Embedded Systems Advanced Nanodegree

Embedded Software Design

Automotive Door Control System Design

"Dynamic Design"

Amira Magdy Mohamed Abdel Kader

amiramagdy618@gmail.com

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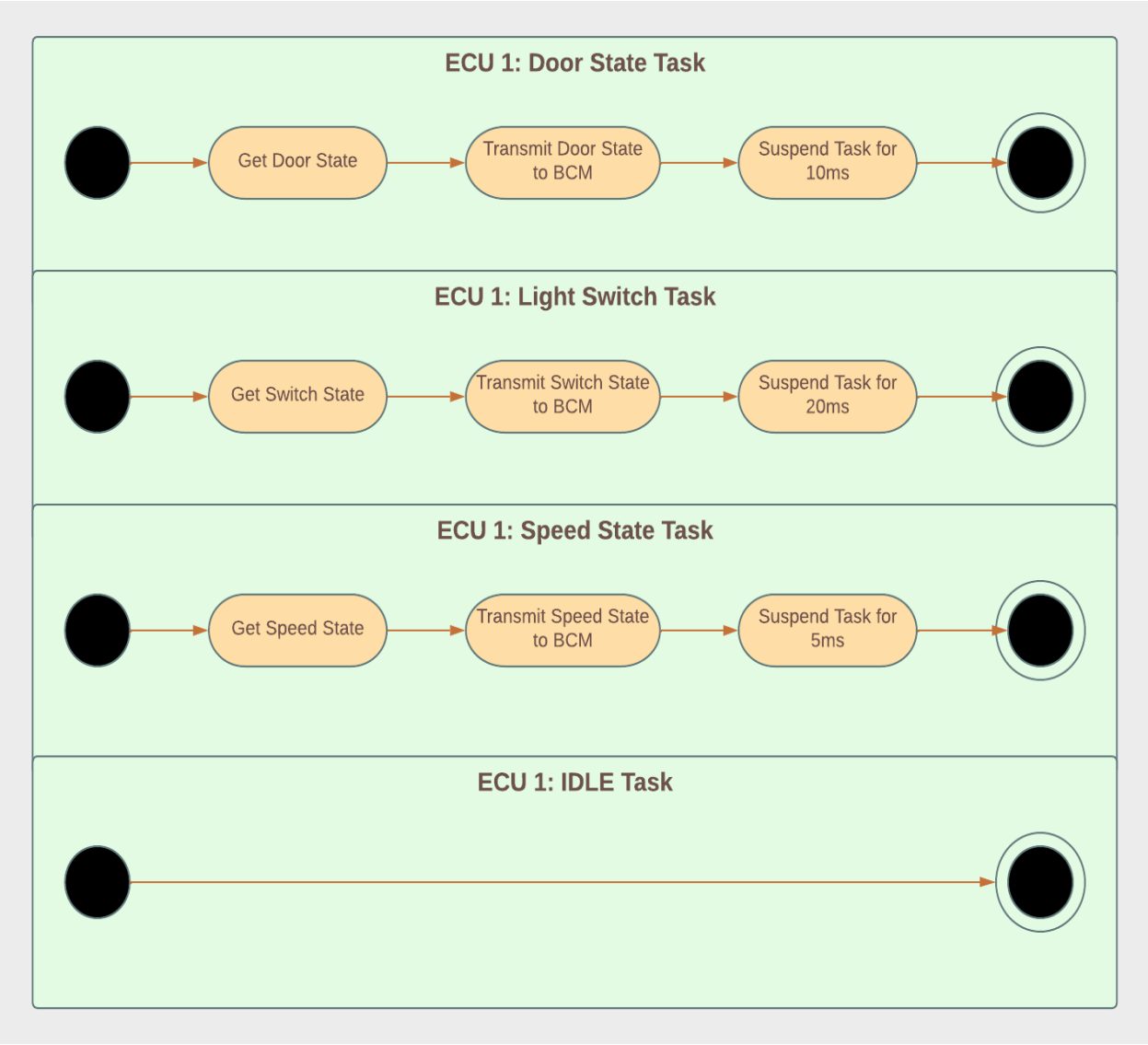
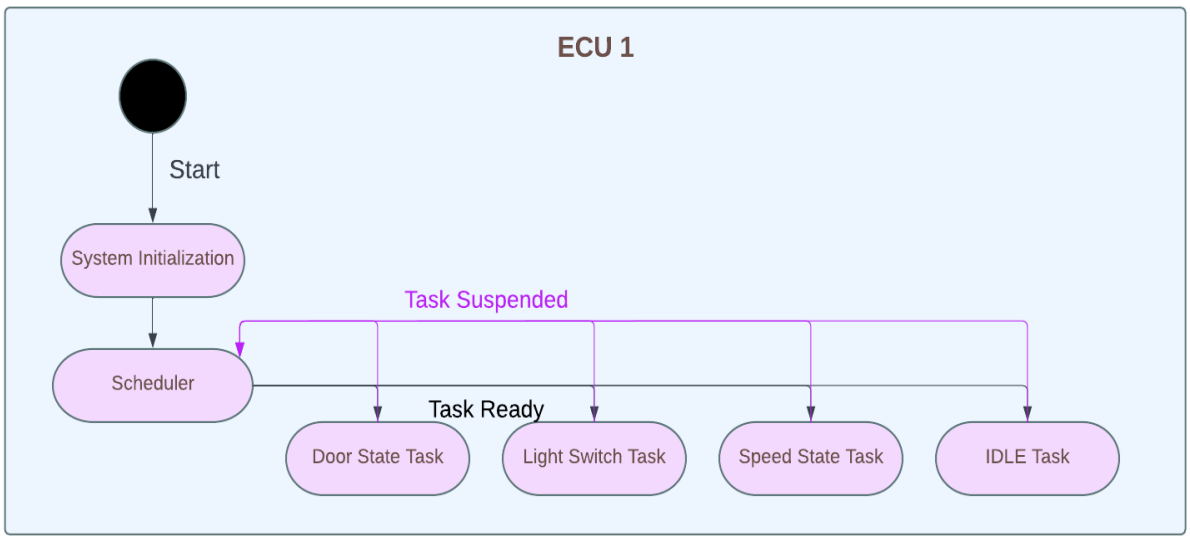
I. ECU 1

