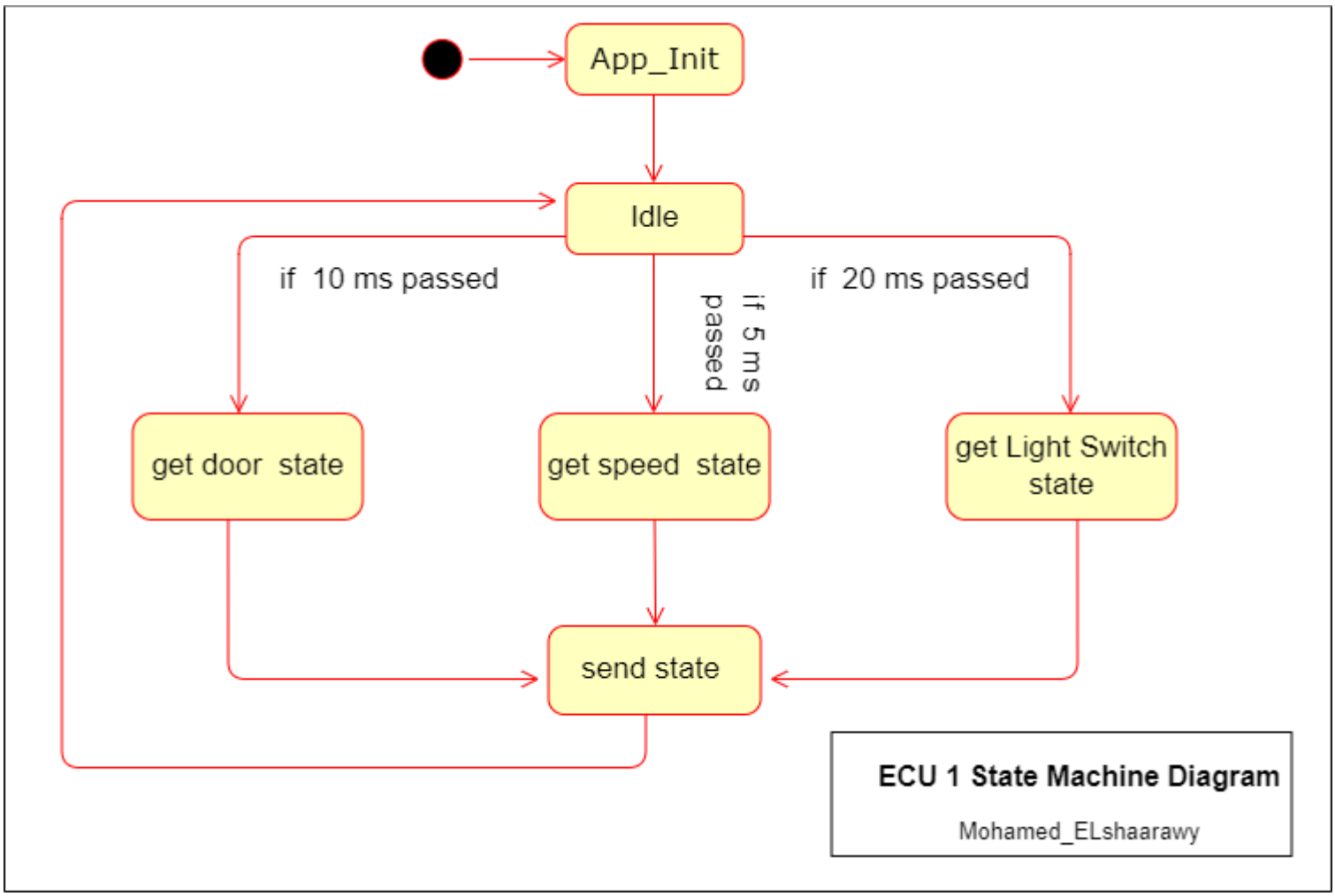
Automotive door control system design

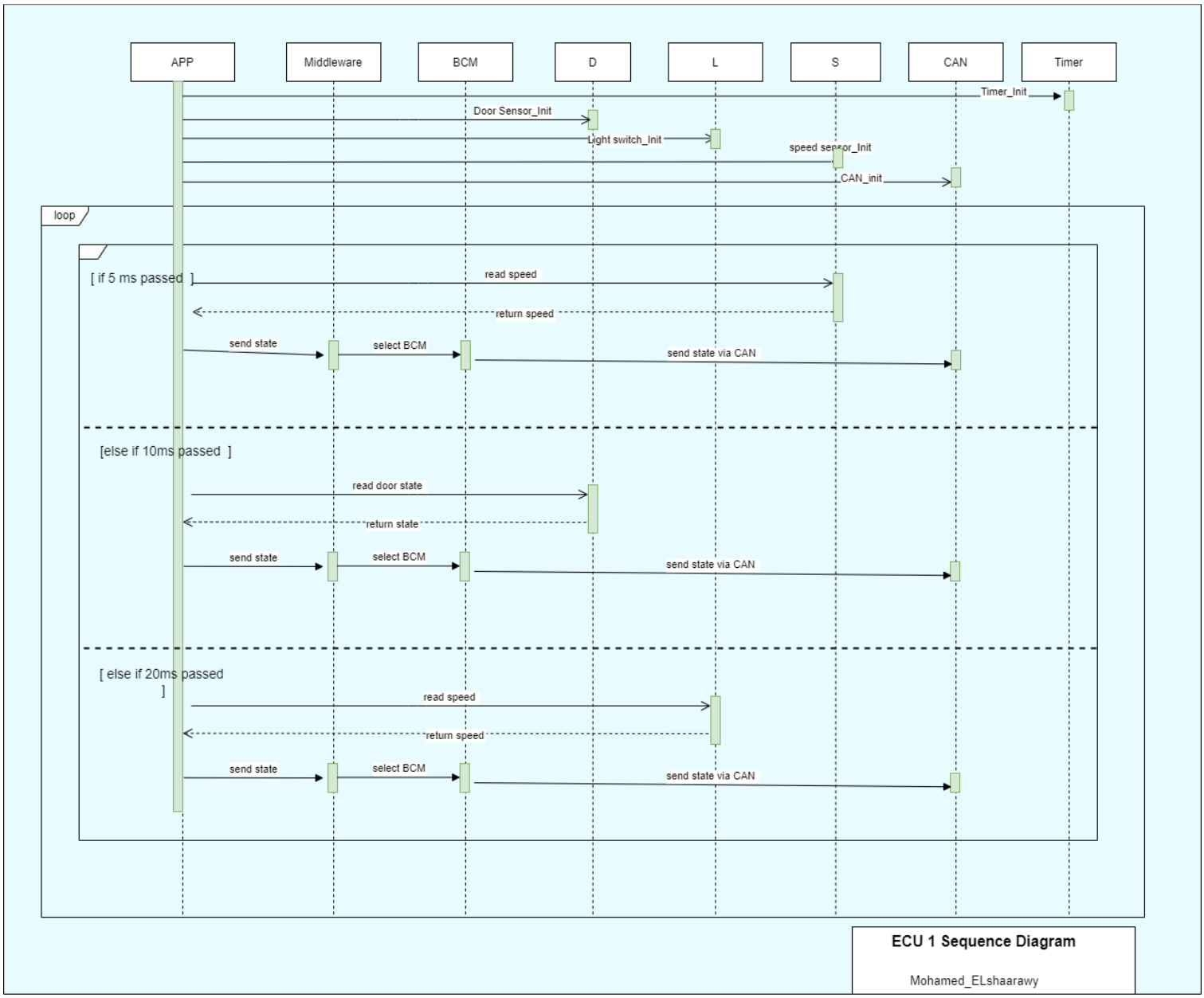
Dynamic design analysis

For ECU 1:

1. **Draw a state machine diagram for each ECU component**
2. **Draw a state machine diagram for the ECU operation**



3. **Draw the sequence diagram for the ECU**



4. **Calculate CPU load for the ECU**

. assume having 3 tasks one for each send process
((T1=1ms , P1=5ms),(T2=1ms, P2=10), (T3=1ms , P3=20ms))

