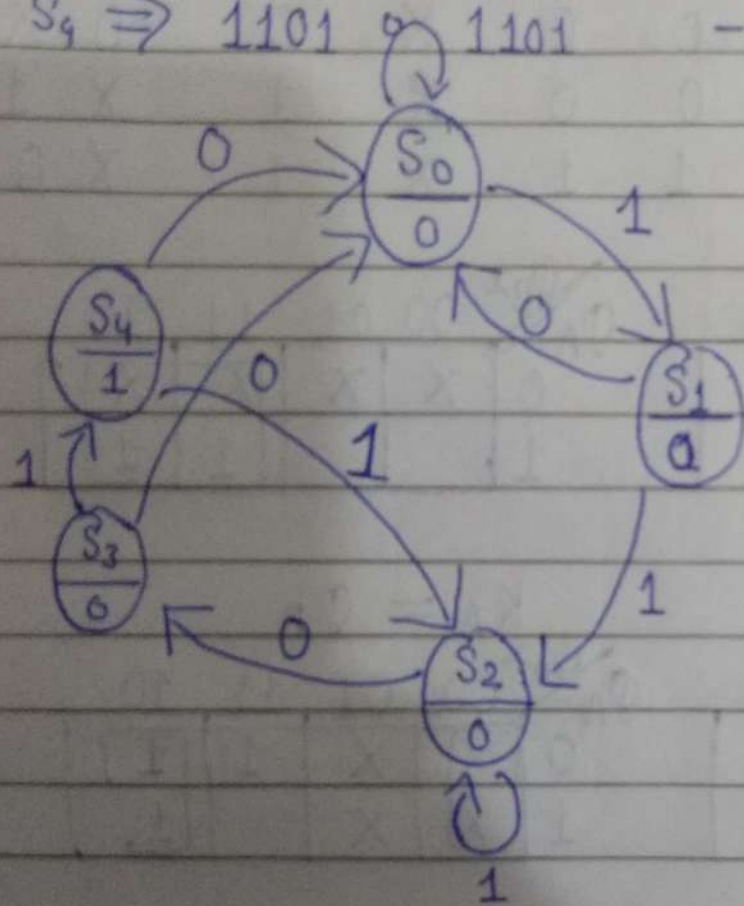


S_0 S_1 Operation

0	0	Stop Counting
0	1	Count Up by 1
1	0	Count Down by 2
1	1	Count Up by 3

Sequence Detection (1101) using Moore Machine

		Has	Need	Binary Code
$S_0 \Rightarrow$	Reset	—	1101--	000
$S_1 \Rightarrow$	1	1	101---	001
$S_2 \Rightarrow$	11	11	01-----	010
$S_3 \Rightarrow$	110	110	1-----	011
$S_4 \Rightarrow$	1101	1101	- or 101--	100



Φ_A	Φ_B	Φ_C	00	01	11	10
0						
1			1	x	x	x

$$Y = \Phi_A \text{ (Moore Model)}$$

State Diagram (Moore Model)

Sequence Detection of 1101 using Moore Machine

Q_A	Q_B	Q_C	x	Q_A^+	Q_B^+	Q_C^+	y	T_A	T_B	T_C
0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	0	0	0	1
0	0	1	0	0	0	0	0	0	0	1
0	0	1	1	0	1	0	0	0	1	1
0	1	0	0	0	1	1	0	0	0	1
0	1	0	1	0	1	0	0	0	0	0
0	1	1	0	0	0	0	0	0	1	1
0	1	1	1	1	0	0	0	1	1	1
1	0	0	0	0	0	0	1	1	0	0
1	0	0	1	0	1	0	1	1	1	0

$Q_A \backslash Q_C x$	00	01	11	10
00				
01			1	
11	x	x	x	x
10	1	1	x	x

$Q_A \backslash Q_C x$	00	01	11	10
00			1	
01			1	1
11	x	x	x	x
10		1	x	x

$$T_A = Q_A + Q_B Q_C x$$

$$T_B = Q_C x + Q_B Q_C + Q_A x$$

$Q_A \backslash Q_C x$	00	01	11	10
00		1	1	1
01	1		1	1
11	x	x	x	x
10			x	x

$Q_A \backslash Q_C x$	00	01	11	10
00				
01			1	
11	x	x	x	x
10			x	x

$$T_C = Q_C + Q_B \bar{x} + \bar{Q}_A \bar{Q}_B x$$

$$(Output) y (Moore) \Rightarrow Y = Q_A \quad \text{As all other state are don't care}$$

$$y = Q_B Q_C x \quad (Mealy Machine)$$



Q_A	Q_B	Q_C	x	Q_A^+	Q_B^+	Q_C^+	J_A	K_A	J_B	K_B	J_C	K_C	y
0	0	0	0	0	0	0	0	X	0	X	0	X	0
0	0	0	1	0	0	1	0	X	0	X	1	X	0
0	0	1	0	0	0	0	0	X	0	X	X	1	0
0	0	1	1	0	1	0	0	X	1	X	X	1	0
0	1	0	0	0	1	1	0	X	X	0	1	X	0
0	1	0	1	0	1	0	0	X	X	0	0	X	0
0	1	1	0	0	0	0	0	X	X	1	X	1	0
0	1	1	1	1	0	0	1	X	X	1	X	1	0
1	0	0	0	0	0	0	X	1	0	X	0	X	1
1	0	0	1	0	1	0	X	1	1	X	0	X	1

