Project (3)

Automotive door control system design

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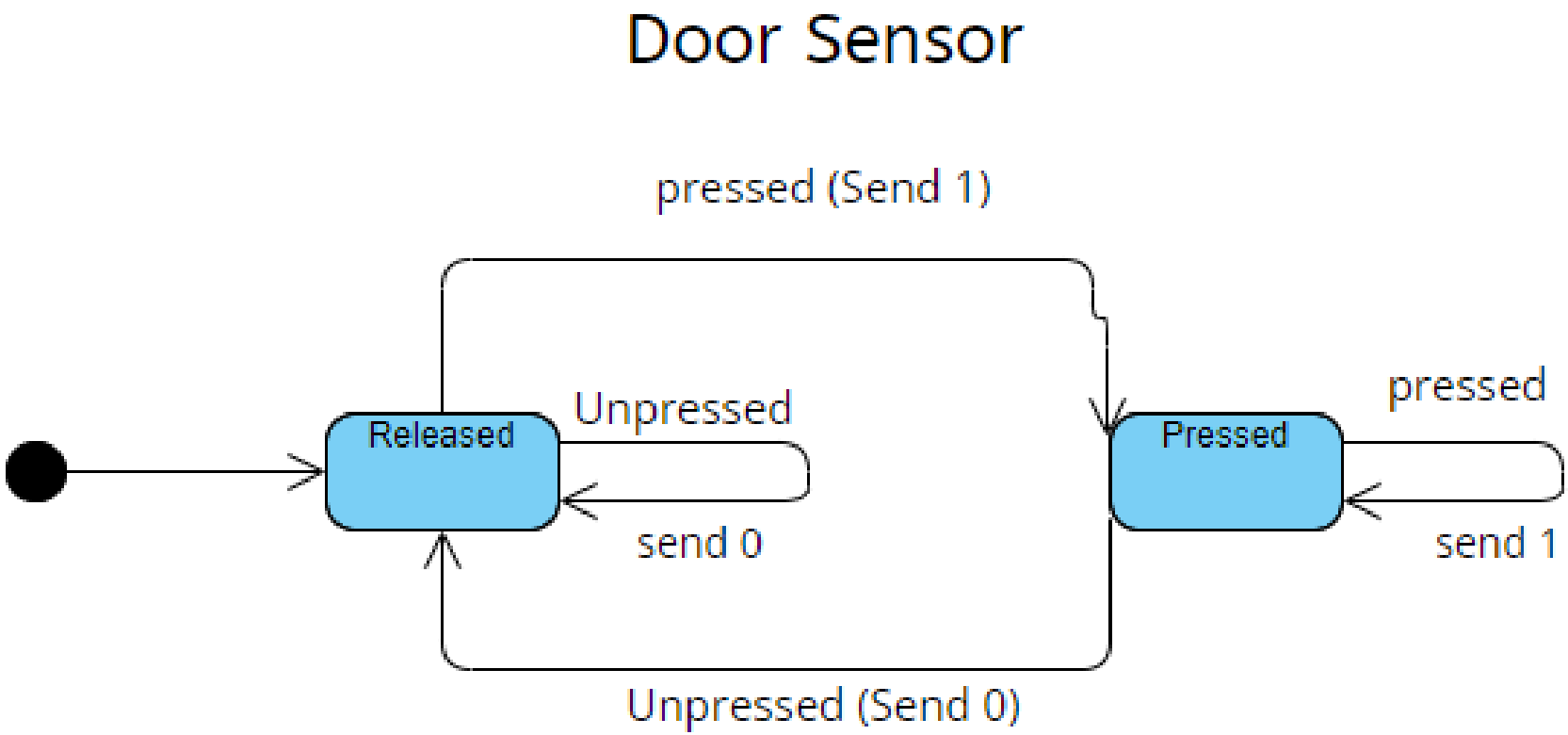
