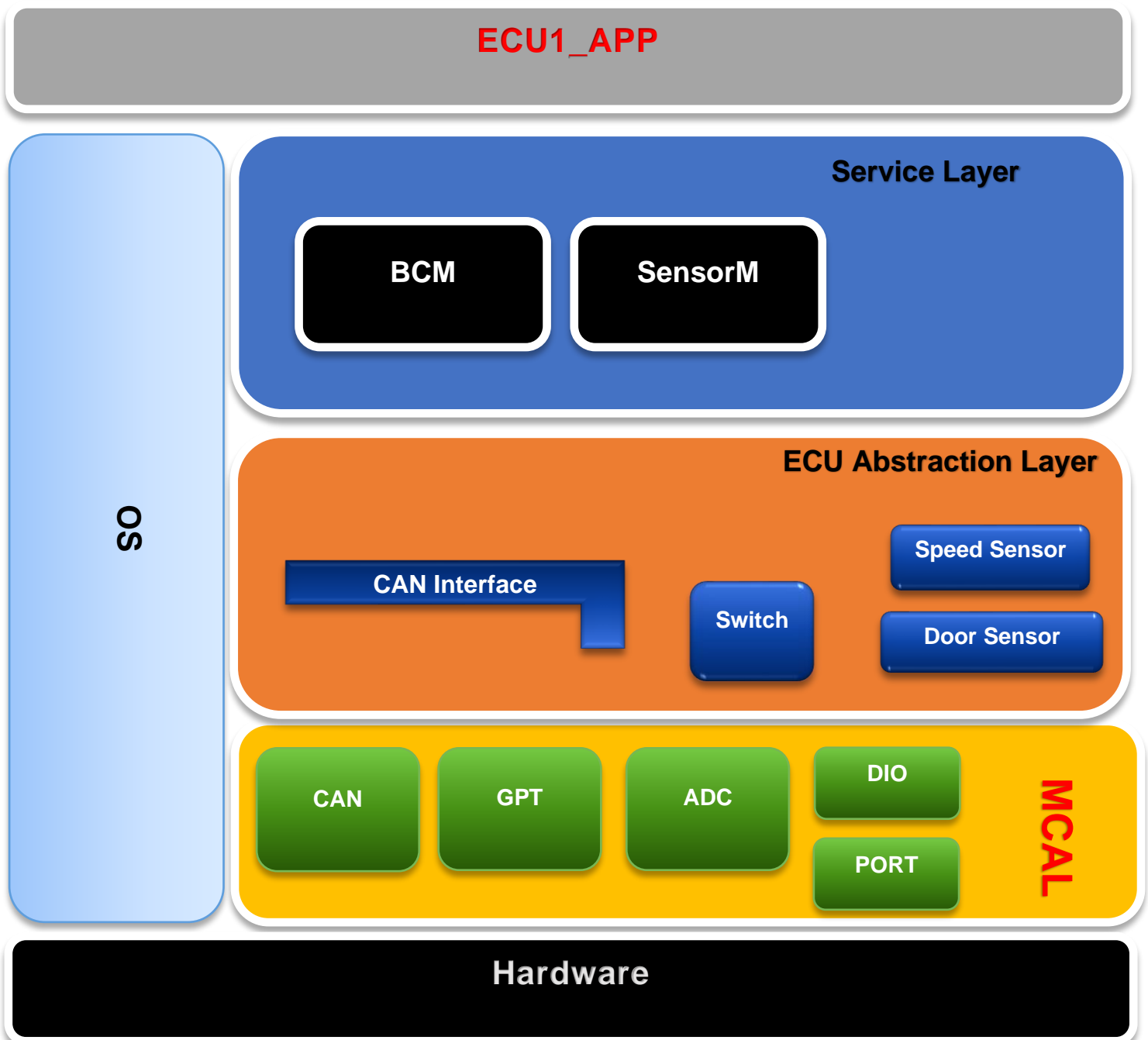
