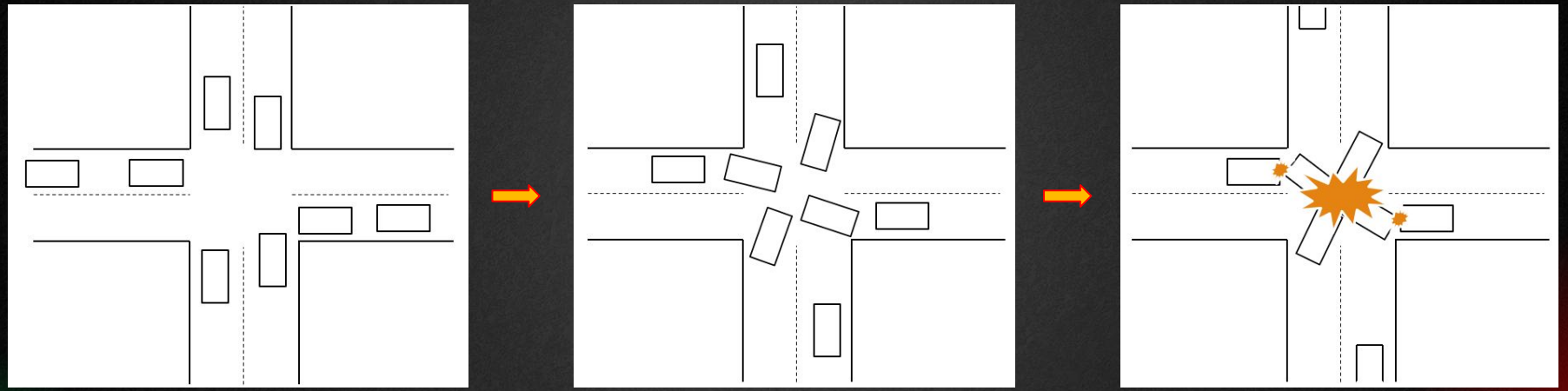
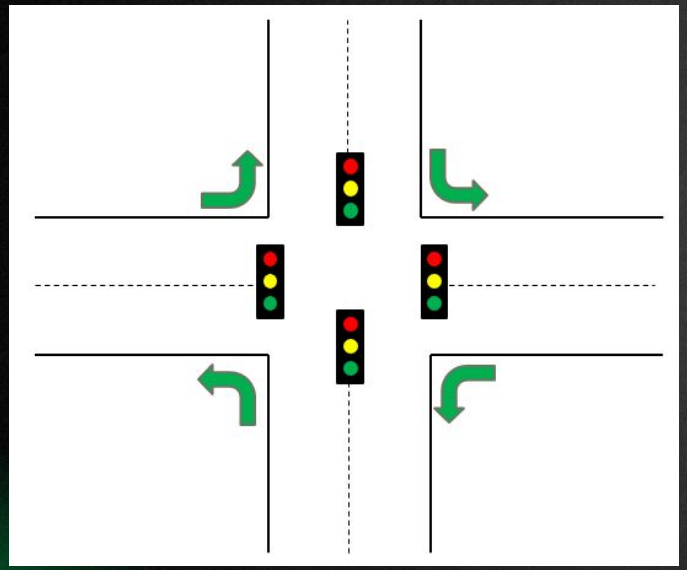
# TRAFFIC LIGHT CONTROLLER