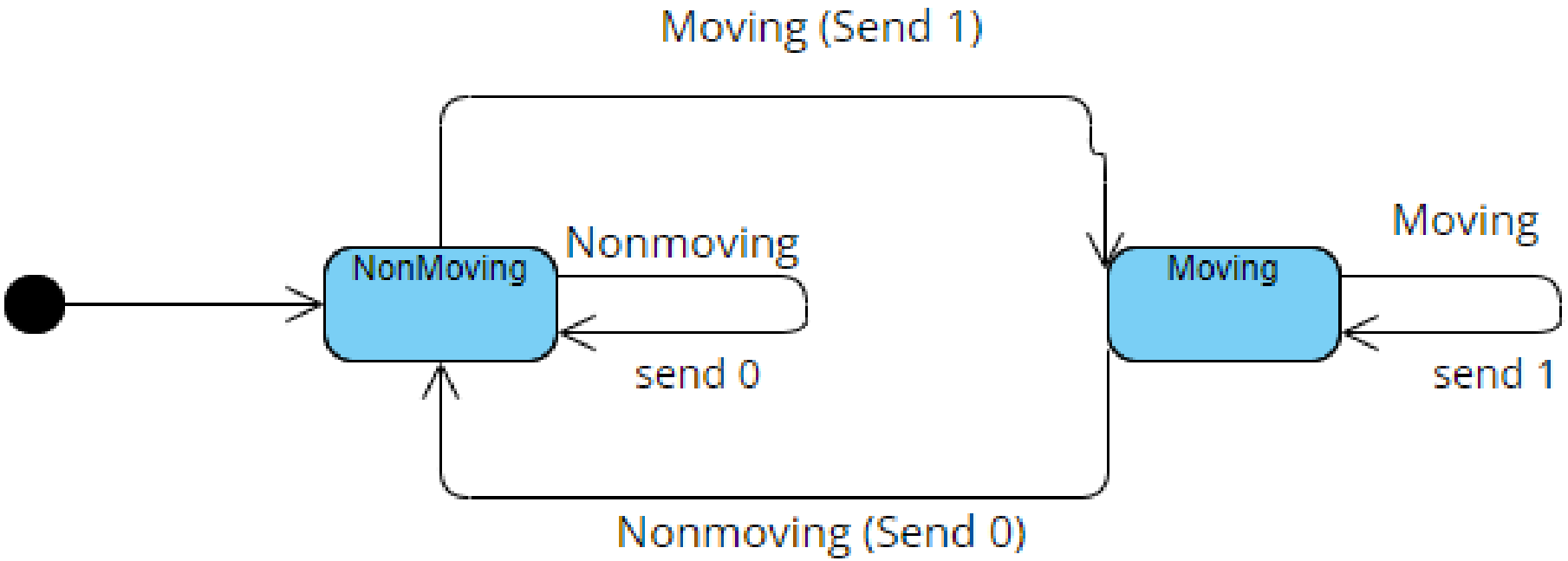
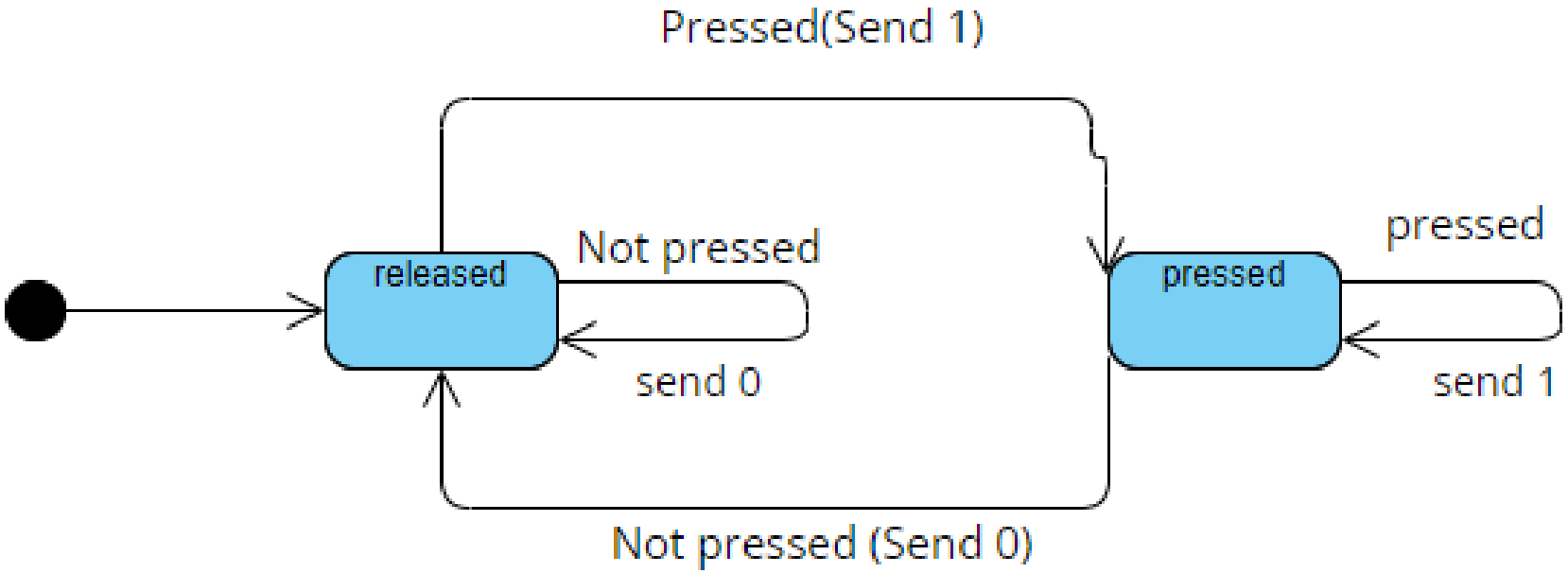
State machine Diagram