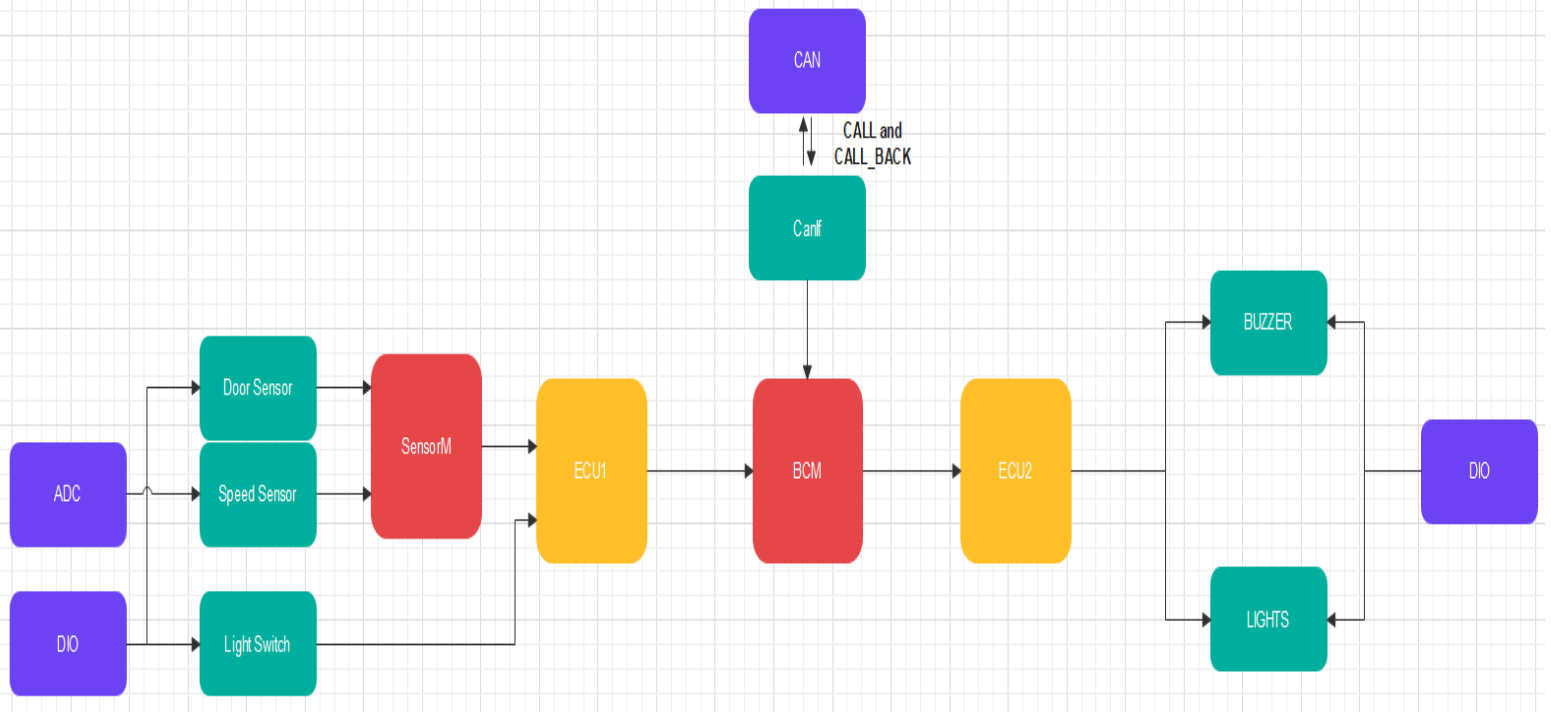


