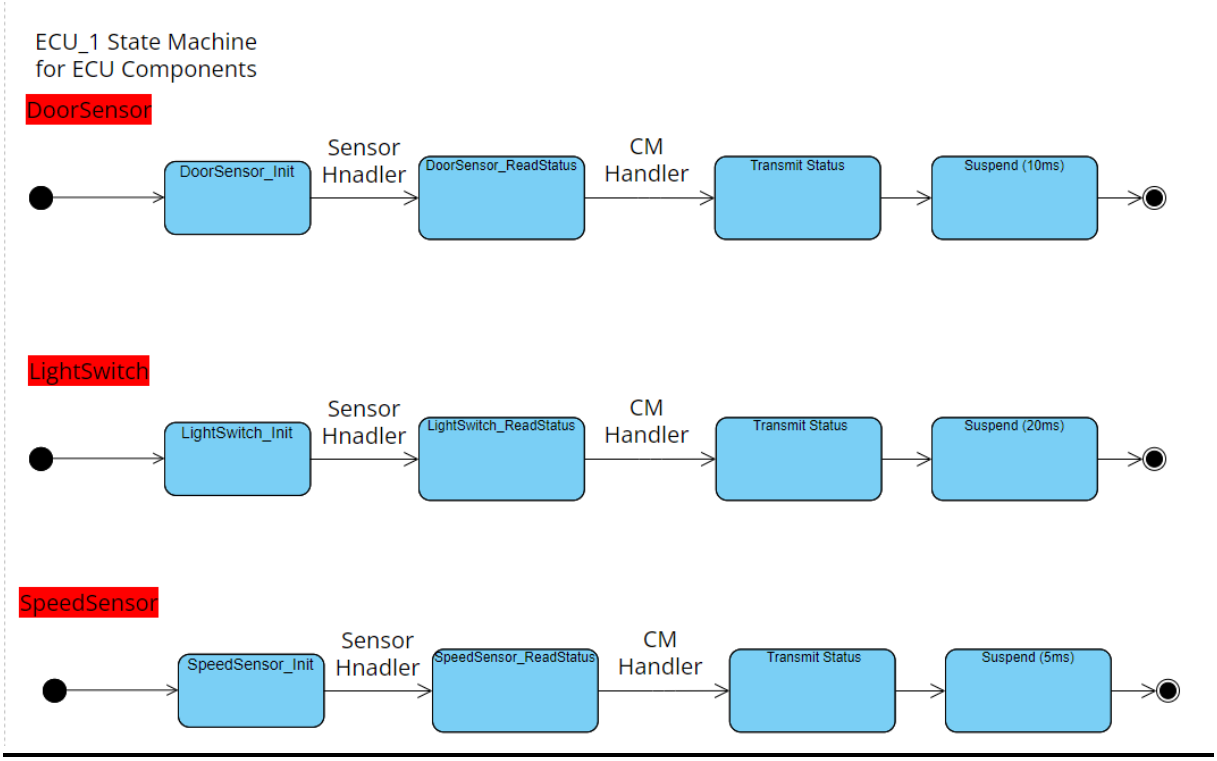
Dynamic Design

Name : Islam Mohamed Othman Mansour

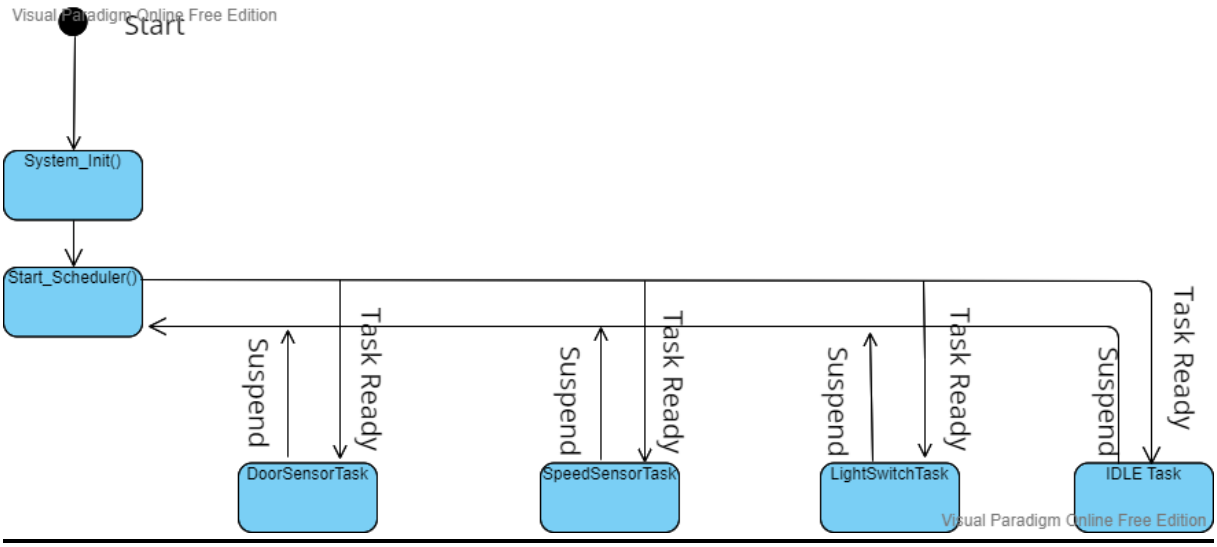
Email : islam.othman2050@gmail.com

Dynacmic Design For ECU_1

