egypt fwd
initiative

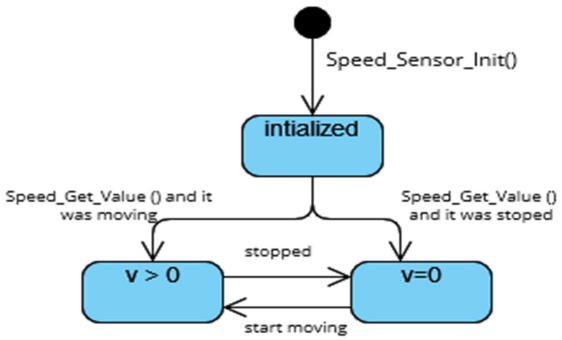
The design project

Dynamic Design

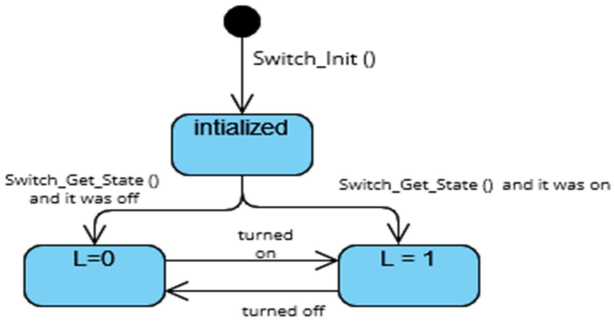
1- ECU 1

A- a state machine diagram for each ECU component

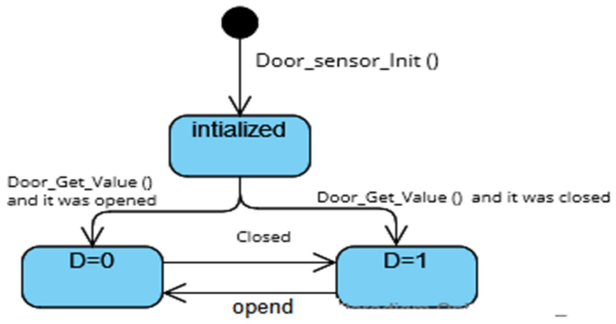
speed_sensor



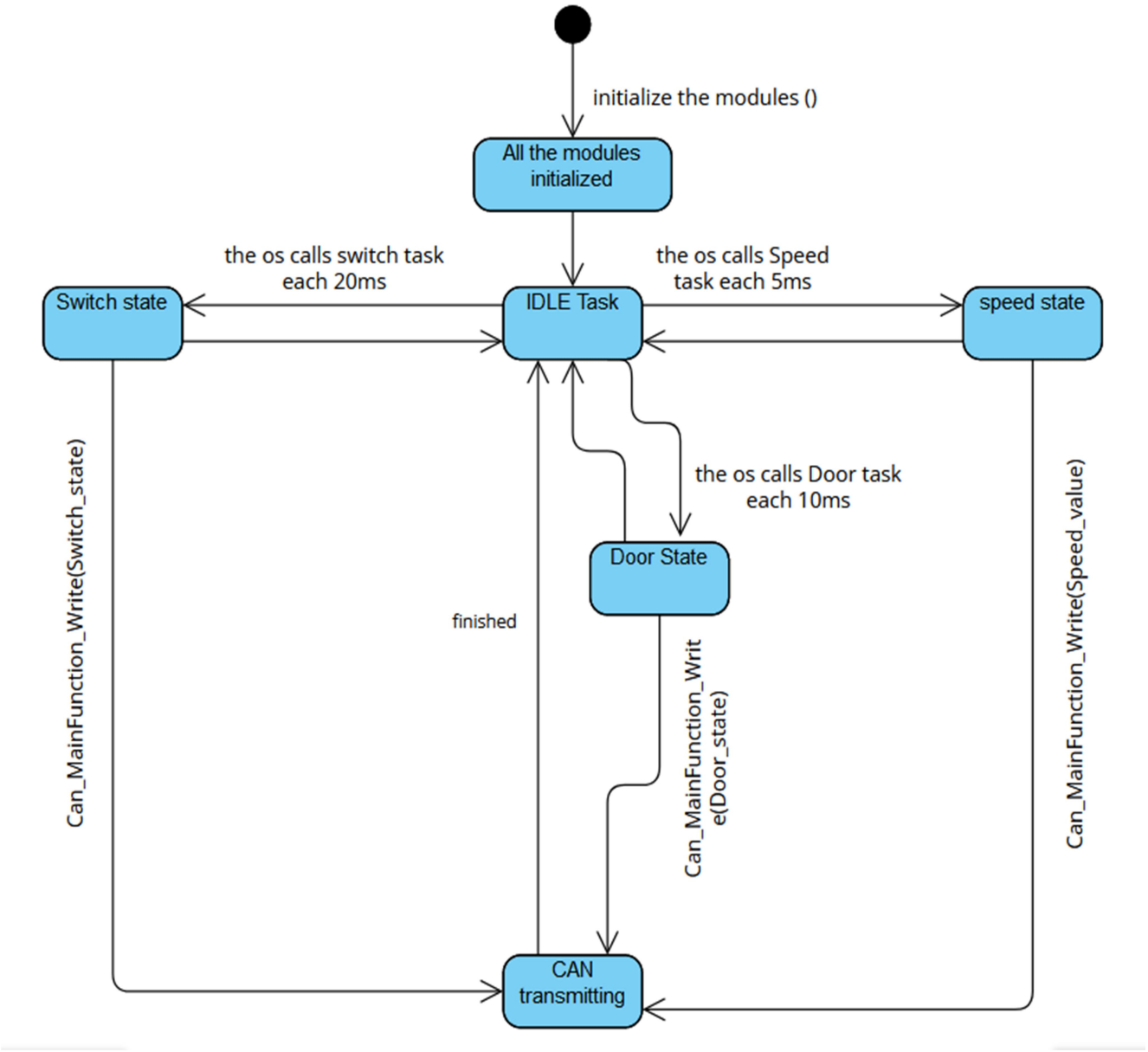
Light Switch