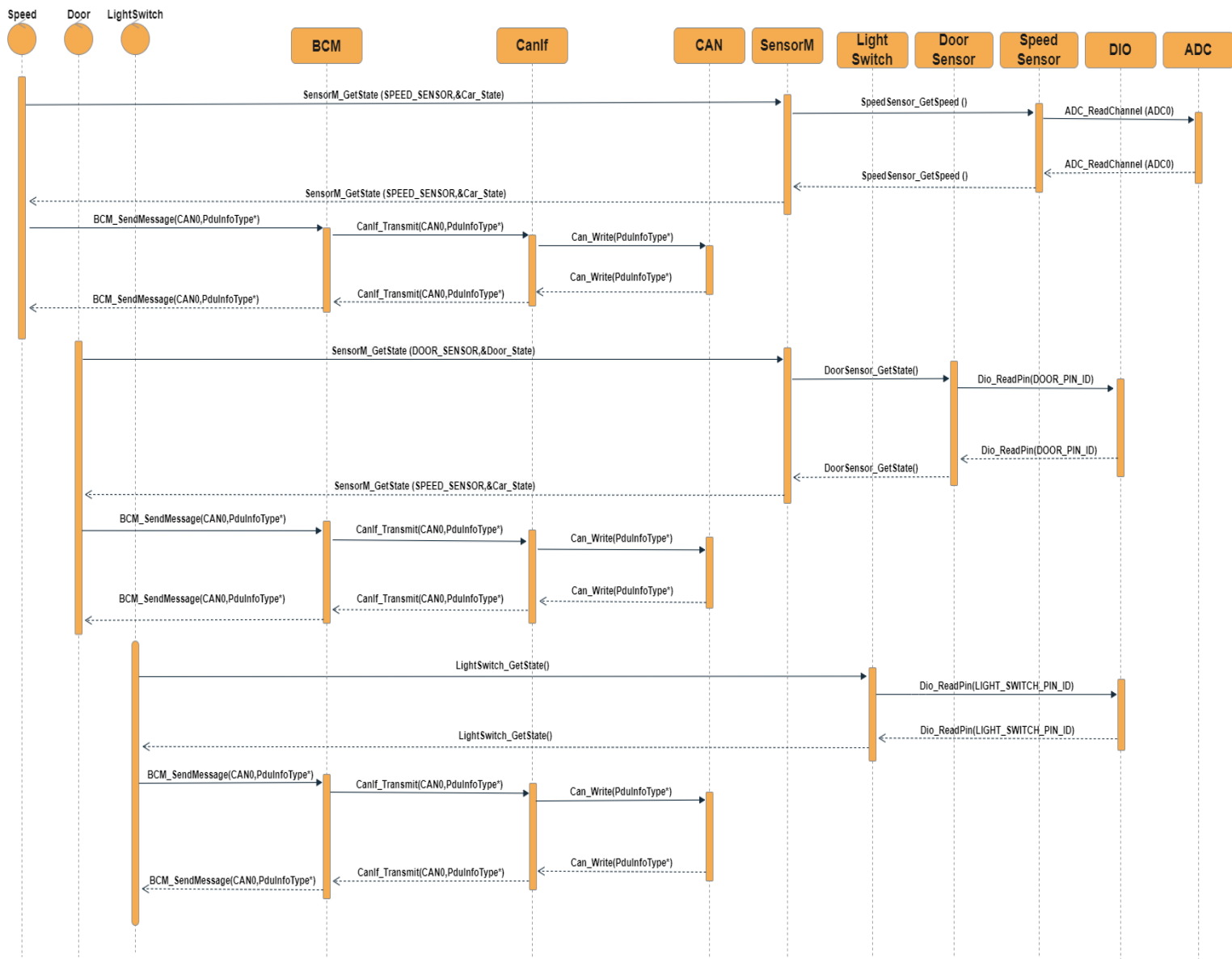
ECU_1 LAYERED ARCHITECTURE



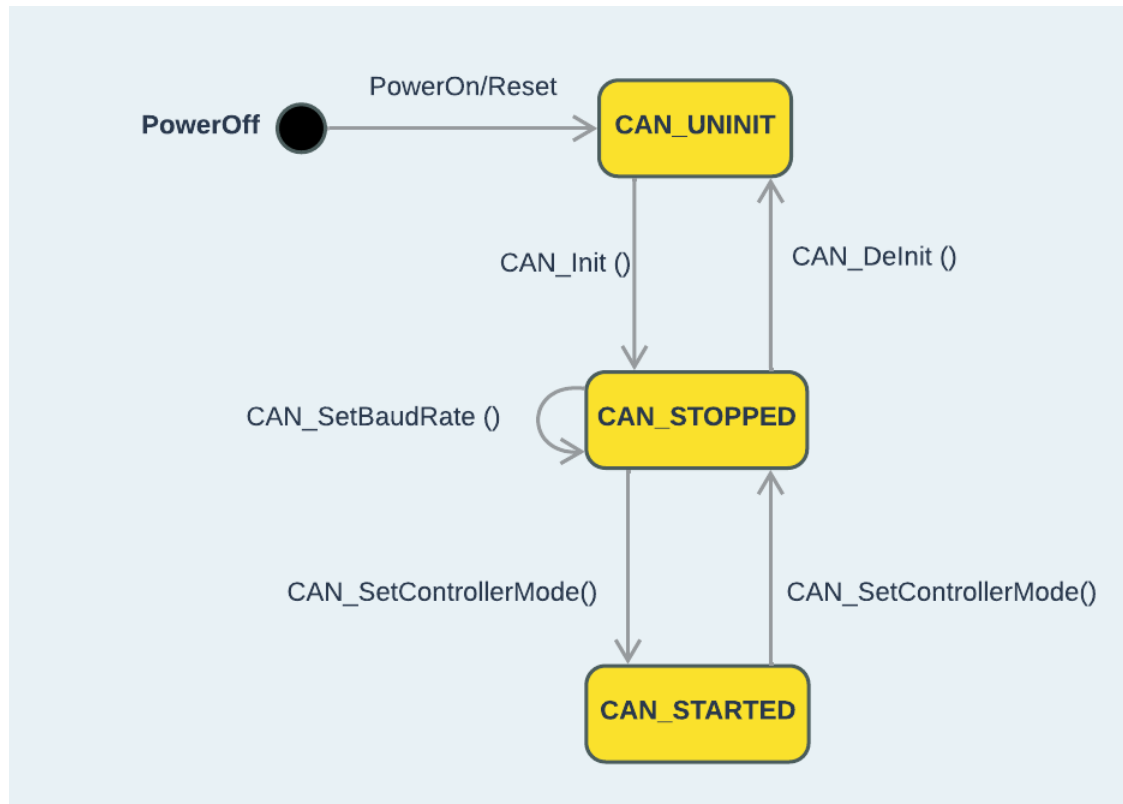
SYSTEM BLOCK DIAGRAM



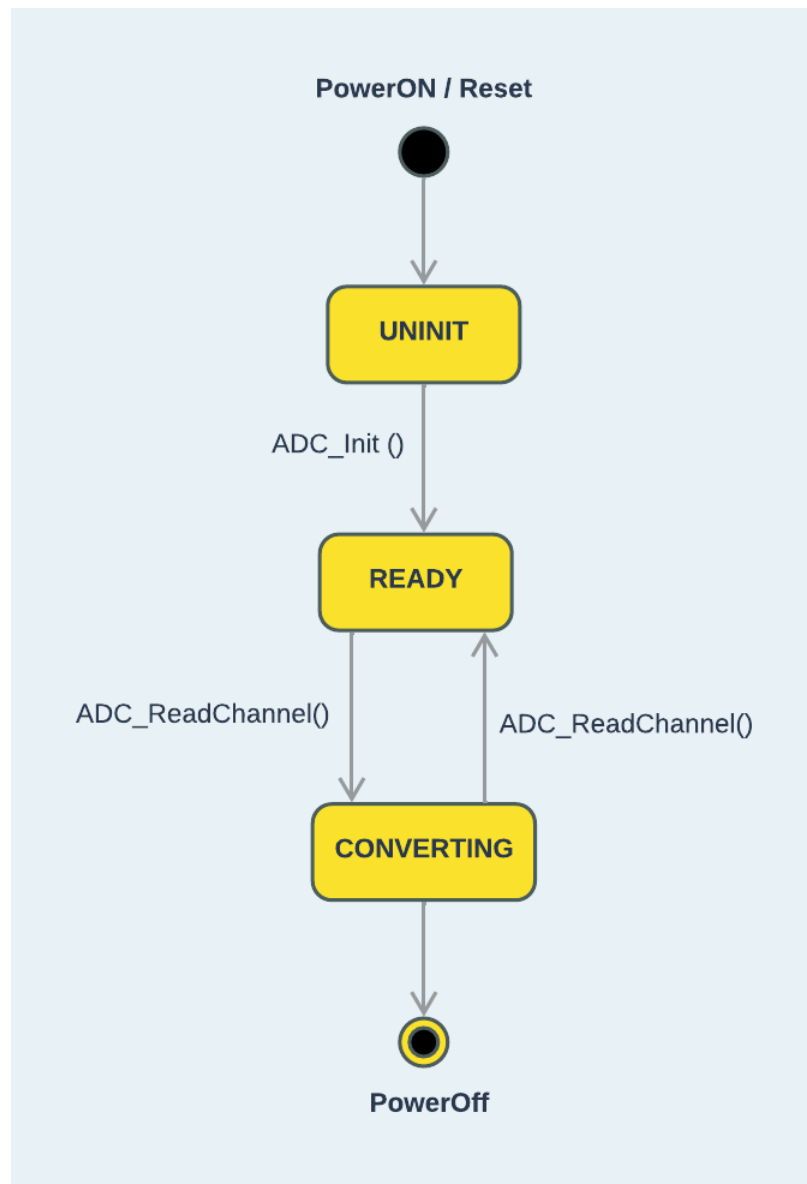
ECU1 SEQUENCE DIAGRAM



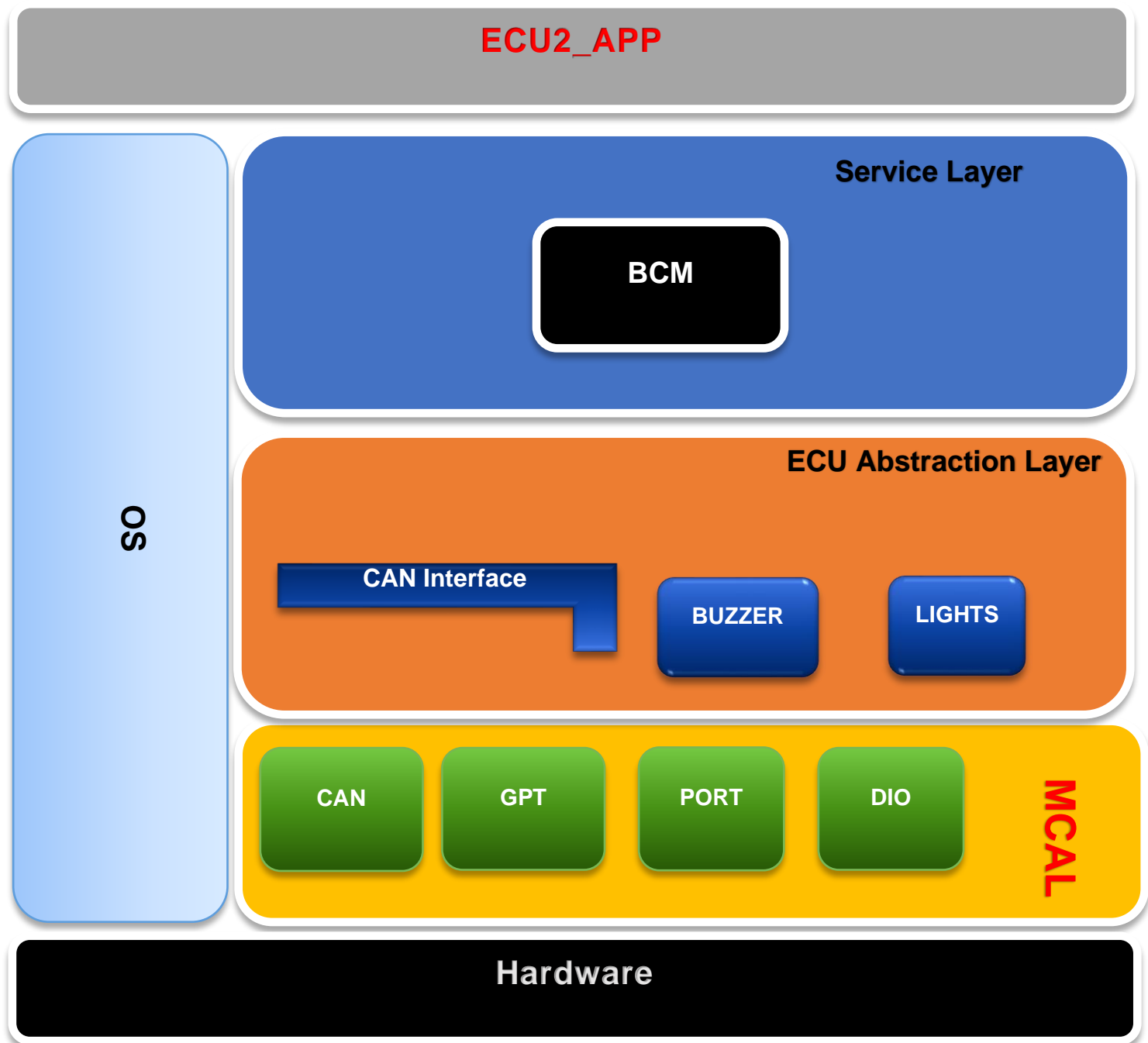
CAN STATE MACHINE



ADC STATE MACHINE



ECU_2 LAYERED ARCHITECTURE



CALCULATION OF BUS LOAD

- **Bus Load** = $\frac{\text{Total number of bits transferred per second}}{\text{Baudrate}} * 100\%$ (1)