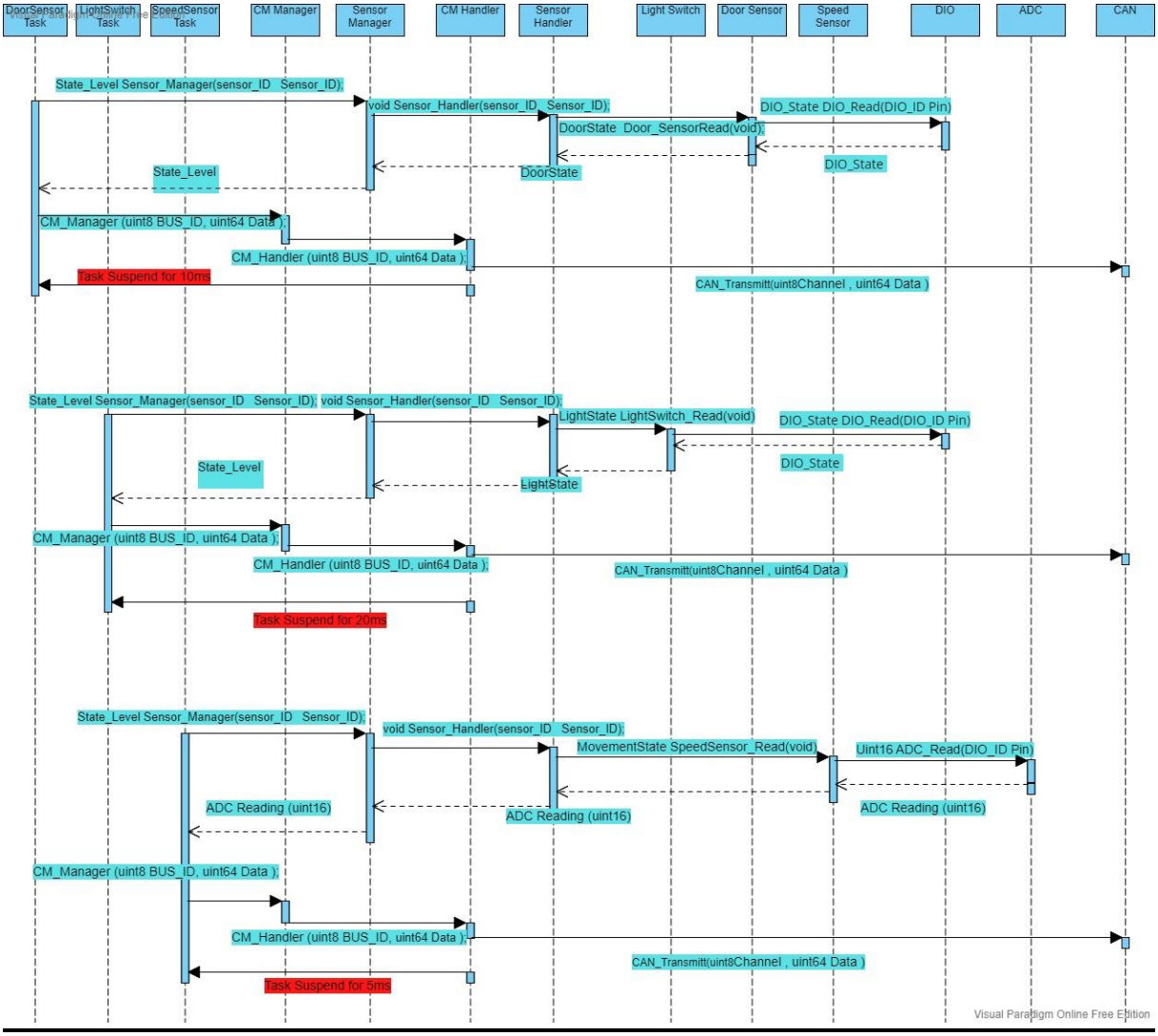
1. State Machine (Component)



2. State Machine (Operation)



3. Sequence Diagram



4. Calculation for CPU Load

Assuming that worst case would be that task executes in 1ms.