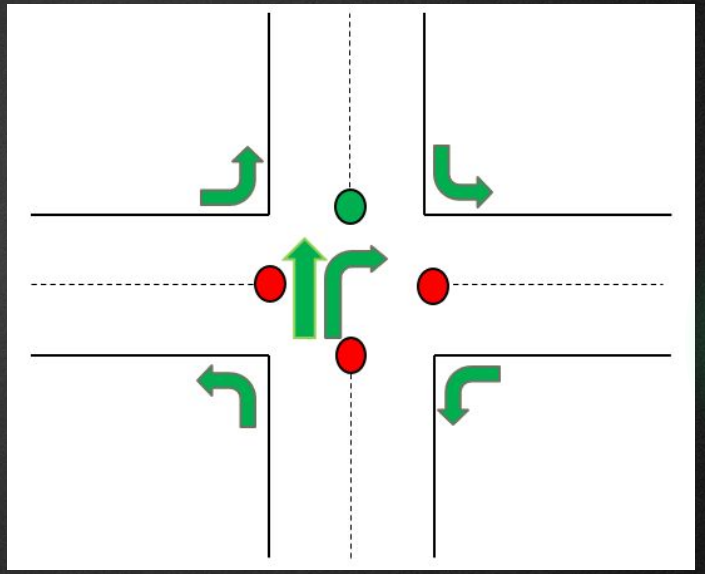
EEL2020 DIGITAL DESIGN COURSE PROJECT

# PROBLEM STATEMENT

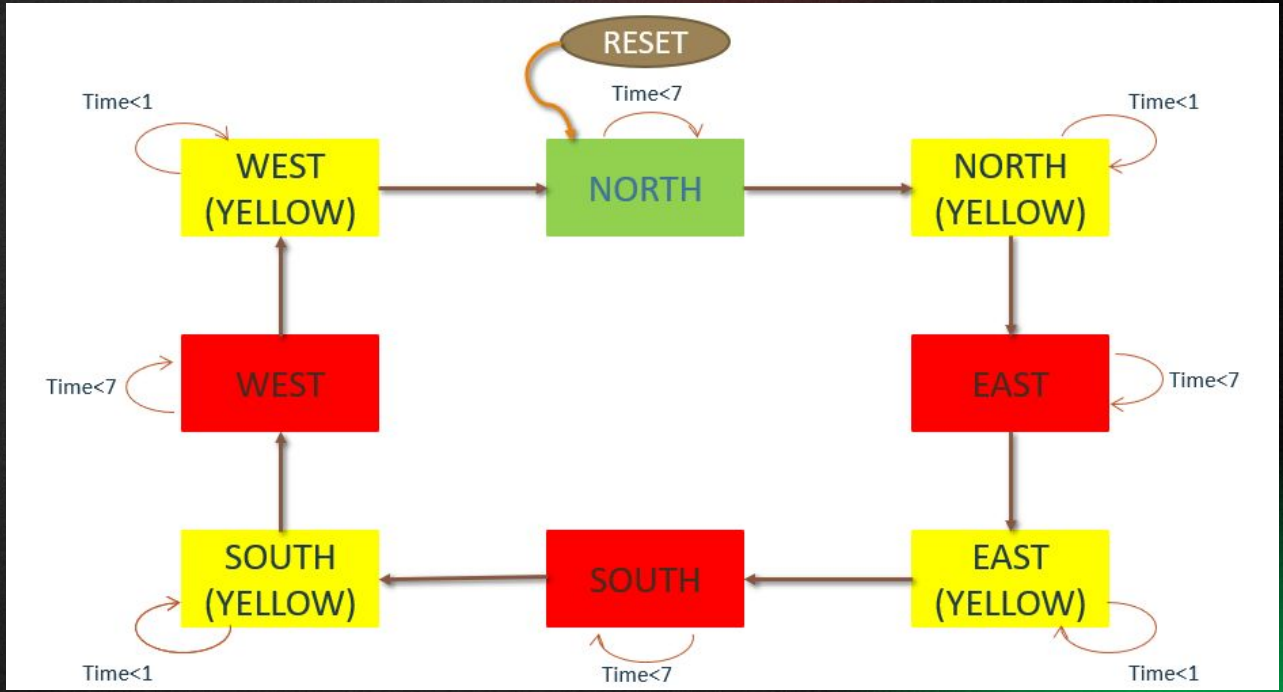


# SOLUTION

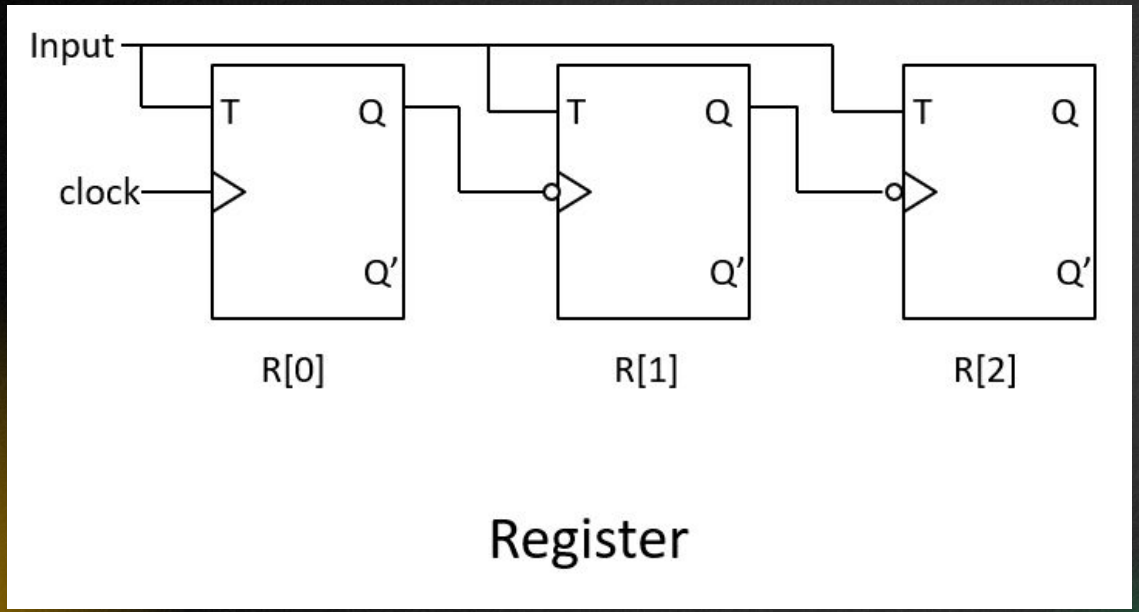




# STATE DIAGRAM



# CIRCUIT DIAGRAM



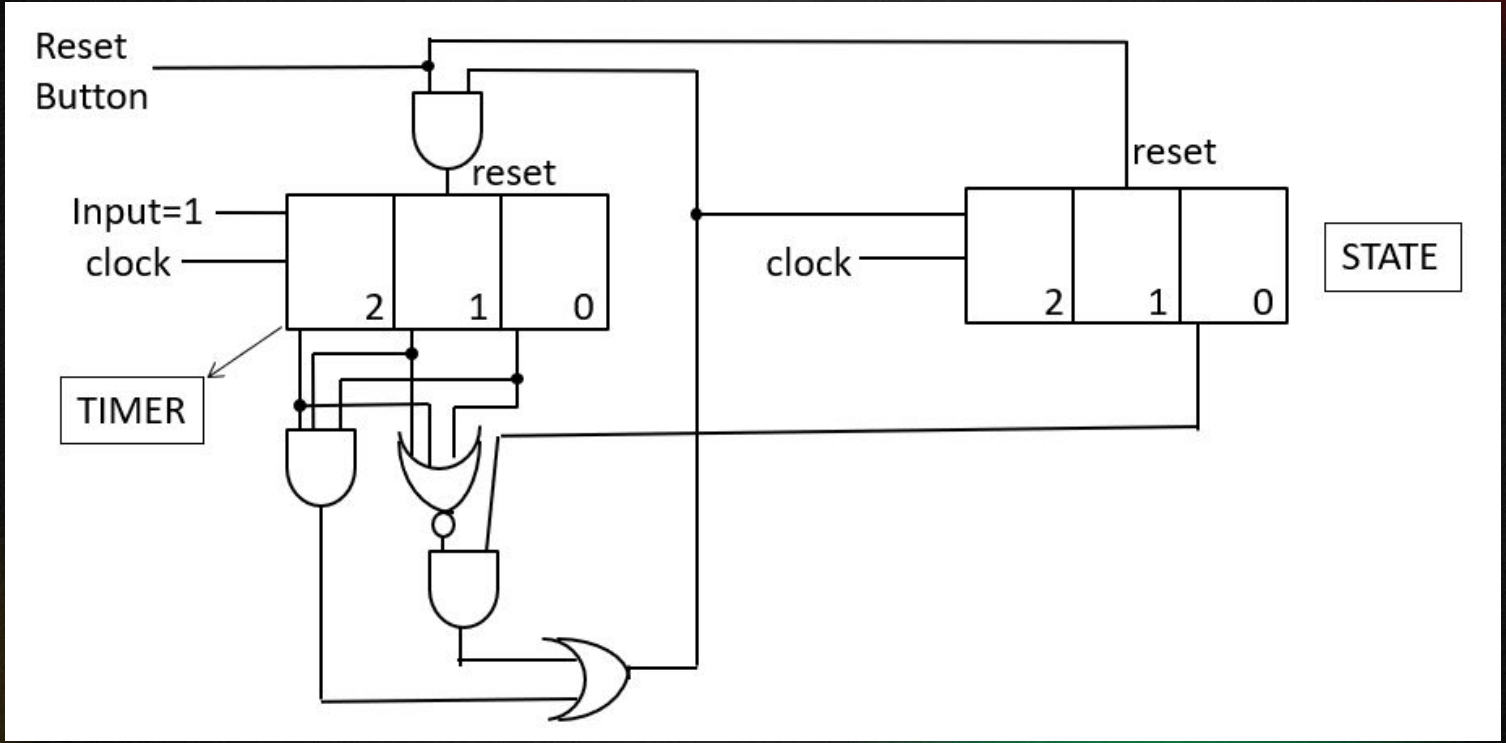

## T Flip-Flop:

Characteristics Equation- T ⊗ Q

For Input=1 , 1 ⊗ Q = Q'
Acts as Counter

For Input=0 , 0 ⊗ Q = Q
Acts as Memory element

# CIRCUIT DIAGRAM



# TRUTH TABLE FOR LIGHTS

| STATE | S[2] | S[1] | S[0] | NORTH | | | SOUTH | | | EAST | | | WEST | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | G | Y | R | G | Y | R | G | Y | R | G | Y | R |