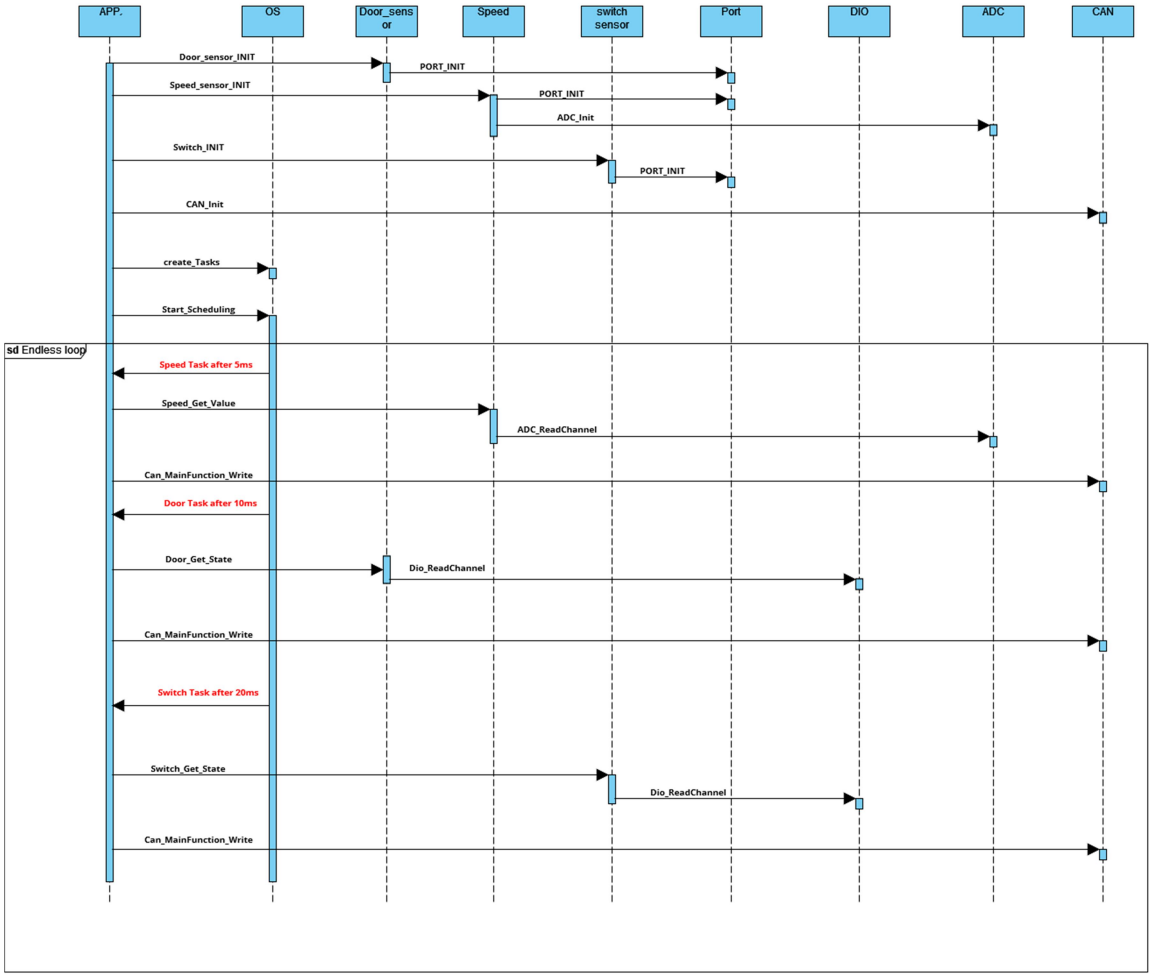
Door_sensor



B - a state machine diagram for the ECU operation



C - a Sequence diagram for the ECU



D – The Cpu Load

Each Can message will be 79 bits , the bit rate = 500Kbits/s

So each message will take 0.158 ms

Task1 (0.19 , 5) Task2 (0.18,10) Task3(0.18,20)