- CAN Frame Size = 56 Bits
- Baud-rate = 1Mbits/sec
- Total number of transferred bits = Number of frames transferred in second * CAN Frame Size , (2)
- For Task1 (Speed):
 - Period = 5Ms.
 - Number of Transferred frame = 1000 msec / 5 msec = 200 frames.
- For Task2 (Door):
 - Period = 10Ms.
 - Number of Transferred frame = 1000 msec / 10 msec = 100 frames.
- For Task3 (Light Switch):
 - Period = 20 Ms.
 - Number of Transferred frame = 1000 msec / 20 msec = 50 frames.
- Total number of frames per second = 200+100+50 = 350 frames
- Substitute in equ(2):
 - Total number of transferred bits = 350 * 56 = 19600 Bits/Sec , (3)
- Substitute in equ(1):
 - **Bus load** = $\frac{19600}{1000000} * 100\% \approx 2\%$

CALCULATING CPU LOAD

- For Task1 (Speed):
 - Period = 5Ms.
 - Execution time = X
 - Priority = 3
- For Task 2 (Door):
 - Period = 10Ms.
 - Execution time = Y
 - Priority = 2
- For Task3 (Light Switch):
 - Period = 20Ms.
 - Execution time = Z
 - Priority = 1
- Hyper Period = 20Ms
- CPU load = (Total Execution Time of all Tasks) / (Hyper Period)

$$\text{CPU load} = (4 * X + 2 * Y + Z) / \text{Hyper-Period}$$