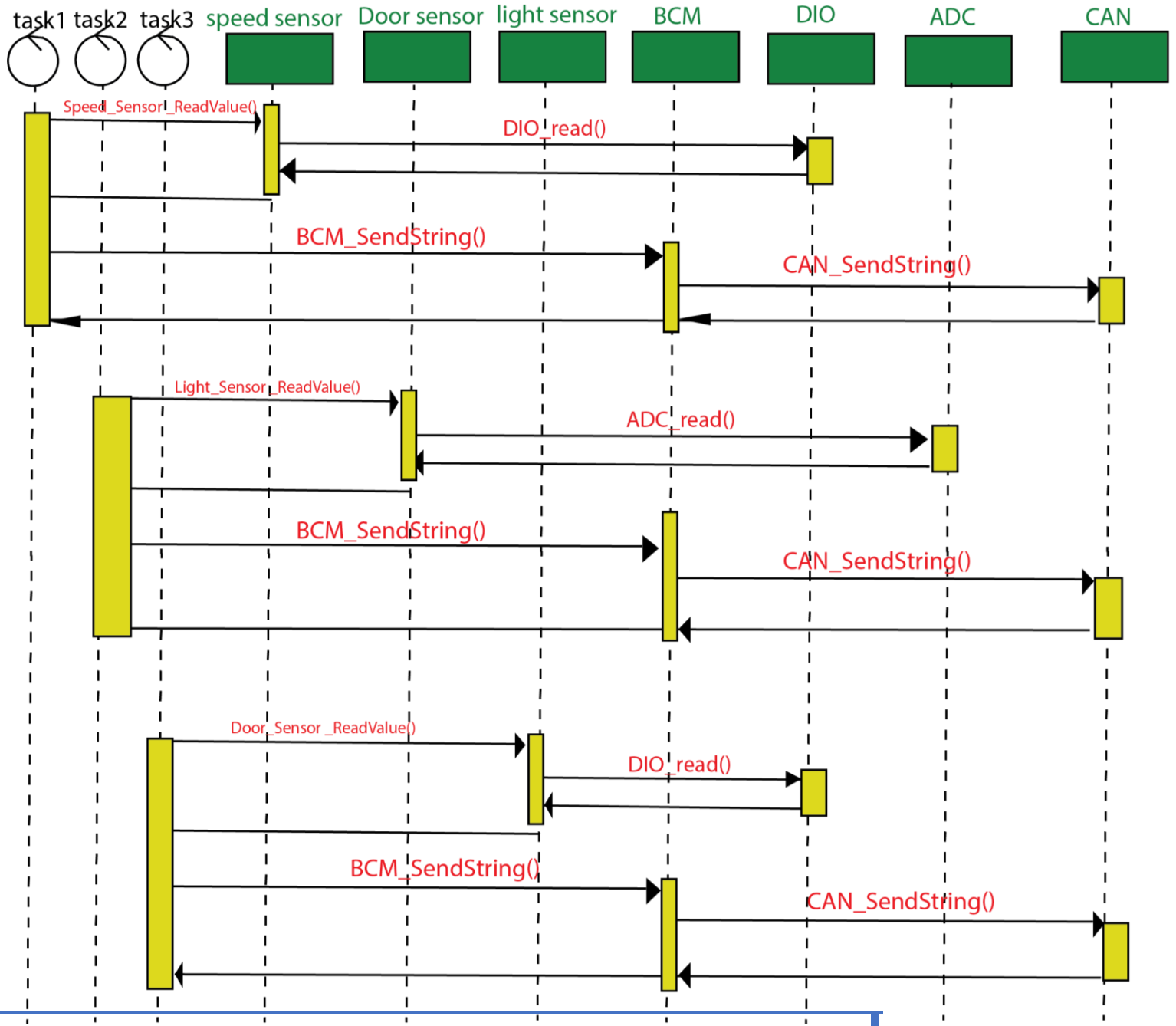
Speed Sensor



Light Switch



Sequence Diagram



System HyperPeriod

Task	Periodicity
Door state	10 ms