- Calculate the system hyperperiod

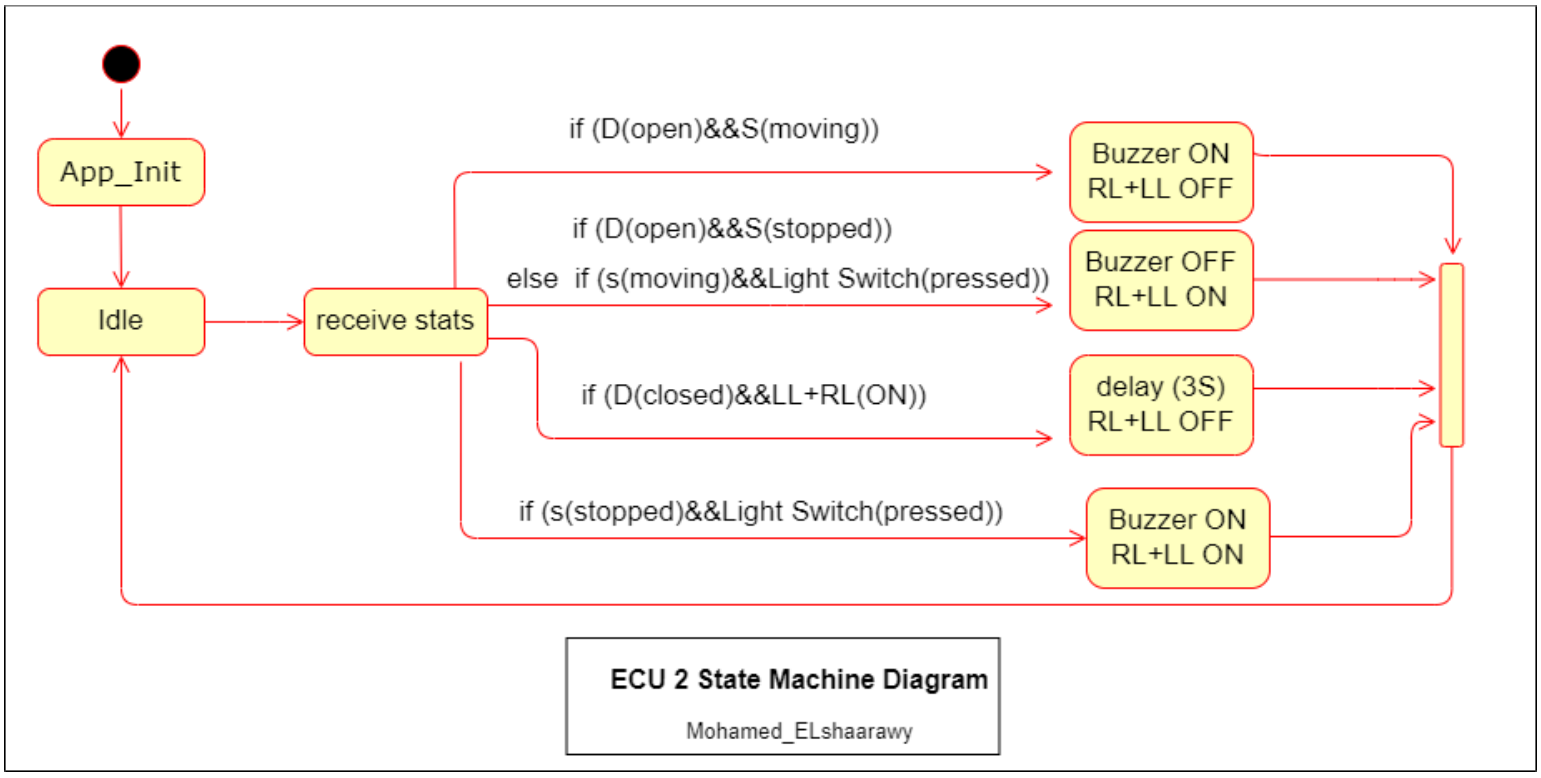
  Hyper Period = 20 ms

- Calculate the CPU load

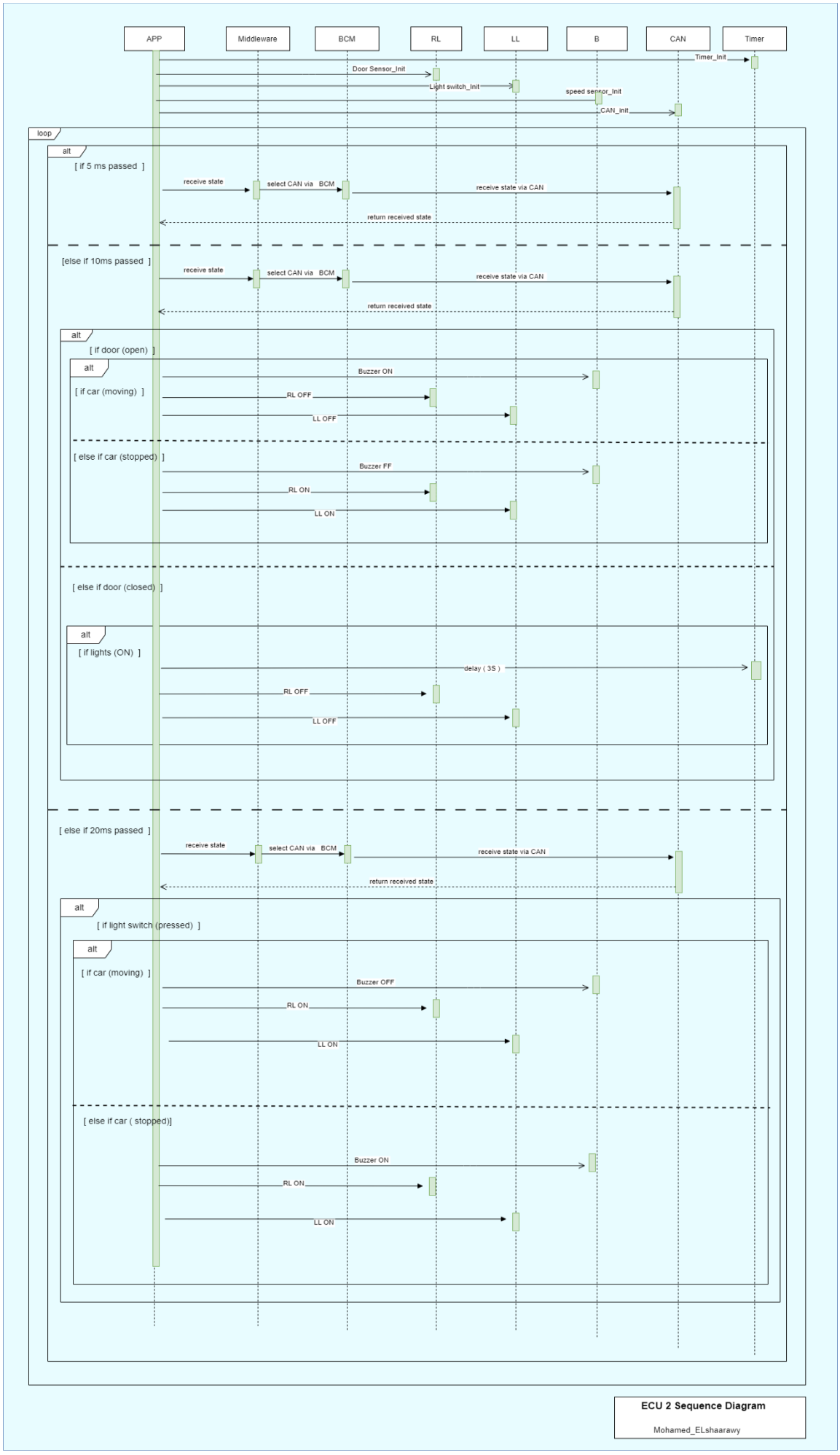
CPU Load = ((1 * 4) + (1 * 2) + (1* 1)) /20 = 0.35
= 35%

For ECU 2:

- **Draw a state machine diagram for each ECU component**
- **Draw a state machine diagram for the ECU operation**



- **Draw the sequence diagram for the ECU**



- **Calculate CPU load for the ECU**

. assume having 3 tasks one for each send process
((T1=1ms , P1=5ms),(T2=1ms, P2=10), (T3=1ms , P3=20ms))

- Calculate the system hyperperiod

  Hyper Period = 20 ms

- Calculate the CPU load

CPU Load = ((1 * 4) + (1 * 2) + (1* 1)) /20 = 0.35
= 35%

- **Calculate bus load in your system: With what percentage of system bus was busy per 1 second**

  - CAN bus load is based on the used capacity divided by maximum capacity

  Assume maximum capacity in a 125 KHz rate CAN system is 1 s * 125 KHz = 125000 bits/s

  Assume 3 states being send of size(130 bits/frame) for each one

  Speed state = 130 each 5 ms =26000 bit/s

  Door state = 130 each 10 ms =13000 bit/s

  Light switch state = 130 each 20 ms =6500 bit/s

  CAN bus load=(26000+13000+6500)/125000=0.364
  =36.4%