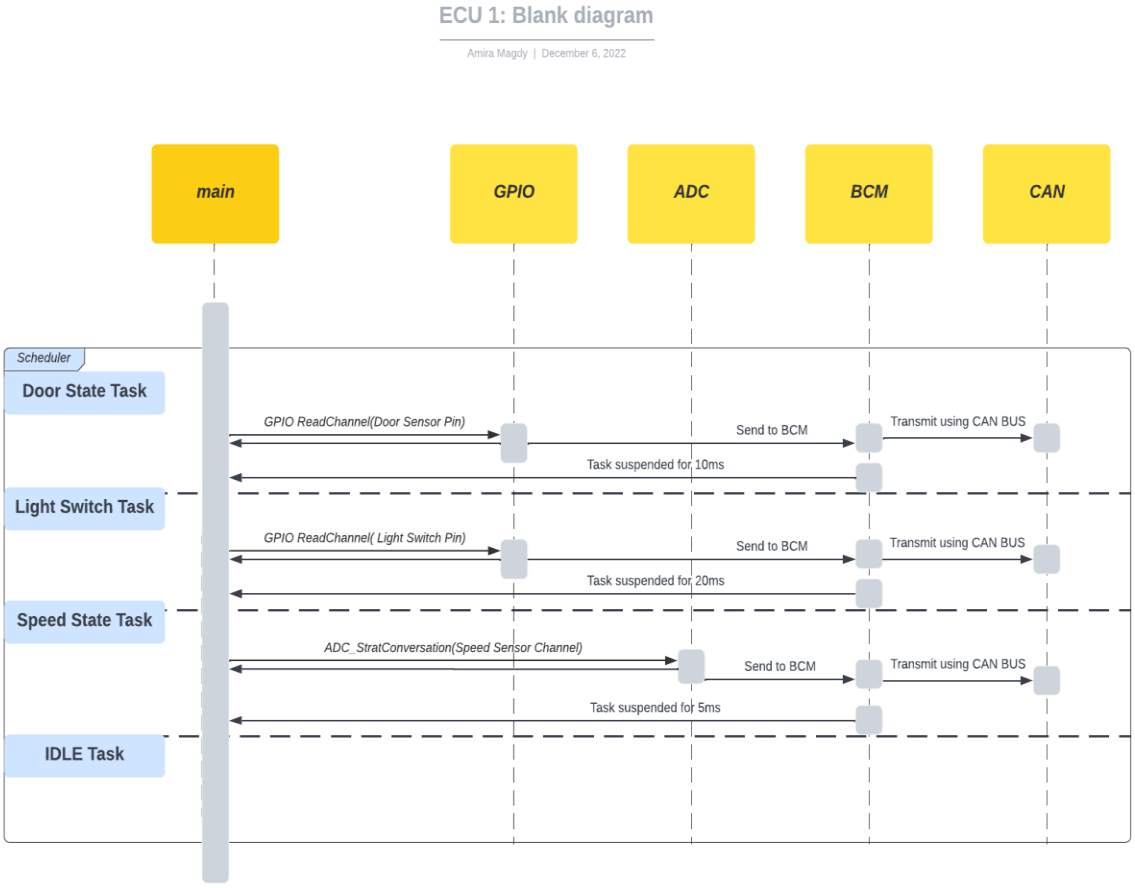
✓ State Machine for each component:



✓ State Machine for ECU operation:



✓ ECU1 Sequence Diagram:



✓ CPU Load:

Task	Deadline	How much it takes during Hyperperiod
Door State	10ms	2
Light Switch	20ms	1
Speed State	5ms	4

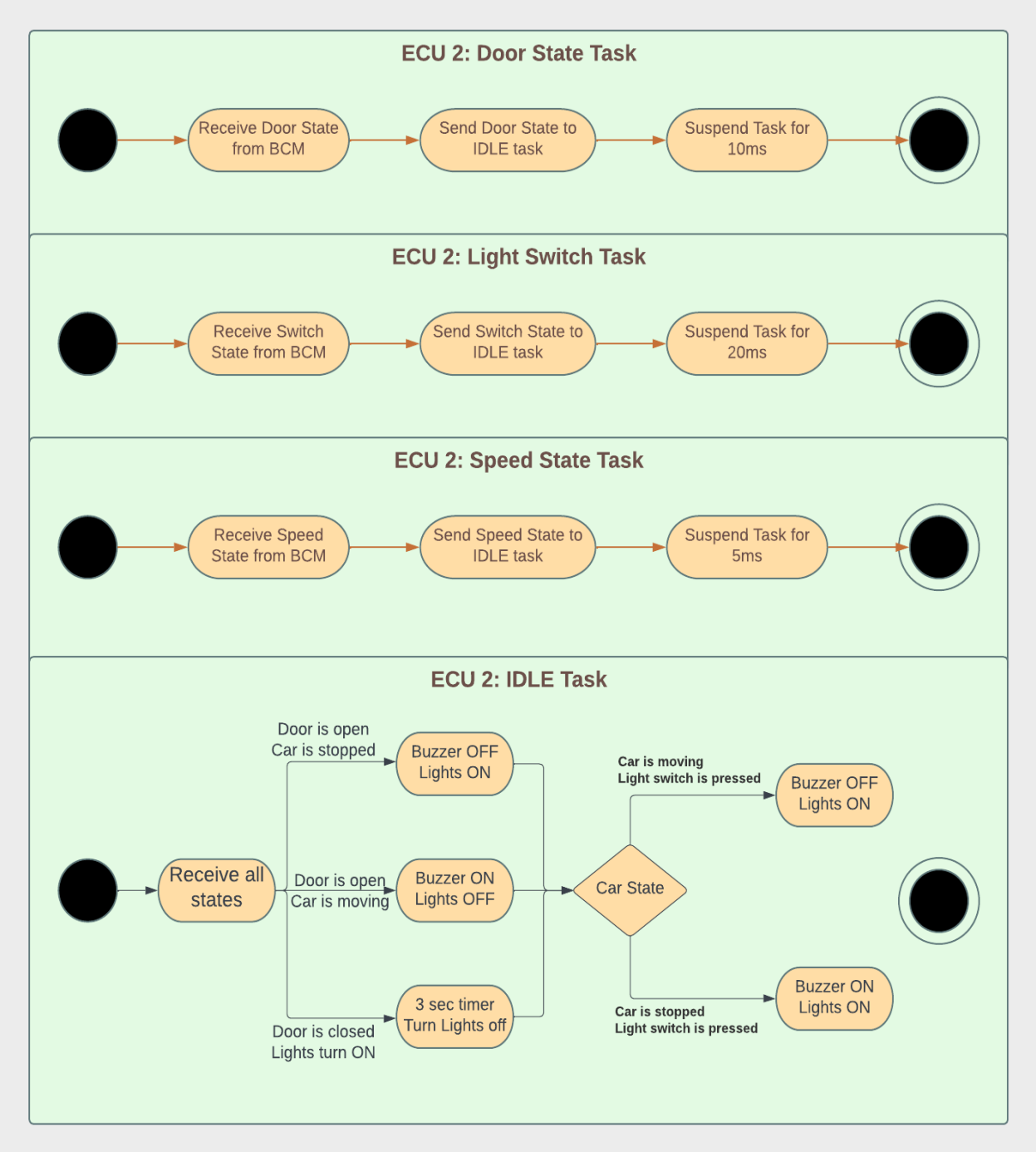
Utilization = Total Execution Time During Hyperperiod / Hyperperiod

