

FWD – Advanced Embedded Systems Course

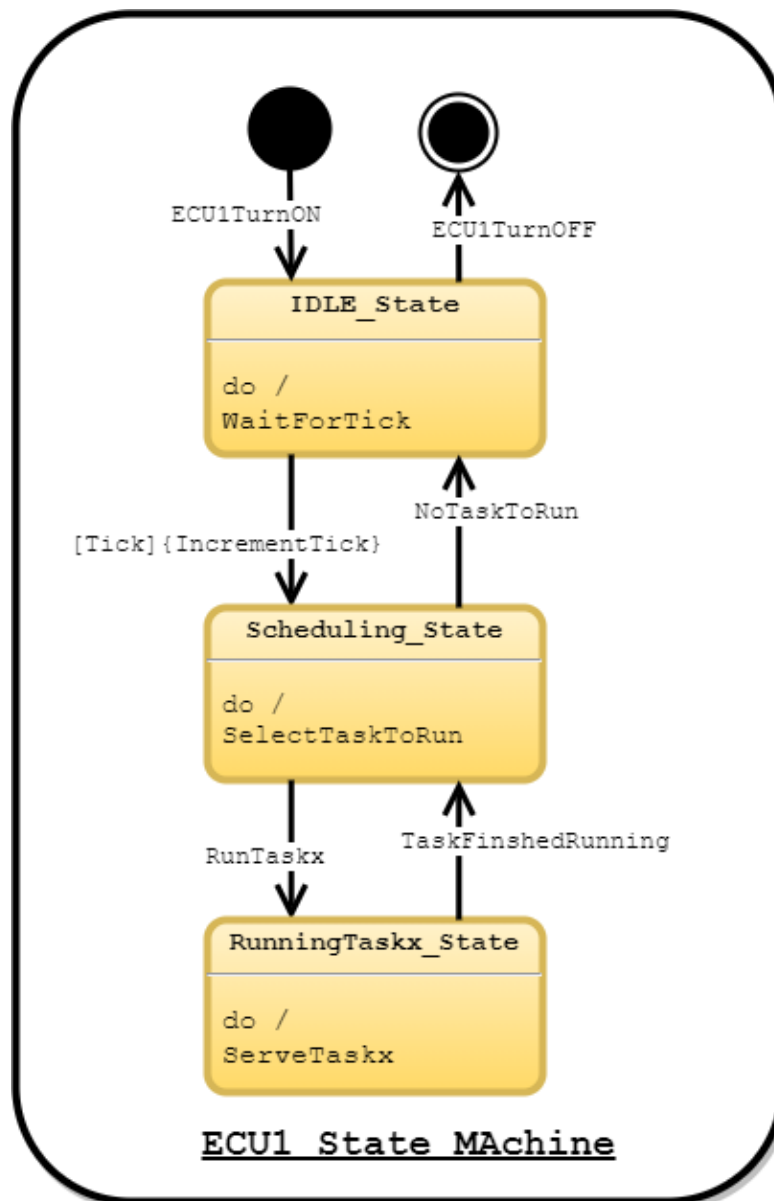
Project #3 – Embedded Software Design

1st : Fully Dynamic Design.

❖ Dynamic design analysis:

