

Dynamic Design

By: Hassan Mahmoud

ECU 1

Components State Machine Diagram

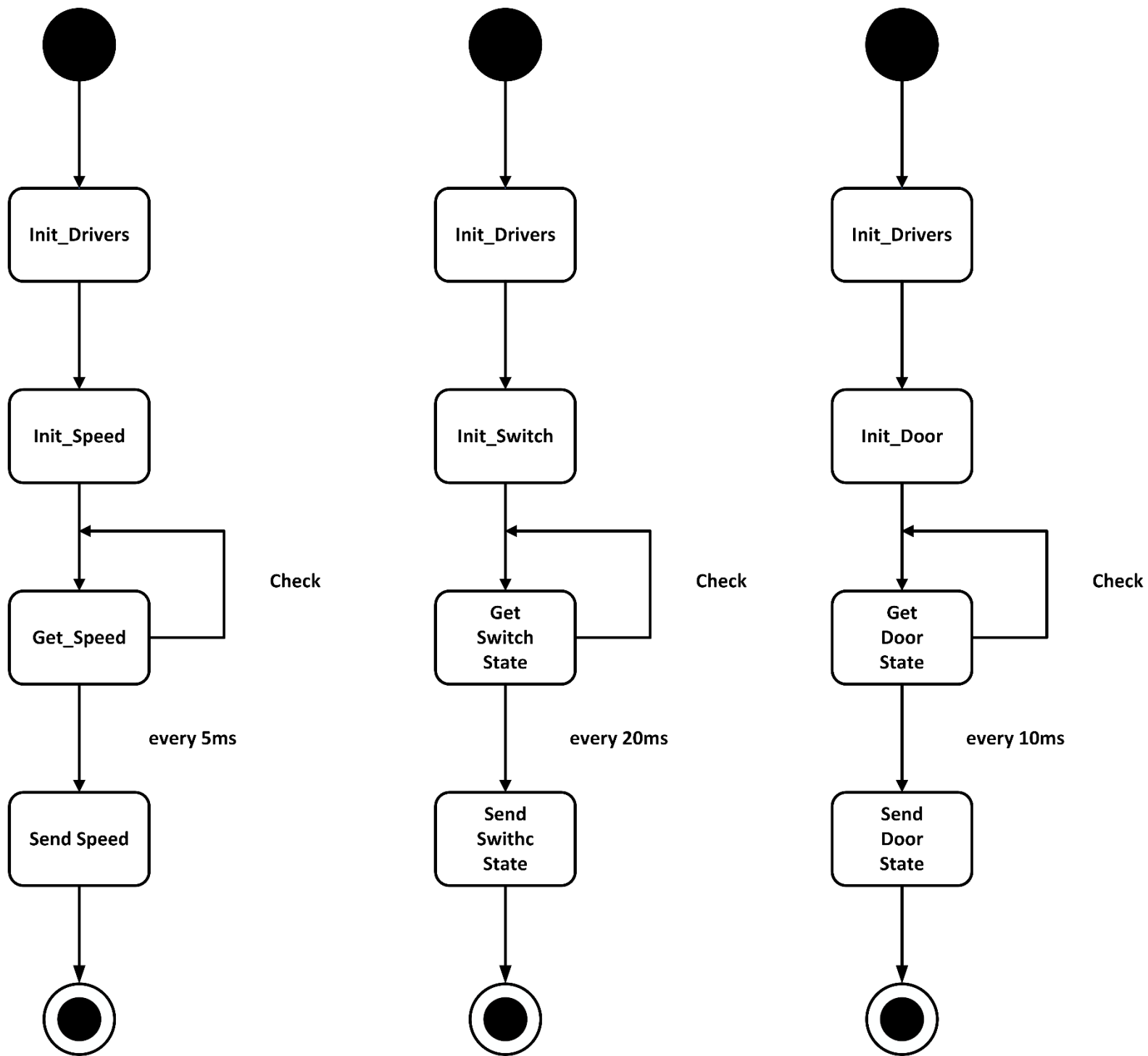


Figure 1: State Machine Diagram for ECU1 components

Operation State Machine Diagram

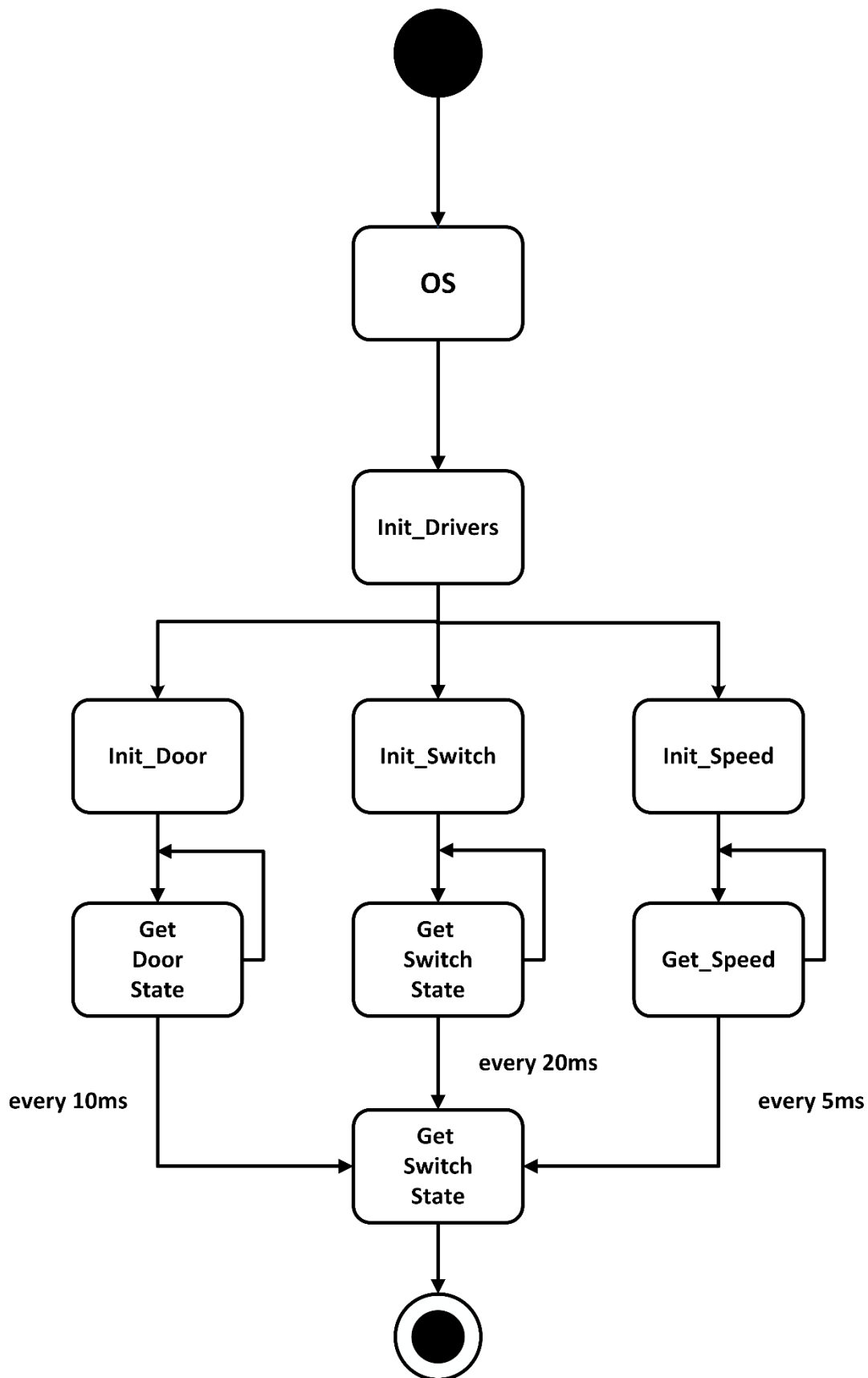


