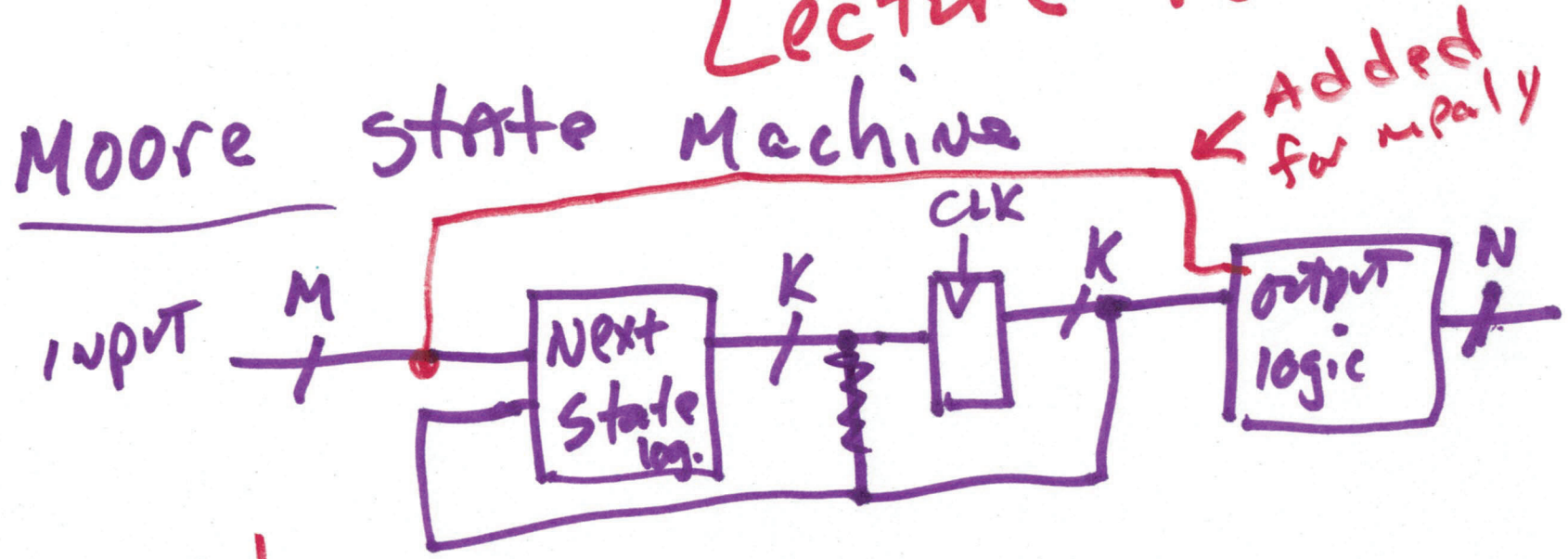
# CpE 100 Digital logic Design

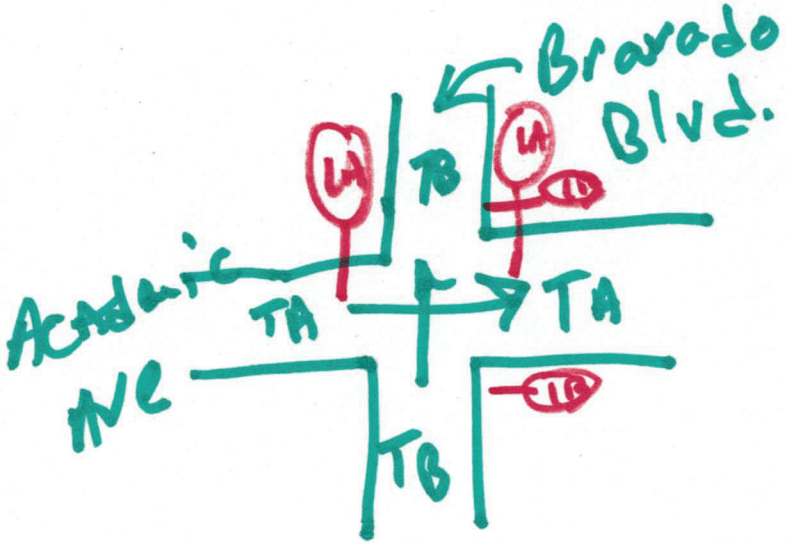
MARCH 24, 2021

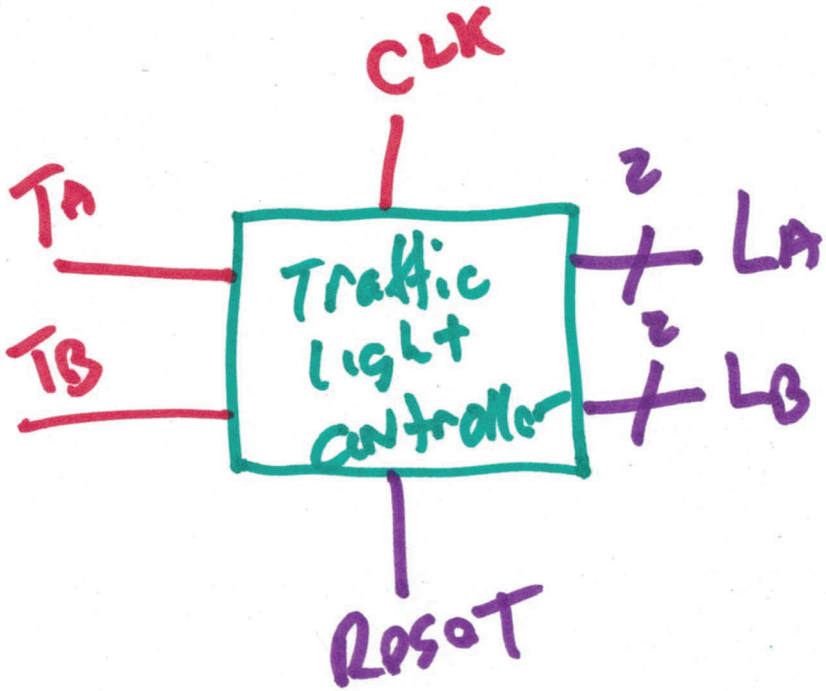
Lecture 15

## Moore state Machine




Mealy state machine




$T_A$ = true then
↓ traffic in the direction

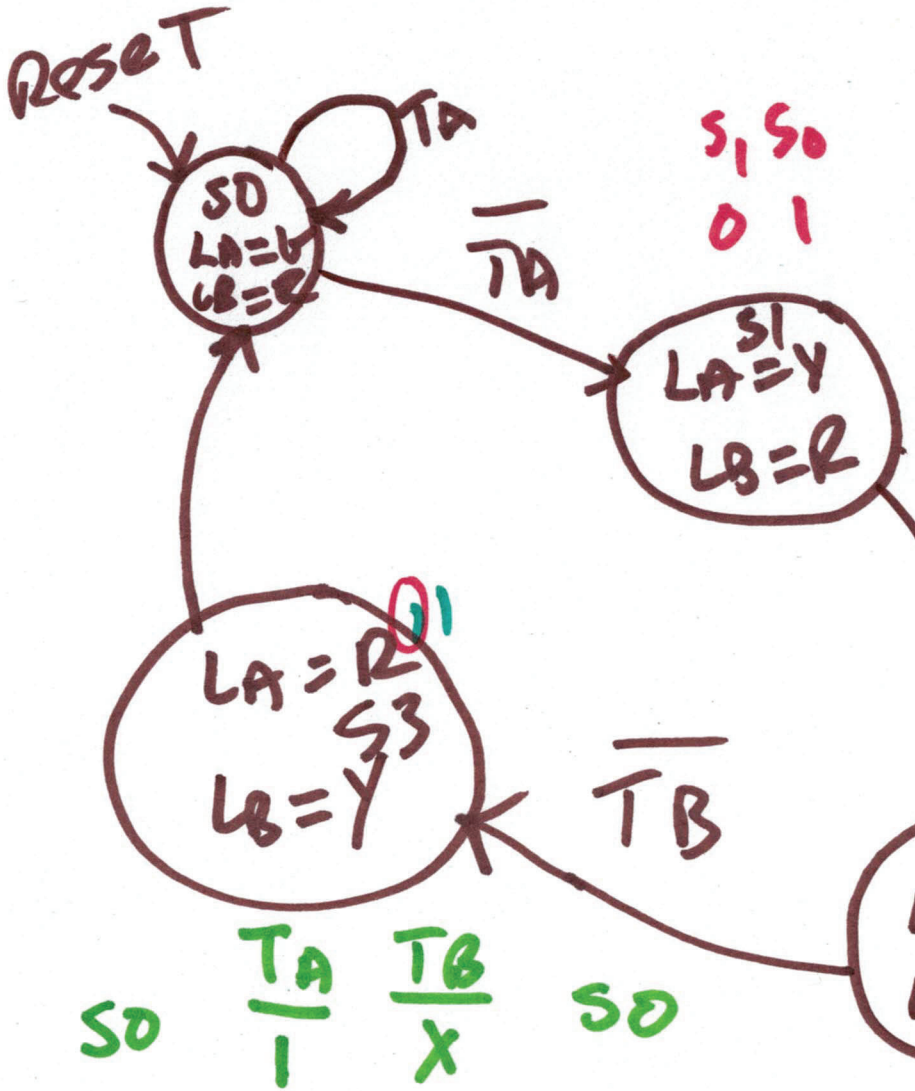
$T_A = 1$

$T_A = 0$ (false) (nobody waiting

$T_B$ = true (1) people WANT to cross

$T_B = 0$ (false)
nobody there

$f = \frac{1}{5} = 0.2$ Hz




$S_1 S_0$

0 1

2-bits

$2^2 = 4$

$2^2 - 1 = 3$

$S_1'$ & $S_0'$

(state diagram FSM)