Light switch state	20 ms
Speed state	5 ms

CPU load

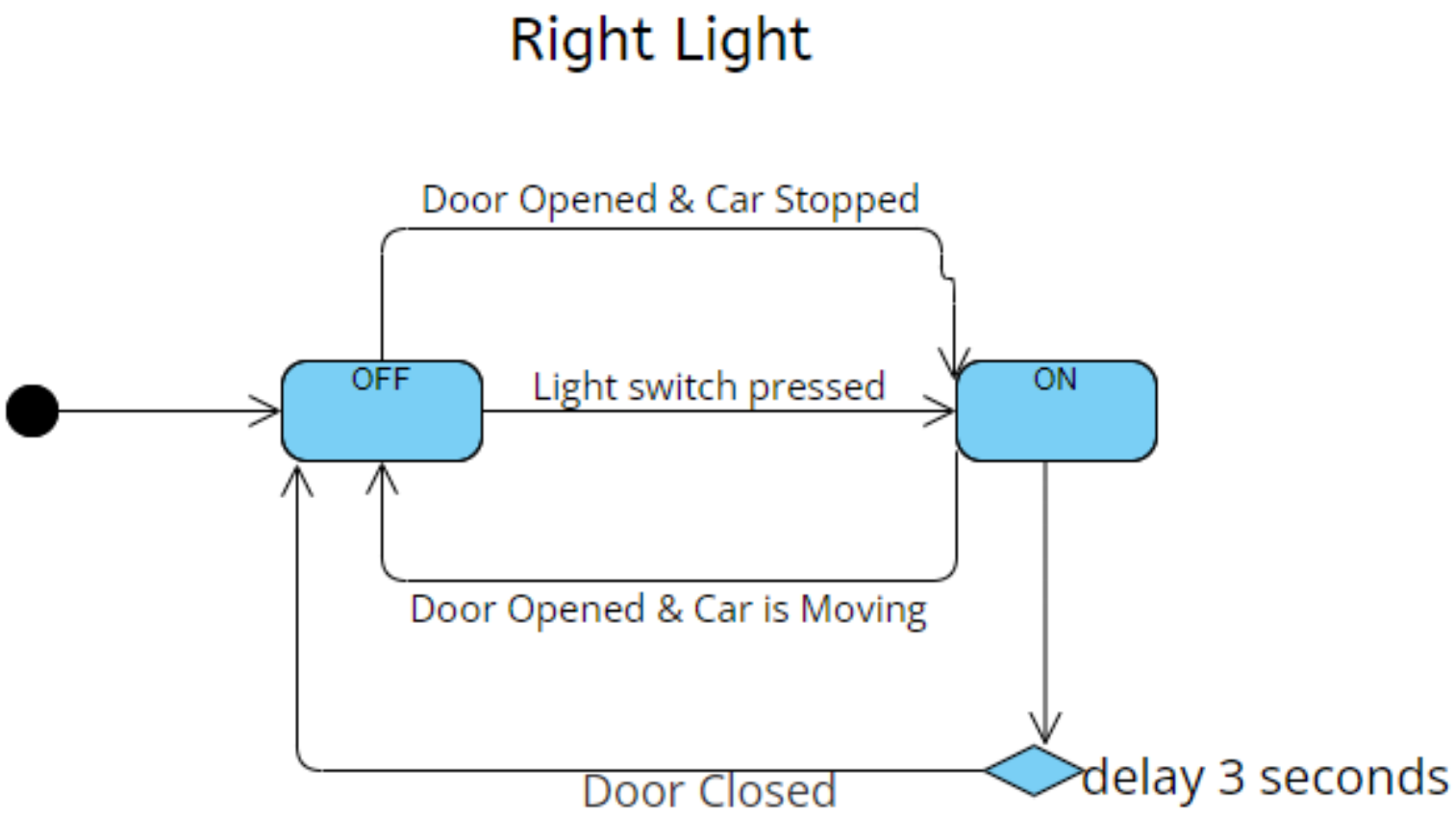
Assume Execution time: task1= task2= task3=1ms