Task	Periodicity (ms)	Execution (ms)
Door Sensor	10ms	1ms
Light Switch	20ms	1ms
Speed Sensor	5ms	1ms

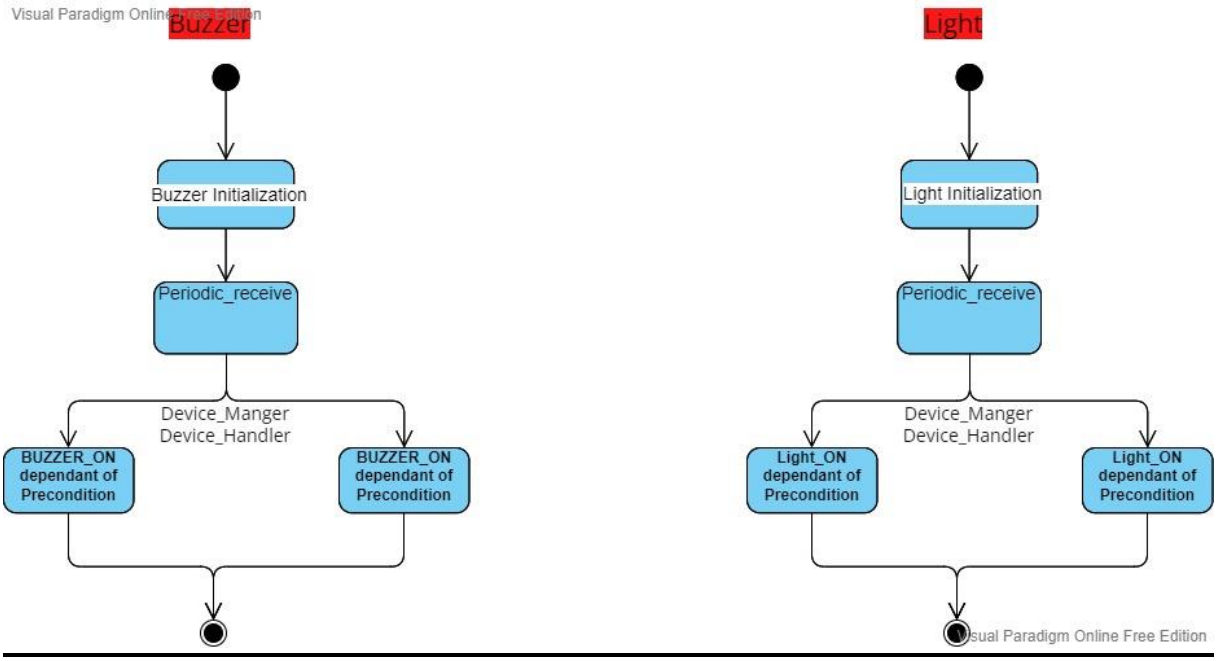
Time(Hyper Period) = LCM (Periods) = 20ms

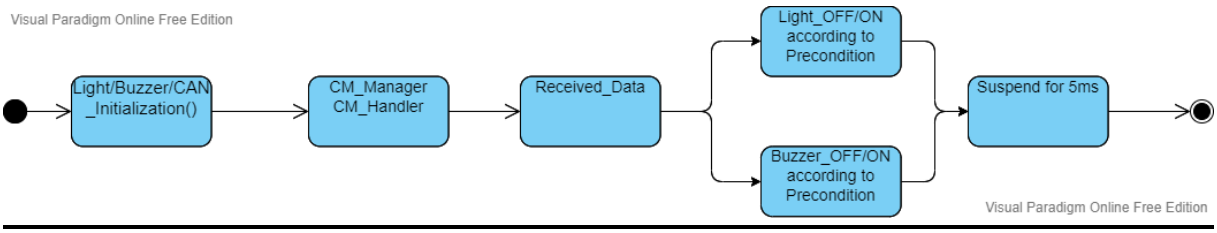
CPU_Load = ∑ E / H = (1ms x 2 + 1ms x 1 + 1ms x 4) / 20 x 100 = 35%

➔ Then Tasks are Scedulable.

