

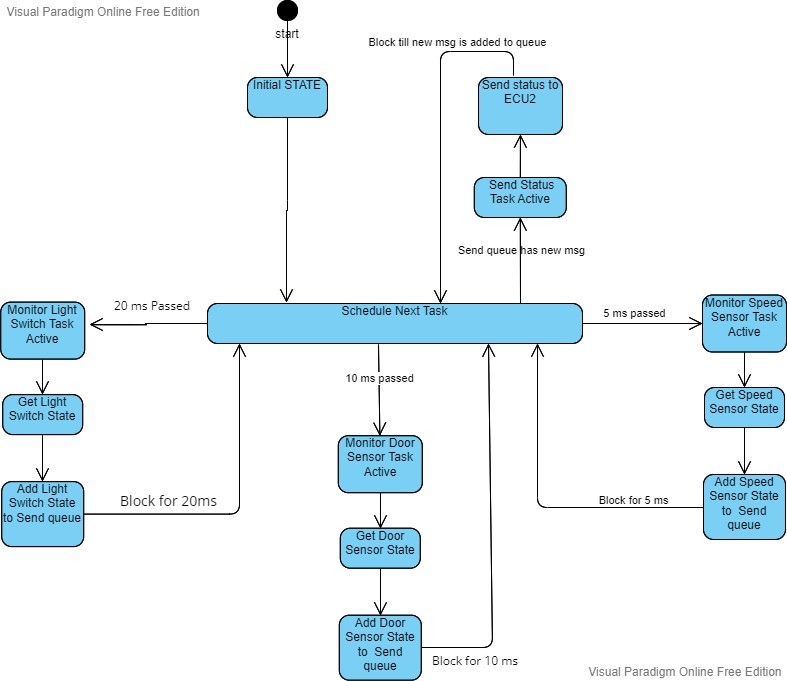
Automotive Door Control System Design

Dynamic Design

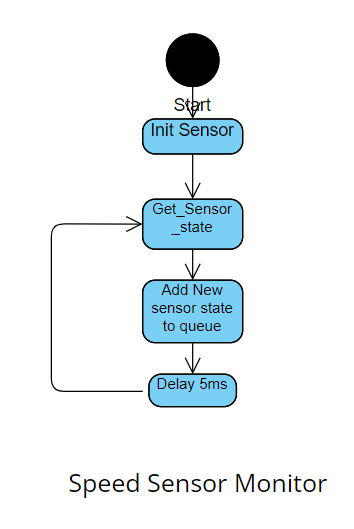
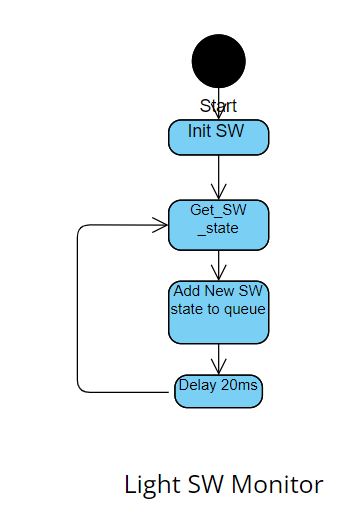
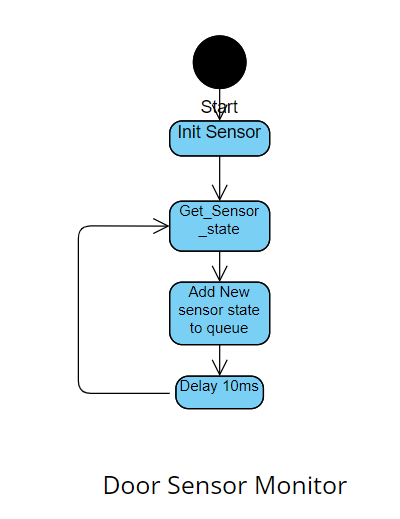
Nora Elhennawy | EGYFWD | 4-10-22