Task	Execution Time (during 1 hyperperiod)
Door state	1 * 2 ms
Light switch state	1*1 ms
Speed state	1* 4 ms

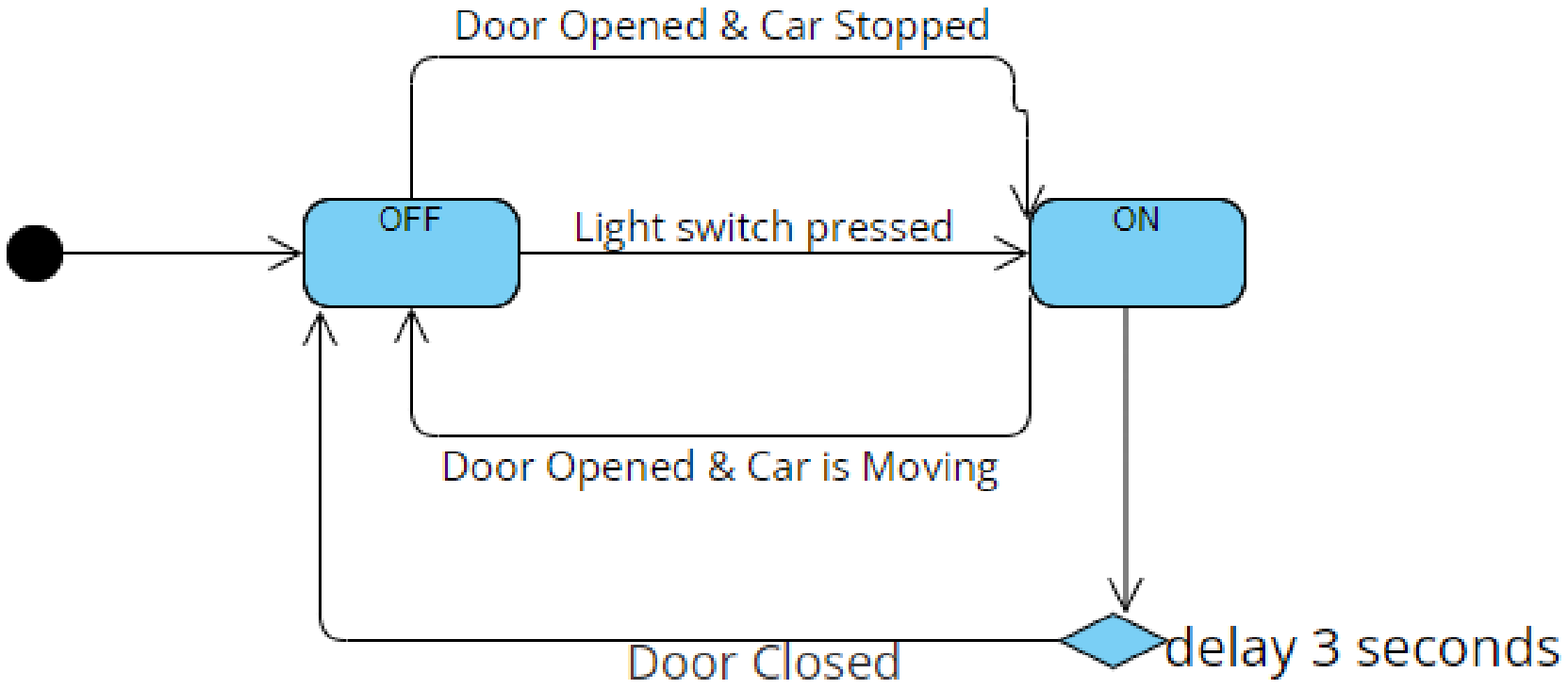
$$\text{CPU Load} = \frac{Total\ Execution\ Time}{Total\ System\ Time}$$