$U = [(1m*2)+(1m*1)+(1m*4)/20m] \times 100\% = 35\%$

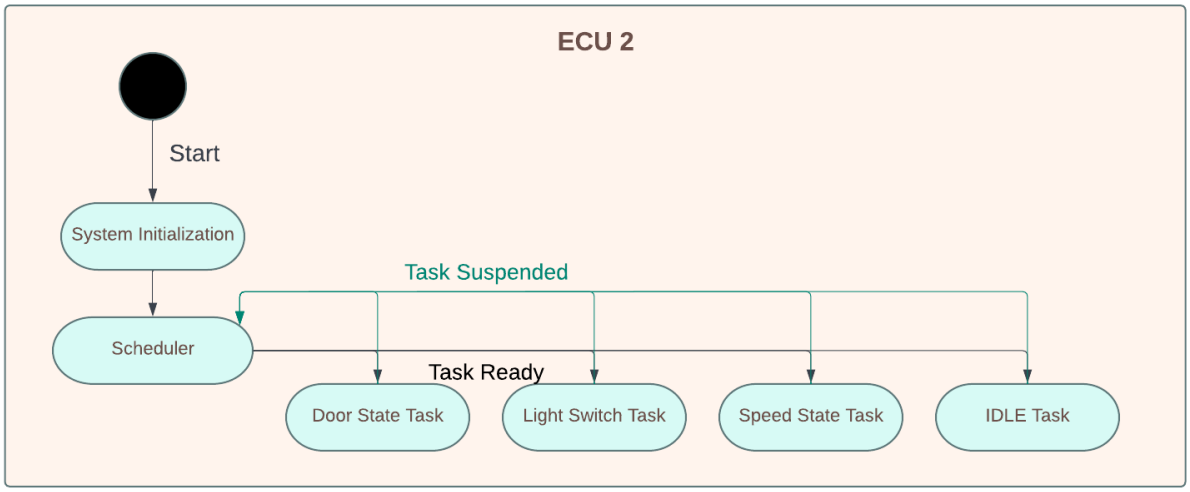
There for CPU load shall never exceed 35%