# ECU1

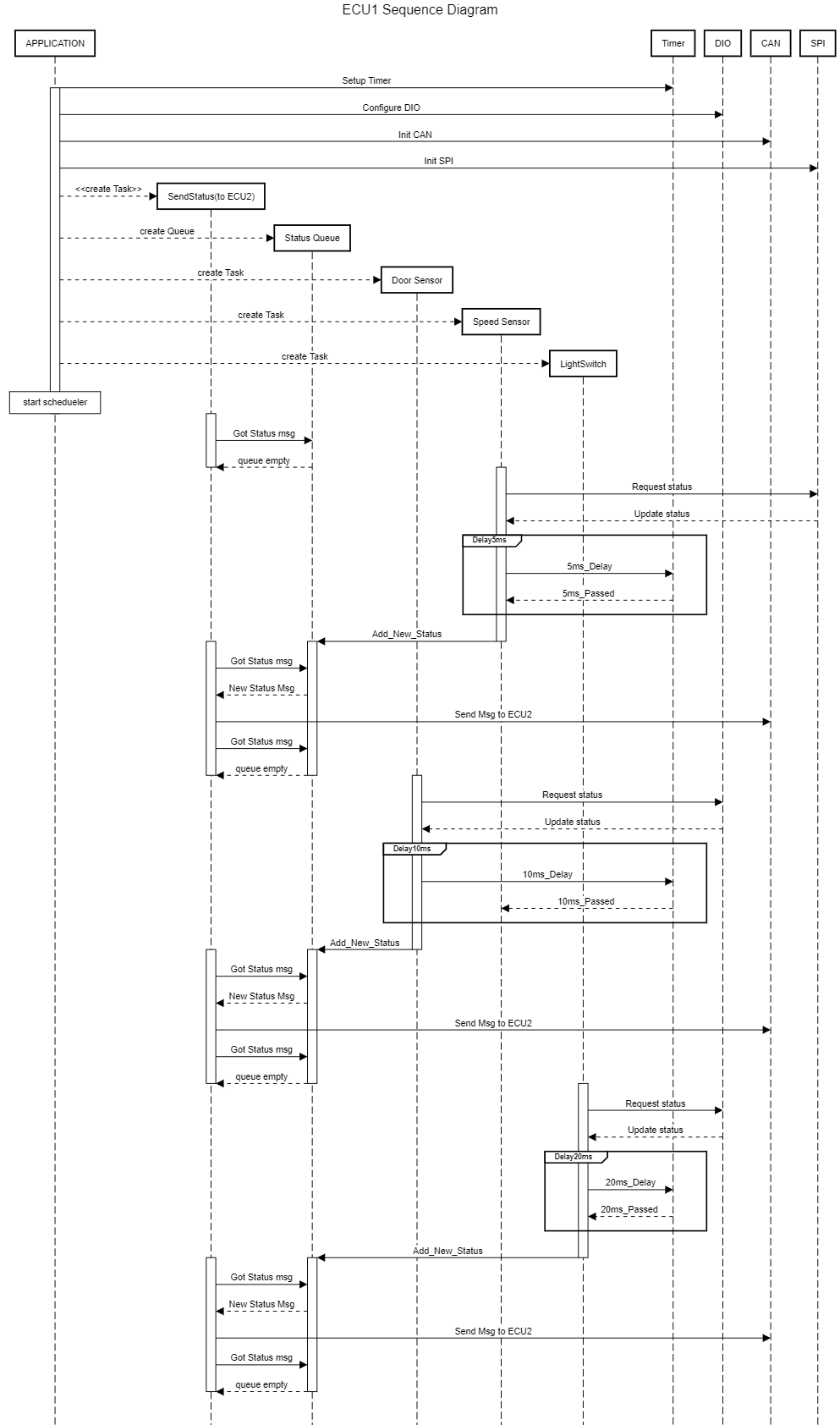
## State Machine diagram



## ECu1 Components State diagrams

## ecu1 sequence diagram



## ecu1 CPU load

The system has 4 tasks:

Door\_Sensor\_Monitor : exec time 15 us , period=10 ms

Speed\_Sensor\_Monitor : exec time 15us , period=5ms

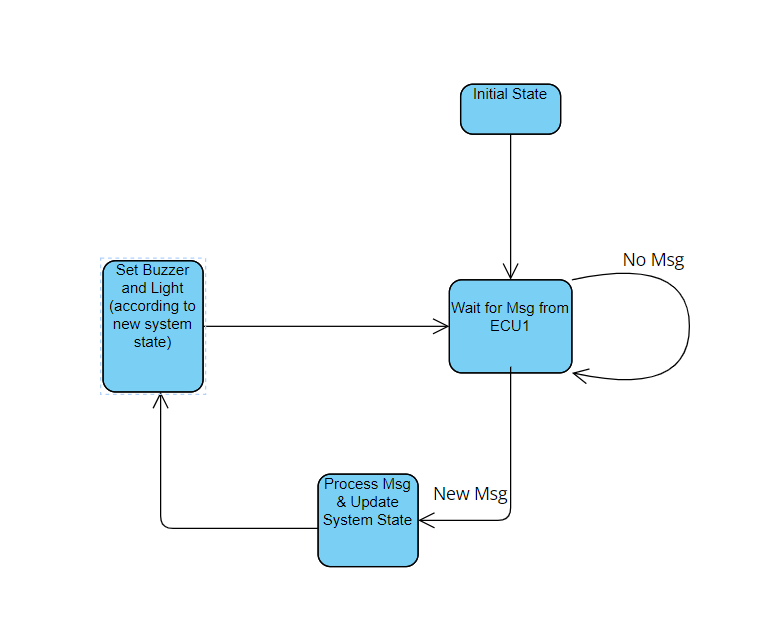
Light\_SW\_Monitor : exec time 15 us, period=20 ms

Send\_Status\_Task : exec time 18 us, period=5ms

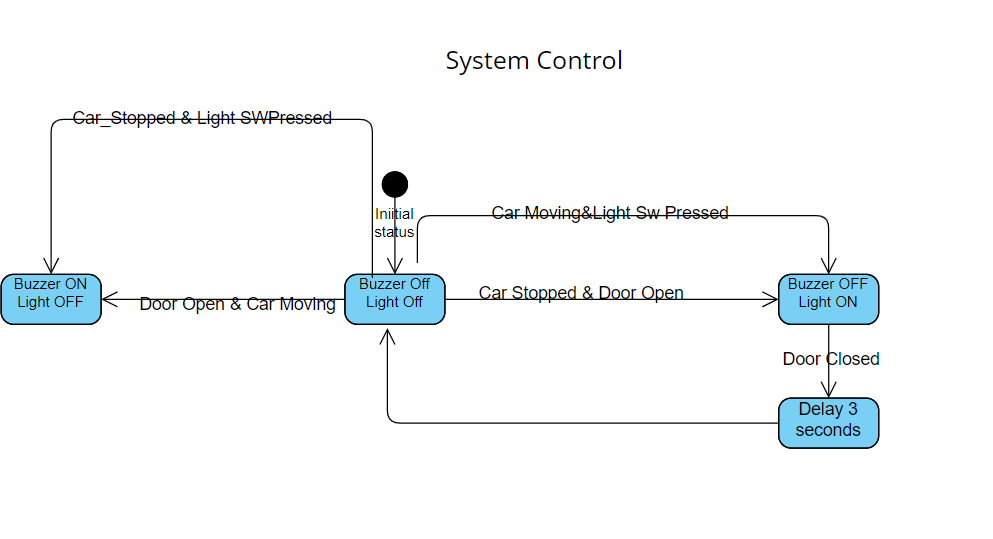
HyperPeriod =20 ms.