$$\text{CPU Load} = \frac{7}{20} * 100 = 35\%$$

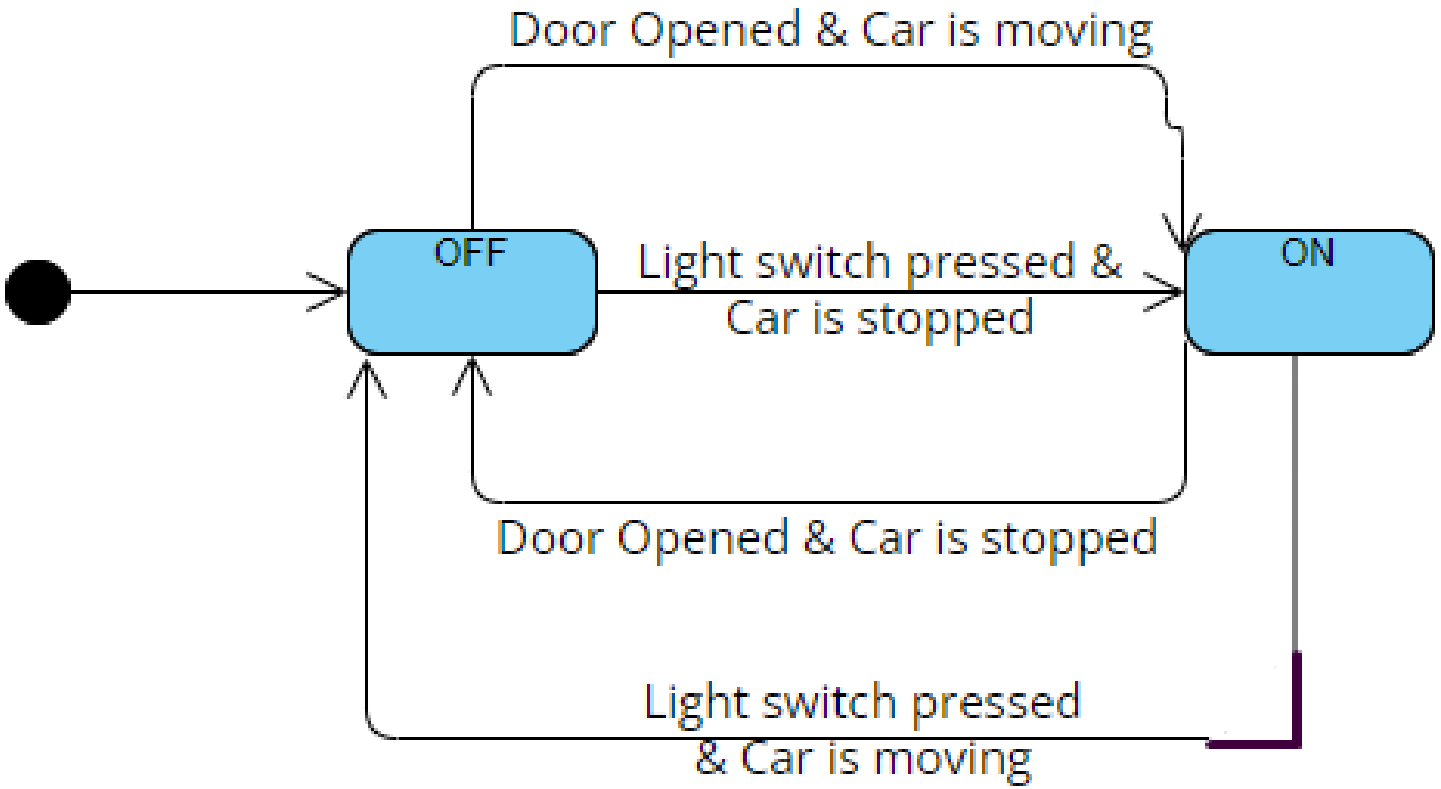
State machine Diagram



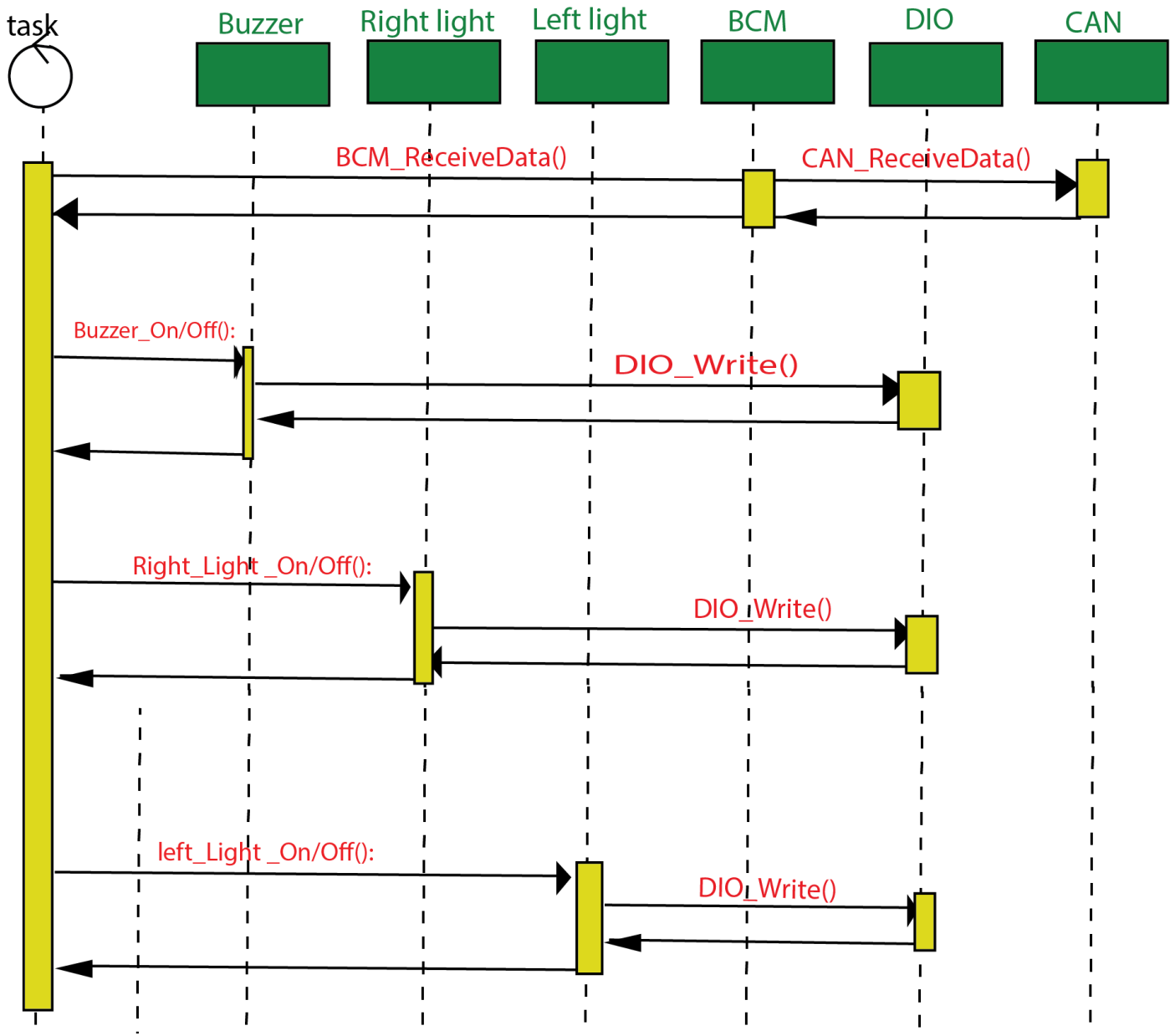
Left Light


Door Opened & Car Stopped
OFF
Light switch pressed
ON
Door Opened & Car is Moving
delay 3 seconds
Door Closed

Buzzer


Door Opened & Car is moving
OFF
Light switch pressed &
Car is stopped
ON
Door Opened & Car is stopped
Light switch pressed
& Car is moving

Sequence Diagram



CPU load

Assume Execution time: task1= task2= task3=1ms

Task	Execution Time (during 1 hyperperiod)
Buzzer Controller	1 * 1 ms
Left Light Controller	1 * 1 ms
Right Light Controller	1 * 1 ms

$$\text{CPU Load} = \frac{Total\ Execution\ Time}{Total\ System\ Time}$$

$$\text{CPU Load} = \frac{3}{20} * 100 = 15\%$$