$Q_A Q_B \backslash Q_C x$	00	01	11	10
00				
01			1	
11	X _b	X _b	X _b	X _b
10	X	X	X _b	X _b

$Q_A Q_B \backslash Q_C x$	00	01	11	10
00	X	X	X	X
01	X	X	X	X
11	X	X	X	X
10	1	1	X	X

$J_A = Q_B Q_C x$

$Q_A Q_B \backslash Q_C x$	00	01	11	10
00			1	
01	X	X	X	X
11	X	X	X	X
10		1	X	X

$K_A = 1$

$Q_A Q_B \backslash Q_C x$	00	01	11	10
00	X	X	X	X
01			1	1
11	X	X	X	X
10	X	X	X	X

$$J_B = Q_A Q_B x + Q_C x$$

$$K_B = Q_C$$

$\Phi_A \Phi_B \backslash \Phi_C x$	00	01	11	10
00		1	X	X
01	1		X	X
11	X	X	X	X
10			X	X

$\Phi_A \Phi_B \backslash \Phi_C x$	00	01	11	10
00	X	X	1	1
01	X	X	1	1
11	X	X	X	X
10	X	X	X	X

$$J_C = \Phi_B \bar{x} + \bar{\Phi}_A \bar{\Phi}_B x$$

$$K_C = 1$$

$$Y = \Phi_A$$

Sequence Detection of 1101 using Moore Mealy Machine

Φ_A	Φ_B	x	Φ_A^+	Φ_B^+	y	T_A	T_B
0	0	0	0	0	0	0	0
0	0	1	0	1	0	0	1
0	1	0	0	0	0	0	1
0	1	1	1	0	0	1	1
1	0	0	1	1	0	0	1
1	0	1	1	0	0	0	0
1	1	0	0	0	0	1	1
1	1	1	0	1	1	1	1

$\Phi_A \backslash \Phi_B x$	00	01	11	10
0			1	
1			1	1

$\Phi_A \backslash \Phi_B x$	00	01	11	10
0		1	1	1
1	1		1	1

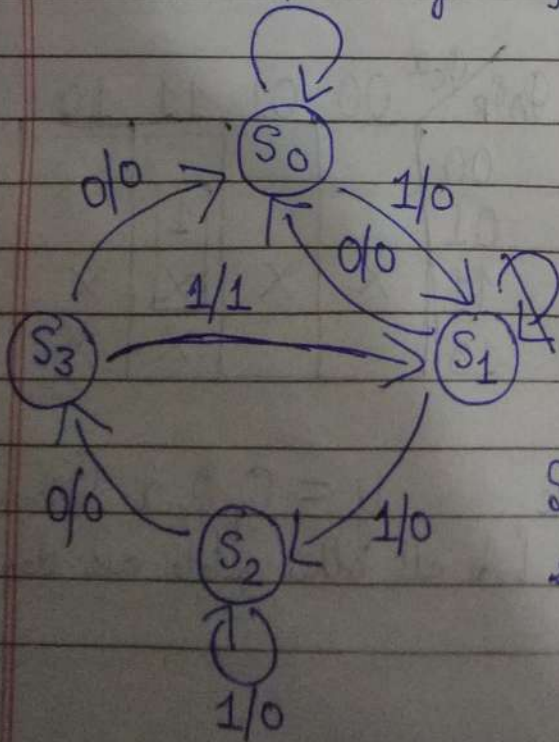
$$T_A = \Phi_B x + \Phi_A \Phi_B$$

$$T_B = \Phi_B^x + \Phi_A x + \Phi_A^x$$

$\Phi_A \backslash \Phi_B x$	00	01	11	10
0				
1			1	

$$T_B = \Phi_B^x + (\Phi_A \oplus x)$$

$$y = \Phi_B \Phi_A x$$



	BC	Has	Need
S_0	00	-	1101--
S_1	01	1	101--
S_2	10	11	01--
S_3	11	110	1--
S_4	-	1101	--- or 101--

Since S_4 and S_1 are equivalent states we don't need S_4 hence only 4 states \Rightarrow 2 Flip Flop

Q_A	Q_B	x	Q_A^+	Q_B^+	y	J_A	K_A	J_B	K_B
0	0	0	0	0	0	0	X	0	X
0	0	1	0	1	0	0	X	1	X
0	1	0	0	0	0	0	X	X	1
0	1	1	1	0	0	1	X	X	1
1	0	0	1	1	0	X	0	1	X
1	0	1	1	0	0	X	0	0	X
1	1	0	0	0	0	X	1	X	1
1	1	1	0	1	1	X	1	X	0