Figure 2: State Machine Diagram for ECU1 Operation

Sequence Diagram

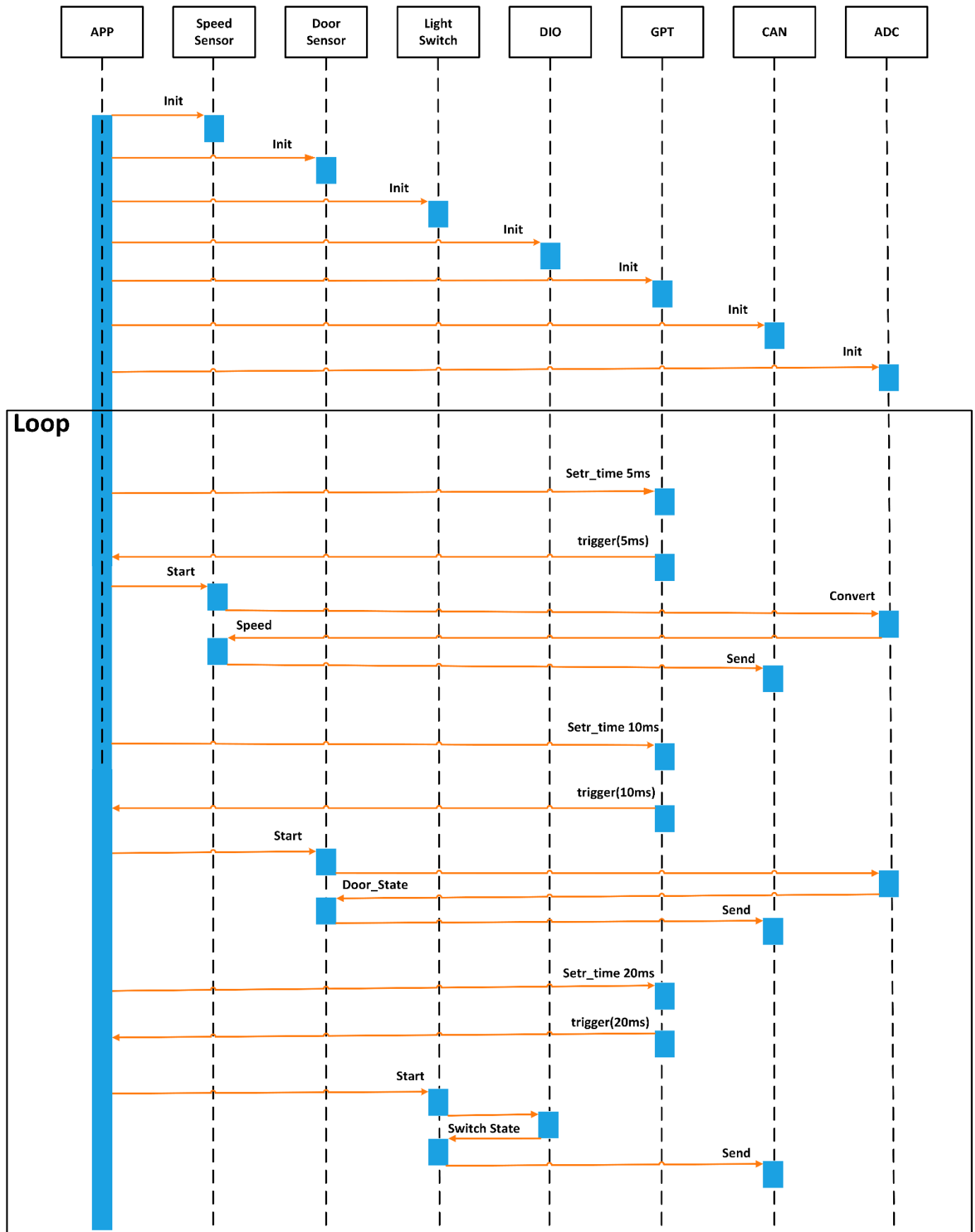


Figure 3: Sequence Diagram for ECU1

CPU Load Calculation

o Utilization = Total Execution Time During Hyperperiod / Hyperperiod