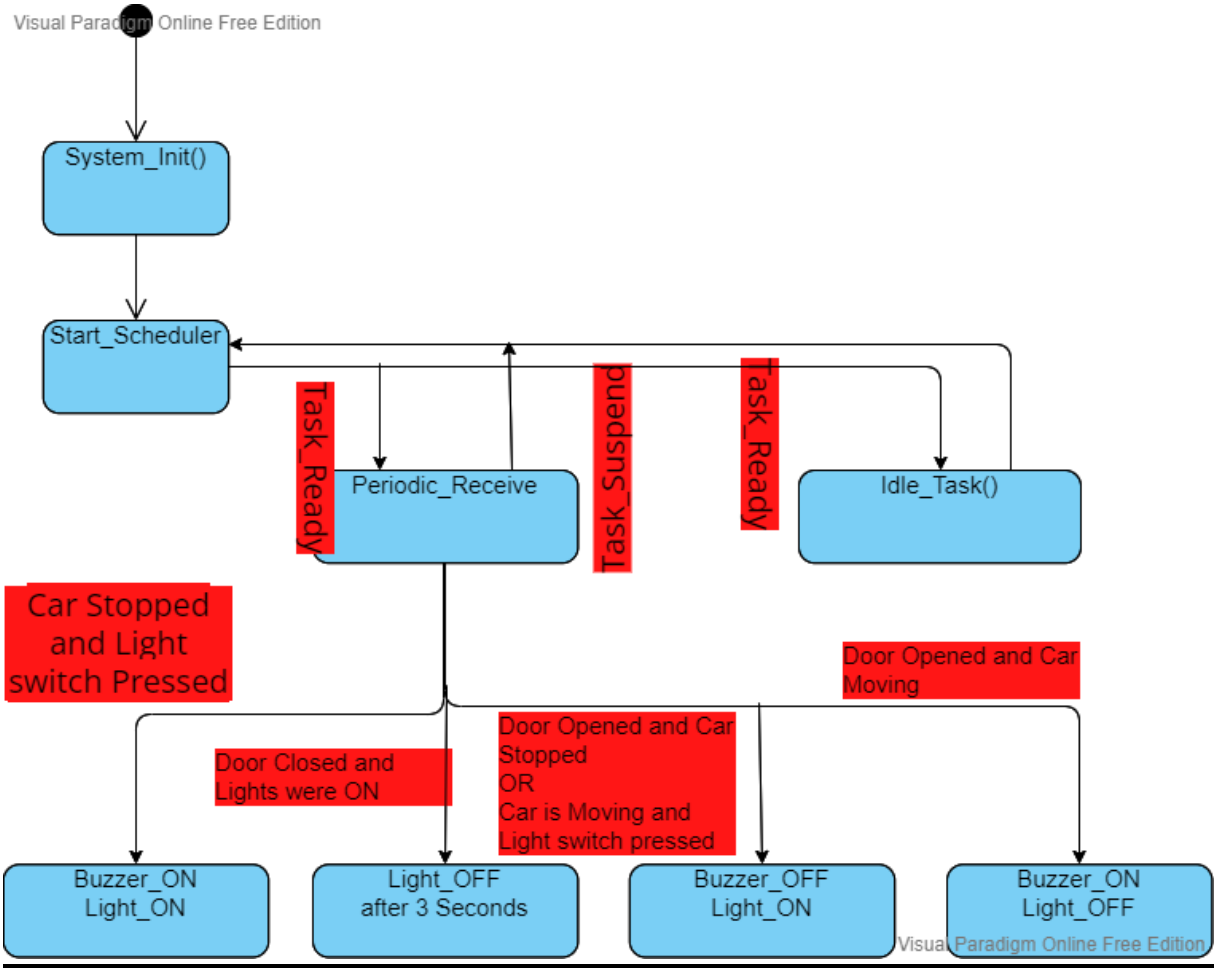
Dynacmic Design For ECU_2

1. State Machine (Component)

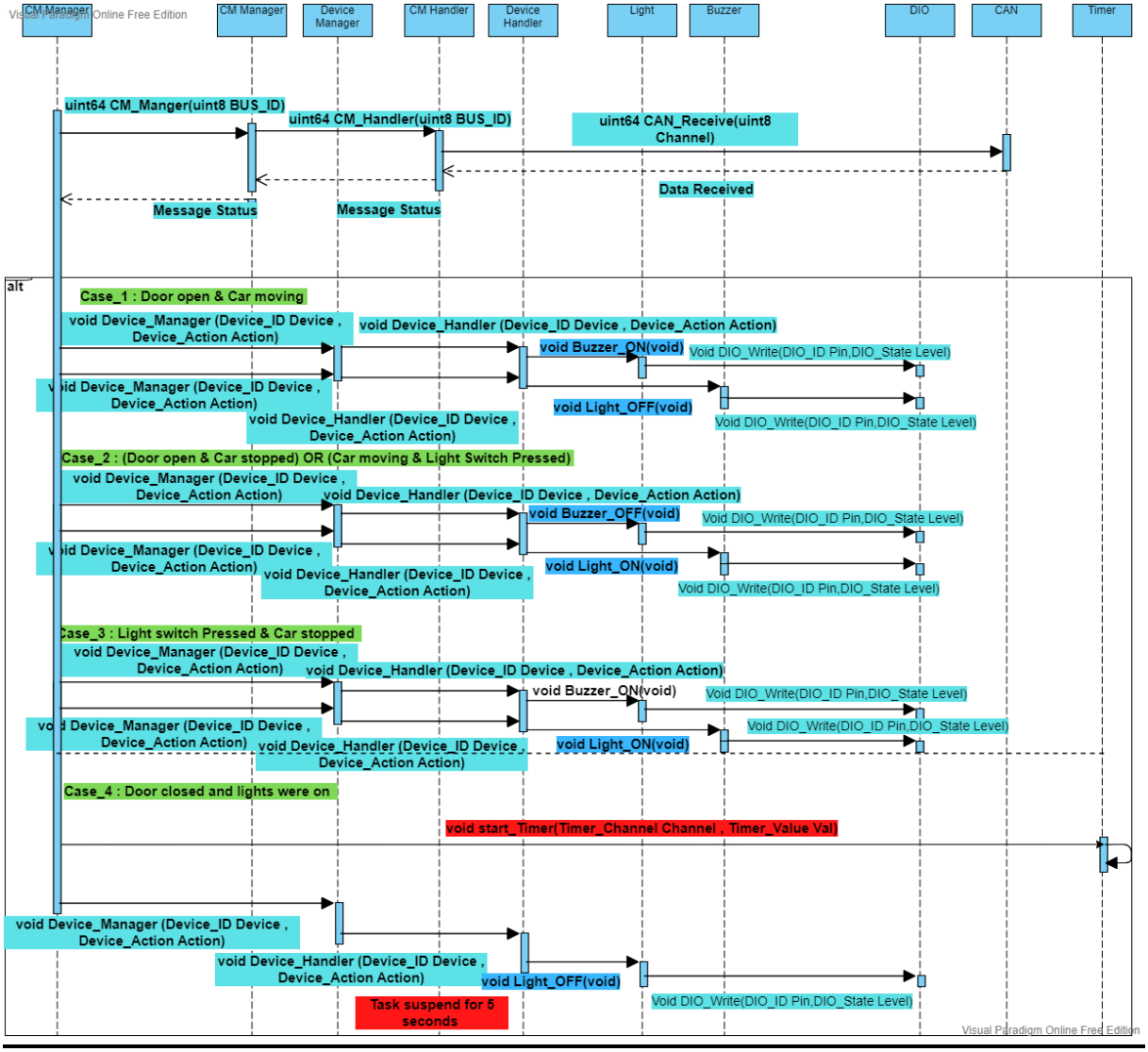




2. State Machine (Operation)



3. Sequence Diagram



4. Calculation for CPU Load

Assuming that worst case would be that task executes in 1ms.

Task	Periodicity (ms)	Execution (ms)
Task Receive	5ms	1ms

Time(Hyper Period) = LCM (Periods) = 5ms

CPU_Load = ∑ E / H = (1ms x 1) / 5 x 100 = 20%

➔ Then Tasks are Scedulable.

5. Calculation for BUS Load

→Our Calculation would be per 1 Second.

Bus Load : Time of Load on the bus per 1 second.

1 Can frame can handle up to 125bit

Assume we configure our bus with 256Kbit per second.

Bit time = 1 / bit rate = 1 / (256 * 1000)s = 3.9µs = 4µs

Time require per frame = (4 µs/bit * 125bit) = 0.5ms

Tasks to transfared on the bus :-

1frame every 5ms → 200 Frame per second

1frame every 10ms → 100 Frame per second

1frame every 20ms → 50 Frame per second

So we ended up with 350 frame per second.

Total Time on Bus = (Total no. of frames) * (time needed for 1 Frame)

= 350 frame * 0.5ms = 175ms

BUS_LOAD = (175ms / 1000ms) * 100 = 17.5 %