$S_1 S_0$

1 0

10

$S_1 S_0$

1 0

| | $T_A$ | $T_B$ | |
|---|---|---|---|
| S0 | 1 | X | S0 |
| S0 | 0 | X | S1 |
| S1 | X | X | S2 |

| | $T_A$ | $T_B$ | |
|---|---|---|---|
| S2 | X | 1 | S2 |
| S2 | X | 0 | S3 |
| S3 | X | X | S0 |

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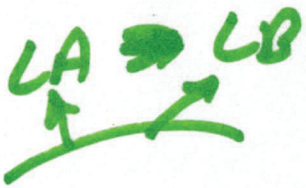
TABLE 3.2

| State | Encodings S1:0 |
|---|---|
| S0 | 00 |
| S1 | 01 |
| S2 | 10 |
| S3 | 11 |

S1 S0




| Outputs | Encodings, L1:0 |
|---|---|
| Green | 00 |
| yellow | 01 |
| Red | 10 |

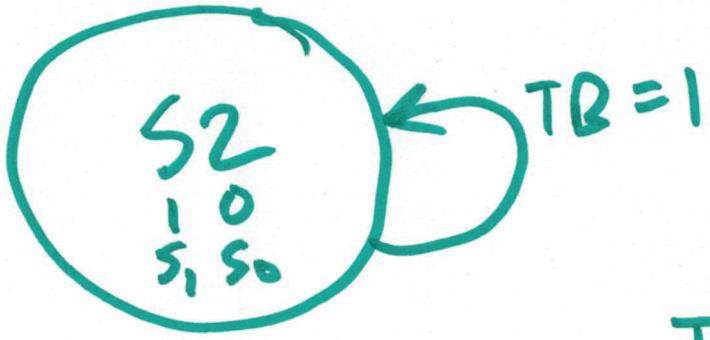
| State | $S_1$ | $S_0$ | $L_{A1}$ | $L_{A0}$ | $L_{B1}$ | $L_{B0}$ |
|---|---|---|---|---|---|---|
| | | | LA | | LB | |
| S0 | 0 | 0 | 0 | 0 (green) | 1 | 0 (red) |
| S1 | 0 | 1 | 0 | 1 (yell) | 1 | 0 (red |
| S2 | 1 | 0 | 1 | 0 (red) | 0 | 0 (green) |
| S3 | 1 | 1 | 1 | 0 (red) | 0 | 1 (yell) |

$S_1 = 0$ $S_0 = 0$

$$S_1' = \bar{S}_1 S_0 + S_1 \bar{S}_0 \cdot \bar{T}_B + S_1 \bar{S}_0 T_B$$

$$S_0' = \bar{S}_1 \bar{S}_0 T_A + S_1 \bar{S}_0 \bar{T}_B$$

5)




$$TB \cdot S_1 \cdot \overline{S_0} \Rightarrow S_1 = 1$$