o Utilization = $((1 * 2) + (1 * 1) + (1 * 4) / 20) * 100\% = 35\%$

ECU 2

Components State Machine Diagram

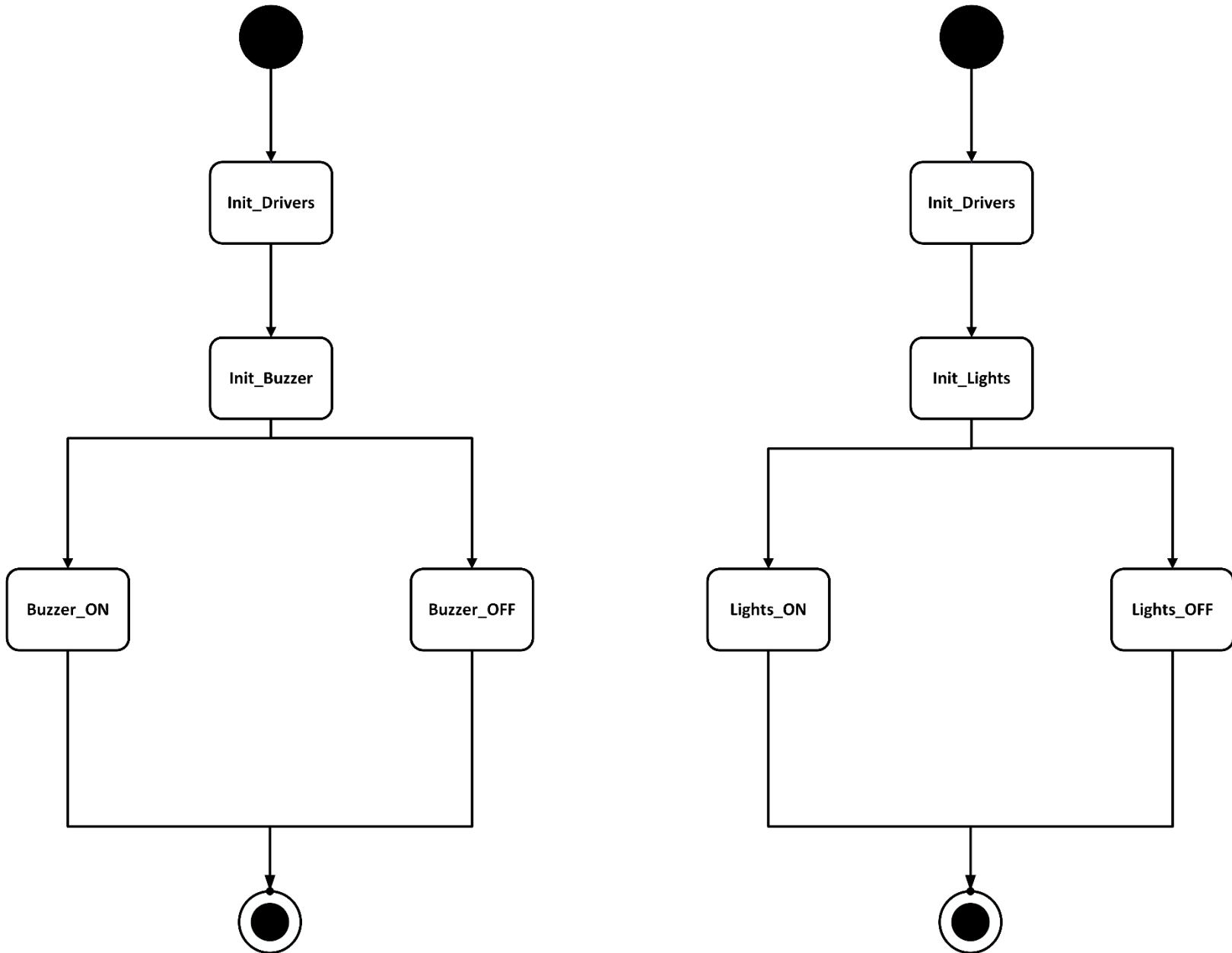


Figure 4: State Machine Diagram for ECU2 Components

Operation State Machine Diagram