CPU Load = ((0.015\*2+0.015\*4+0.015+0.018\*4)/20) x 100 = 0.885 %

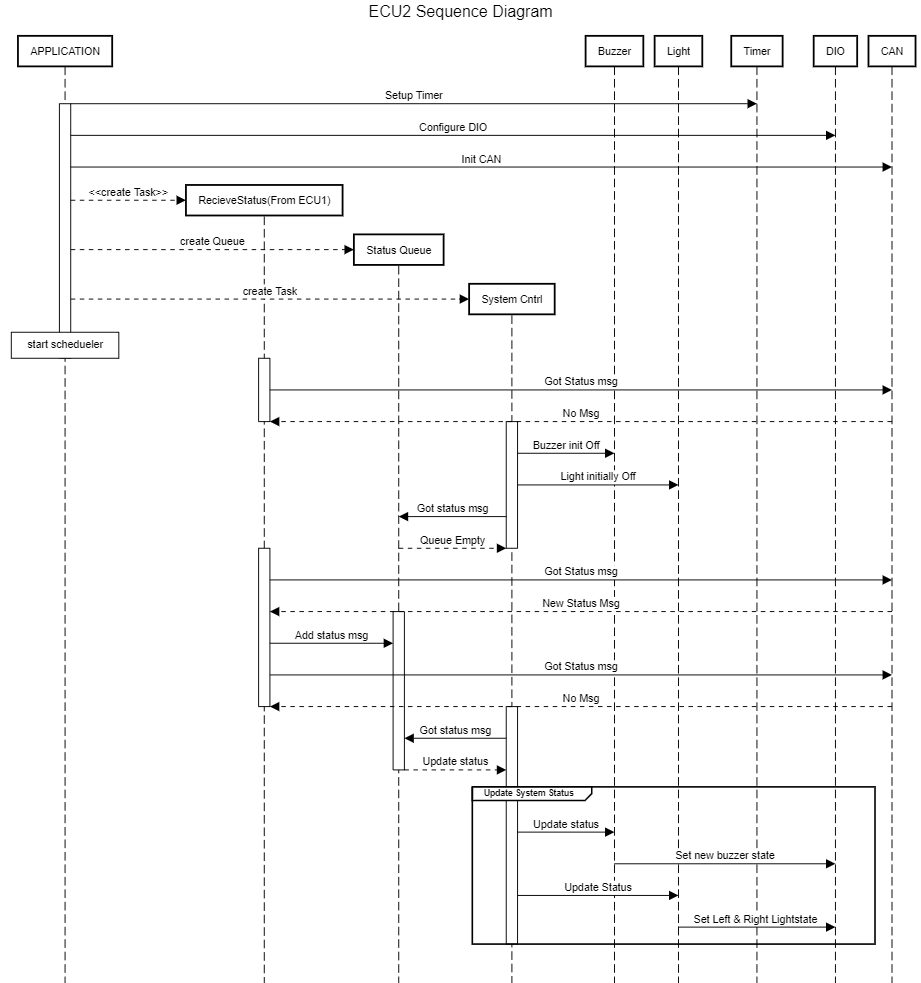
## ecu2 state diagram



## ecu2 components state diagram



## ecu2 sequence diagram



## ecu2 CPU load

The system has two tasks :

RecvStatus\_task : Exe time= 18 us , period =5ms

SystemCntrl: exe time =15 us, period =5ms

Hyper period =5ms

CPU Load = ((0.015+0.018)/5)x100 =0.66 %

NOTE: task exe time was assumed according to real exec time for similar tasks from the RTOS project.

## system bus load

Speed Sensor Status (5ms)=200 messages/second

Door Sensor Status(10ms)=100 message/second

Light Sw Status(20ms) = 50 message /second

Total messages on bus = 350 message/second.

Assuming simple can protocol with a 125-bit frame length at a speed of 500kbit/s:

Bus Load= ((350\*250)/(1000\*1000))\*100=8.75%