$Q_A \backslash Q_B x$	00	01	11	10
0			1	
1	X	X	X	X

$Q_A \backslash Q_B x$	00	01	11	10
0	X	X	X	X
1			1	1

$J_A = Q_B x$

$Q_A \backslash Q_B x$	00	01	11	10
0		1	X	X
1	1		X	X

$K_A = Q_B$

$Q_A \backslash Q_B x$	00	01	11	10
0	X	X	1	1
1	X	X		1

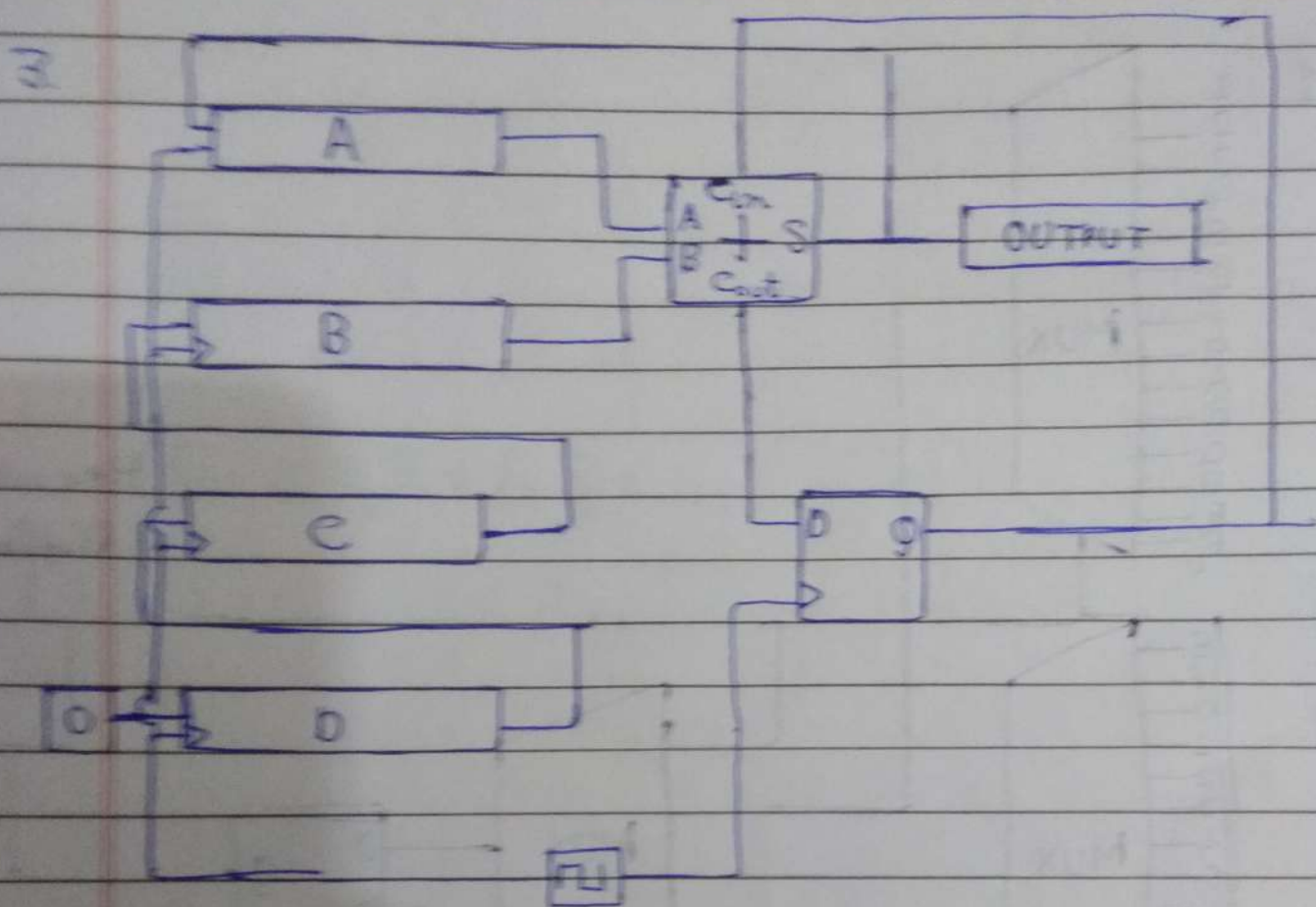
$$J_B = \bar{Q}_A x + Q_A \bar{x}$$

$$= Q_A \oplus x$$

$$K_B = \bar{Q}_A + \bar{Q}_B$$

$$y = Q_A Q_B x$$

Finding Average of 4 Temperatures using Shift Register



We have 4 Shift Register which initially stores 4 temperature values. We need 26 Clock pulses to find the average of 4 values, first 8 clock pulses \Rightarrow A and B are added and Result is transferred to A. C get shifted to B, D get shifted to C. Then again A and B (actually C) are added for next 8 pulses and D is shifted to B (through C) and now A and actual D in B are added to get the total in 24 clock pulses. \Rightarrow After that we shift 2 bit to right to get the average value of four temperatures.