II. ECU 2

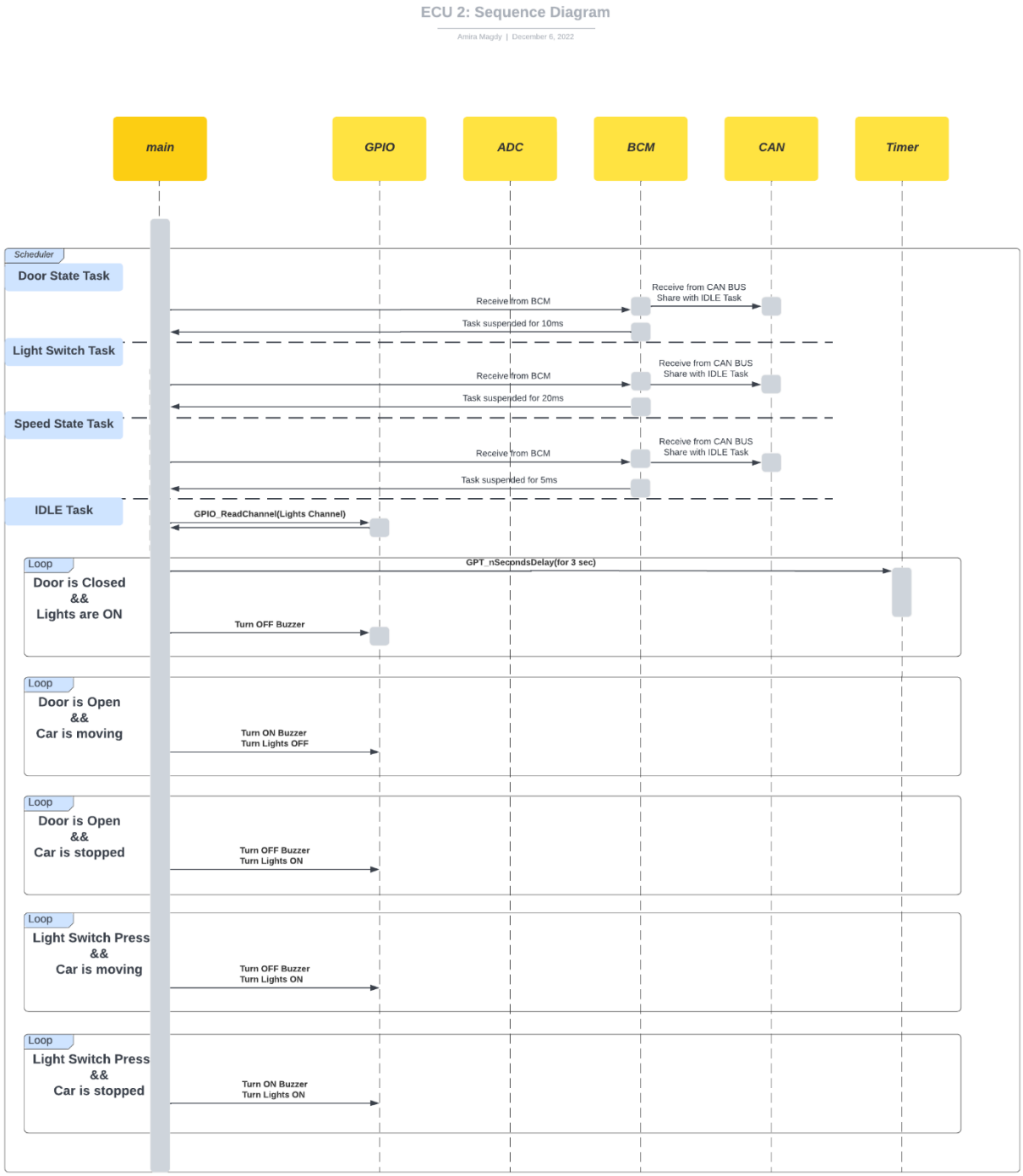
✓ State Machine for each component:



✓ State Machine for ECU operation:



✓ ECU2 Sequence Diagram:



✓ CPU Load:

Task	Deadline	How much it takes during Hyperperiod
Door State	10ms	2
Light Switch	20ms	1
Speed State	5ms	4

Utilization = Total Execution Time During Hyperperiod / Hyperperiod

$U = [(1m*2)+(1m*1)+(1m*4)/20m] \times 100\% = 35\%$

There for CPU load shall never exceed 35%