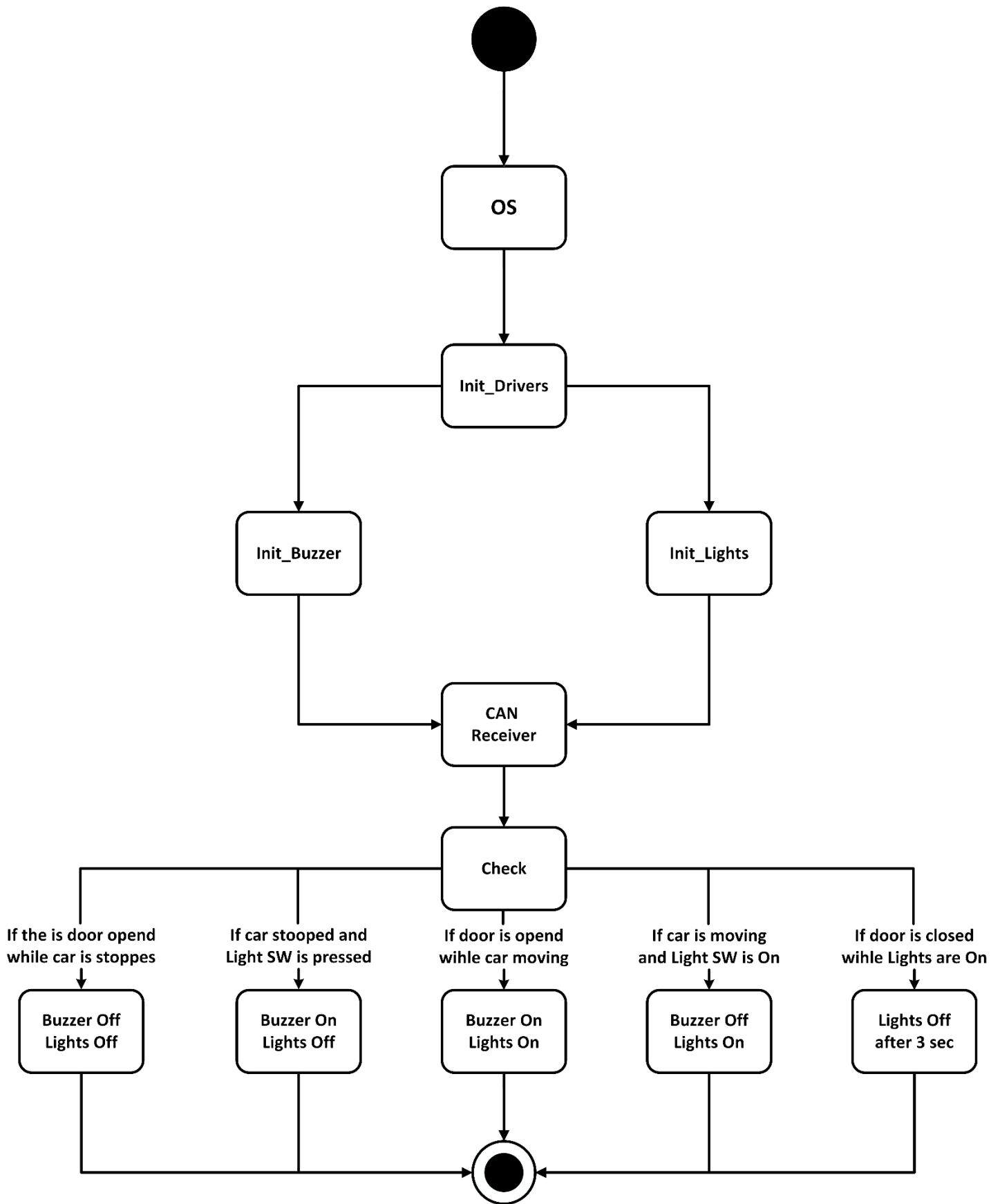


Figure 5: State Machine Diagram for ECU2 Operation

Sequence Diagram

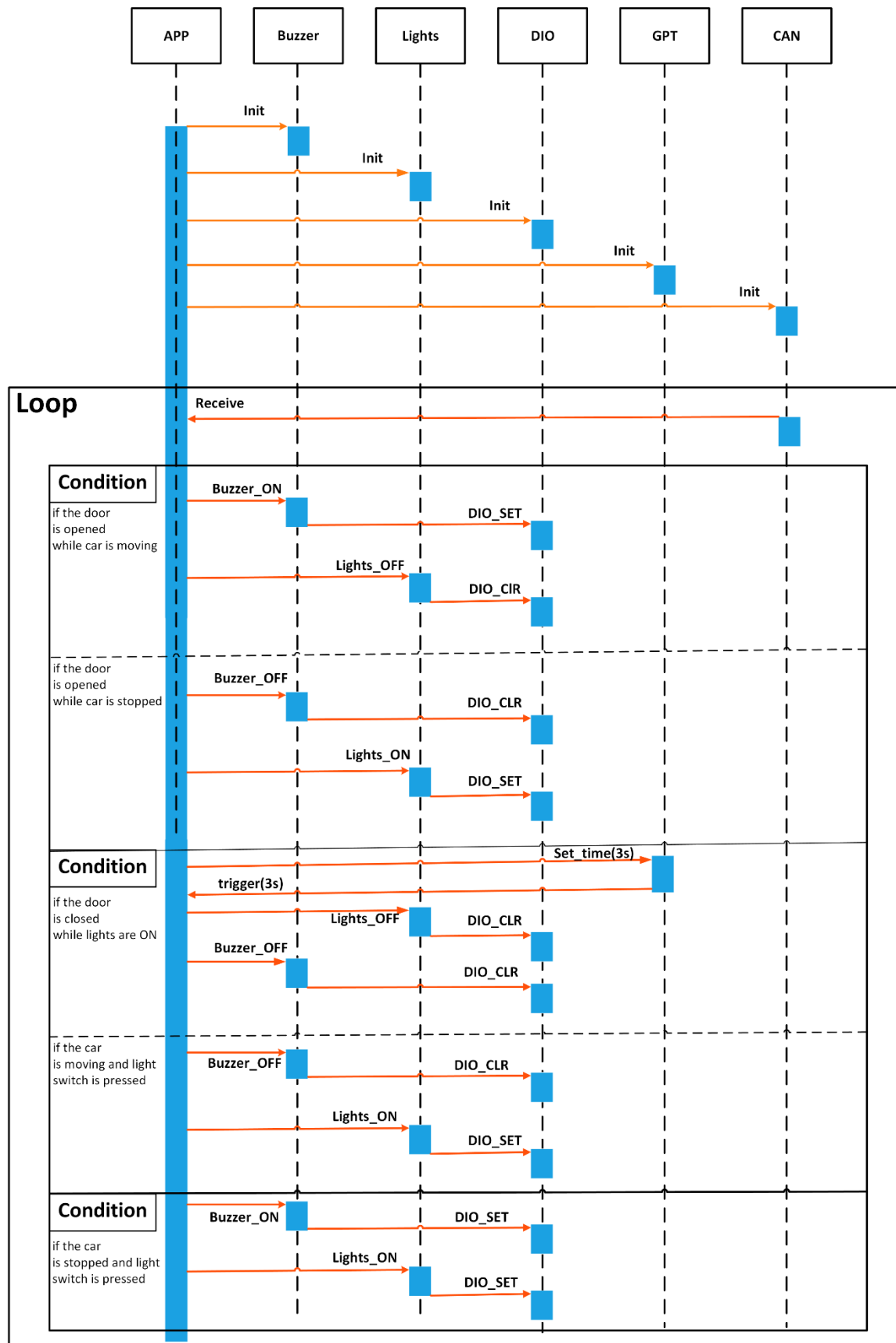


Figure 6: Sequence Diagram for ECU2

CPU Load Calculation

o Utilization = Total Execution Time During Hyperperiod / Hyperperiod

o Utilization = $((1 * 3) / 10) * 100\% = 30\%$

BUS Load Calculation:

we have below multiple sending intervals on the bus as:

1 frame every 5 ms = 200 frames every 1000 ms

1 frame every 10 ms = 100 frames every 1000 ms

1 frame every 20 ms = 50 frame every 1000 ms

This is in total 350 frames every 1000 ms

Total time on bus is $350 * 250 \mu\text{s}$

Total time is $1000 \text{ ms} = 1000 * 1000 \mu\text{s}$

Bus load is $((350 * 250) / (1000 * 1000)) * 100 \% = 8.75 \%$