| North | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| North Yellow | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 |
| South | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| South Yellow | 0 | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| East | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 |
| East Yellow | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 |
| West | 1 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 |
| West Yellow | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |

# LOGIC EQUATIONS

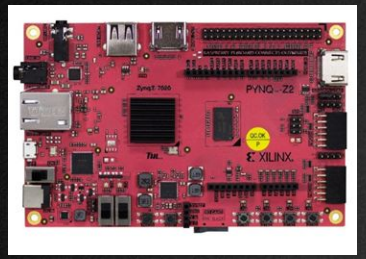
- NG = S0’ & S1’ & S2’
- NY = S0 & S1’ & S2’
- NR = (NG + NR)’

- SG = S0’ & S1 & S2’
- SY = S0 & S1 & S2’
- SR = (SG + SR)’

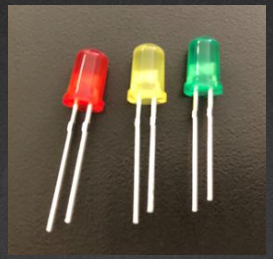
- EG = S0’ & S1’ & S2
- EY = S0 & S1’ & S2
- ER = (EG + ER)’

- WG = S0’ & S1 & S2
- WY = S0 & S1 & S2
- WR = (WG + WR)’

# REQUIREMENTS

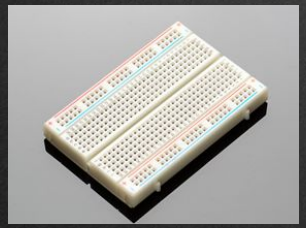


PYNQ-Z2 BOARD

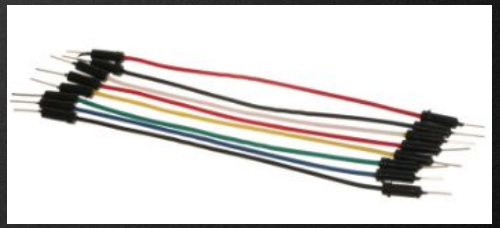


LEDs

RESISTORS



BREADBOARD



WIRES

# IMPLEMENTATION ON BOARD