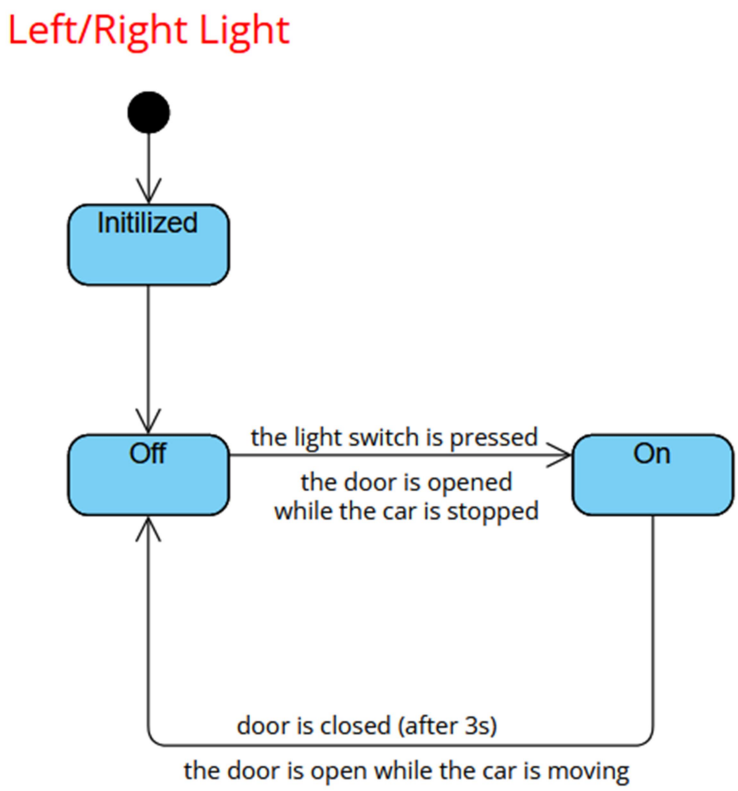
Hyperperiod = 20

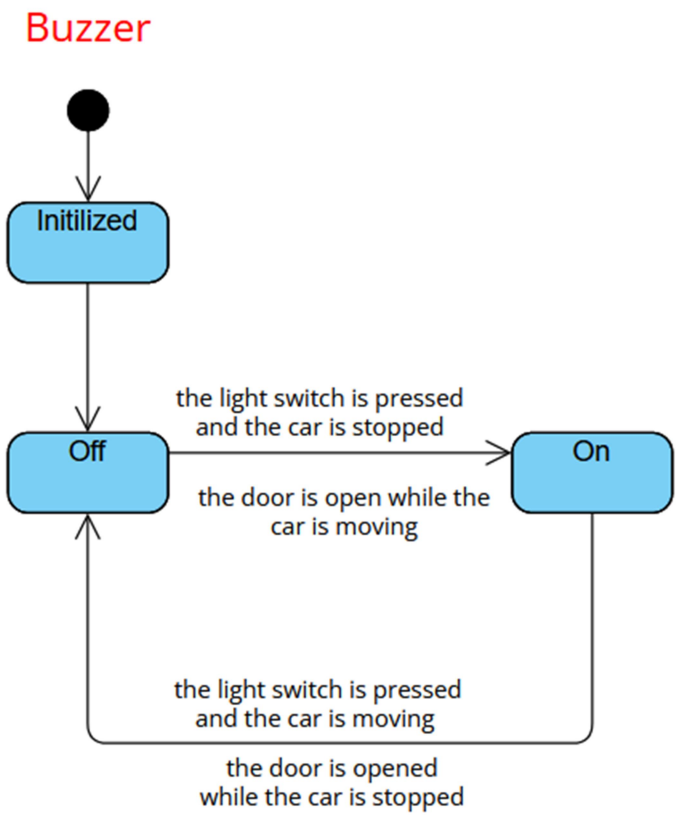
Total execution time = 0.19*4+0.18*2+0.18 = 1.3

Cpu load = 1.3/20= **6.5 %**

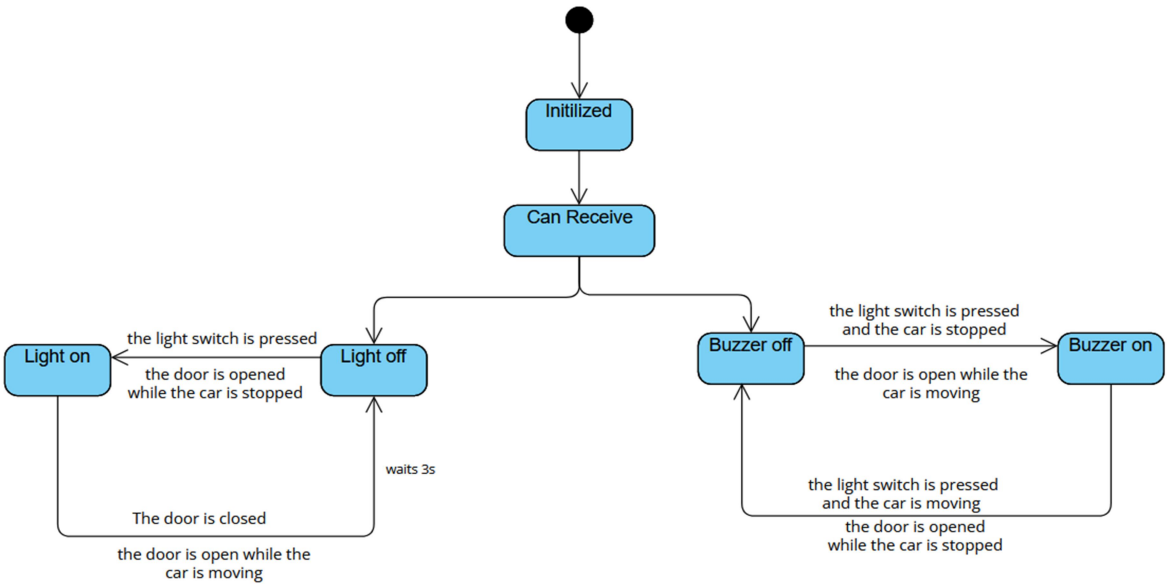
2- ECU 2

A- a state machine diagram for each ECU component

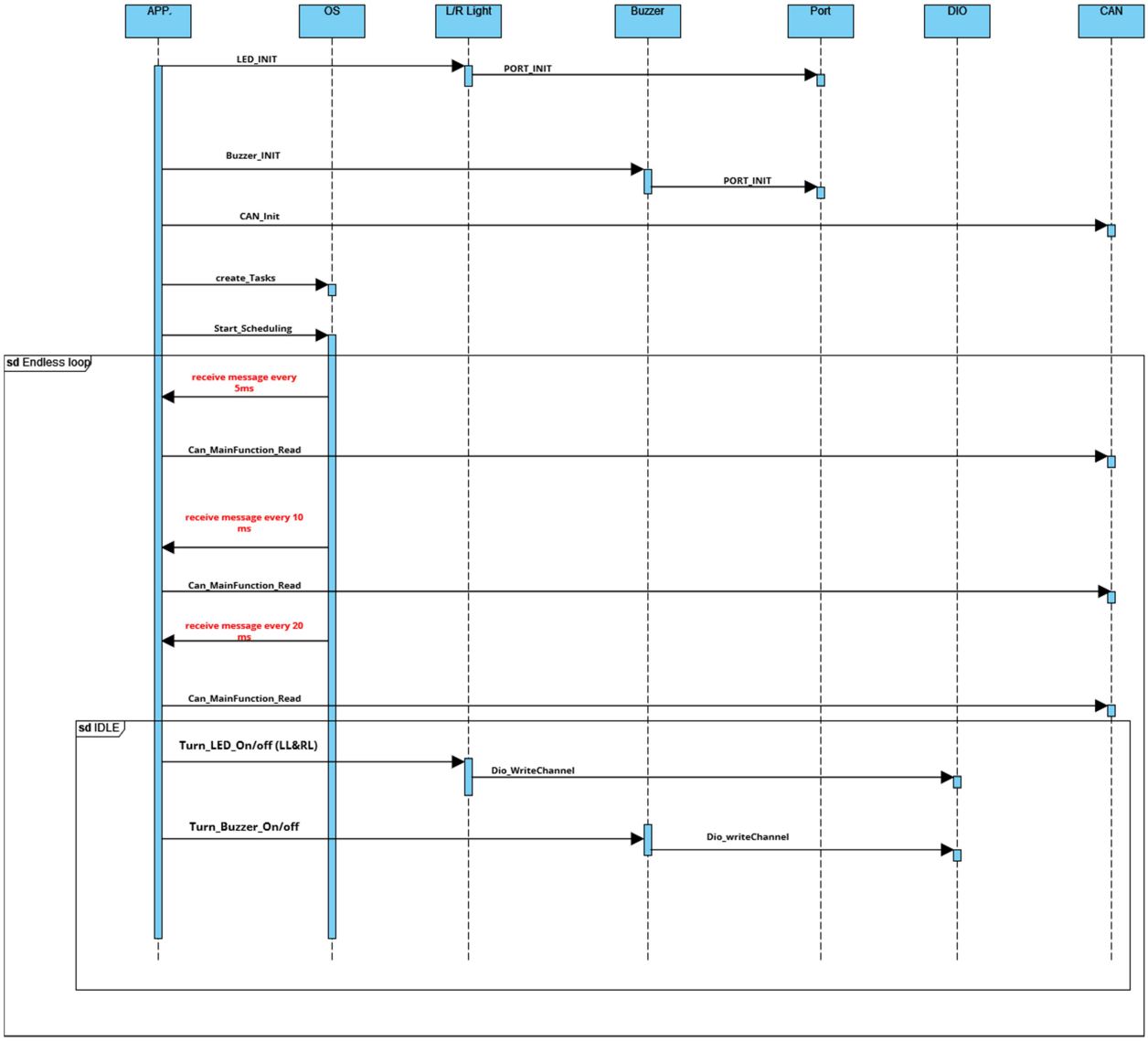




B - a state machine diagram for the ECU operation



C - a Sequence diagram for the ECU



D – The Cpu Load

Each Can message will be 79 bits , the bit rate = 500Kbits/s

So each message will take 0.158 ms

*the tasks will read the Can messages periodically and the decisions of the Leds/Buzzer states will be inside The Idle task .

Task1 (0.158 , 5) Task2 (0.158,10) Task3(0.158,20)

Hyperperiod = 20

Total execution time = 0.158*4+0.158*2+0.158 = 1.106

Cpu load = 1.3/20= **5.5 %**

bus load in the system

The message is 79 bits long (32bits data)
1-Load1 = 79 bits every 5ms so 79*200 within 1s
2-load 2 = 79 bits every 10ms so 79*100 within 1s
3-load 3 = 79bits every 20ms so 79*50 within 1s

Total load =79*200 +79*100+79*50 = 27650 bits/s

- the rate is 500 Kbits/s
  Bus load = 27650/500K = **5.53%**

-if the rate is 250 Kbits/s
  Bus load = 27650/250K = **11.06%**

And so on ..