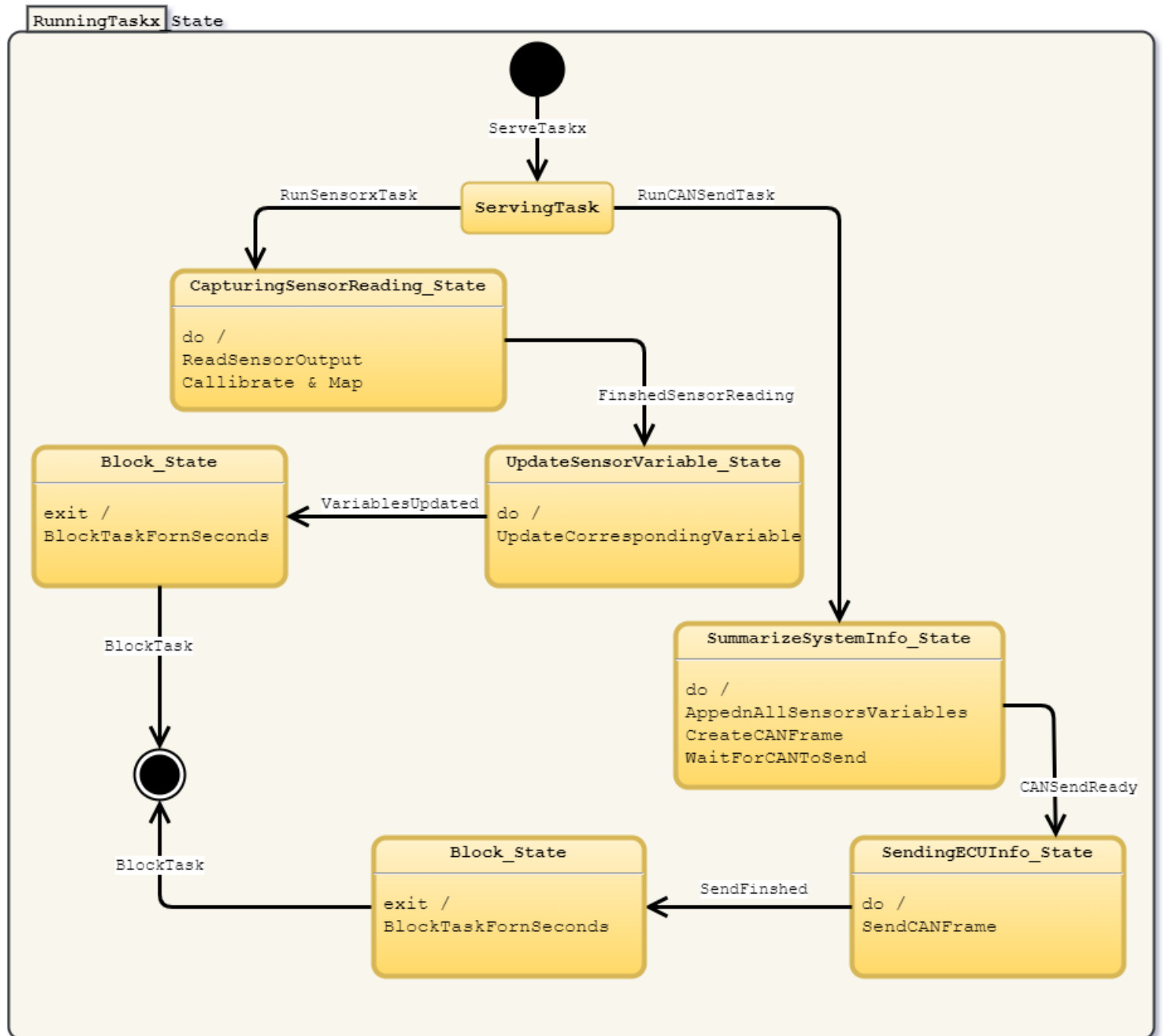
- ECU1 State Machine Diagram
 - ECU1 Operation

ECU1 runs RTOS to handle all tasks:

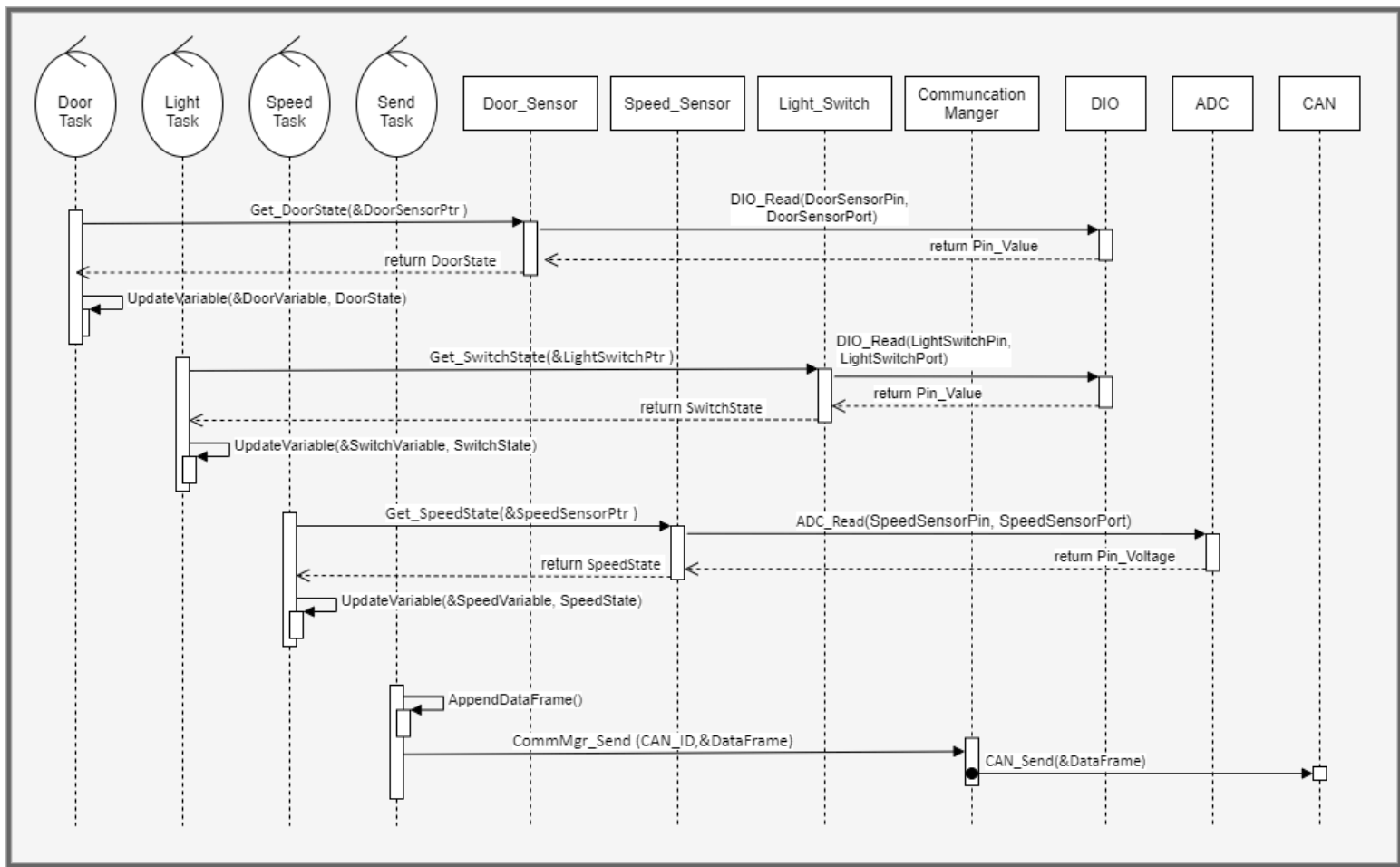


○ ECU1 Components State Machine

ECU1 Tasks states (RTOS Tasks) are composite states from the ECU Operation “RunningTaskx_State” State, ECU1 Tasks are two types, first the tasks serving the sensors/switch with same operation algorithm and summarized under “RunSensorxTask” Condition branch, second the Sending task under “RunCANSendTask” Condition branch:



➤ ECU1 Sequence Diagram

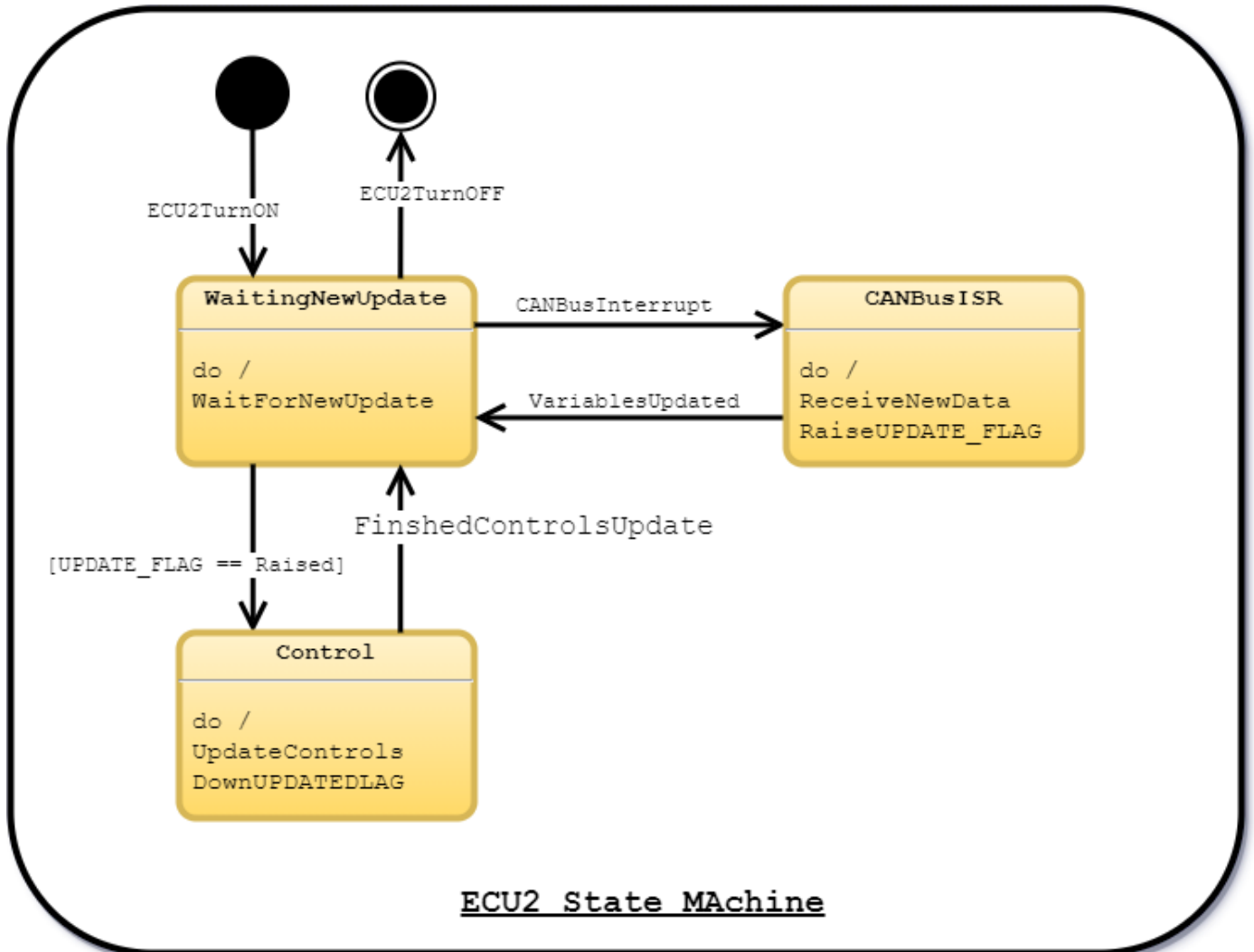


➤ **ECU1 CPU Load**

➤ **ECU2 State Machine Diagram**

○ **ECU2 Operation**

ECU1 Runs an Event-Triggered Architecture to immediately receive ECU1 updates vis CAN Bus and then update the control applied on ECU2 attached components (Lights/Buzzer):



○ ECU2 Components State Machine

Control is a composite state to control Lights/Buzzer according the required logic:

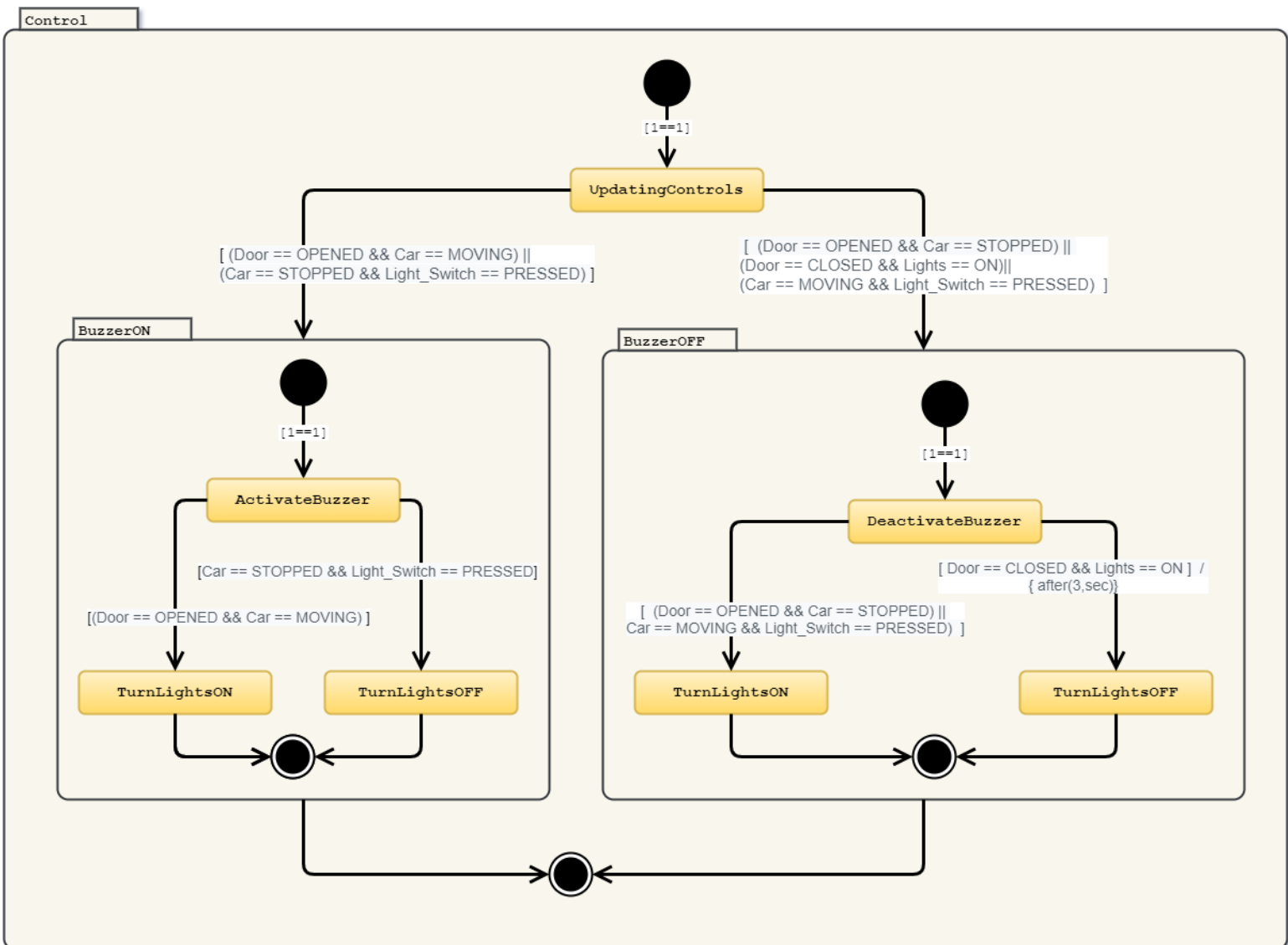
If the door is opened while the car is moving → Buzzer ON, Lights OFF

If the door is opened while the car is stopped → Buzzer OFF, Lights ON

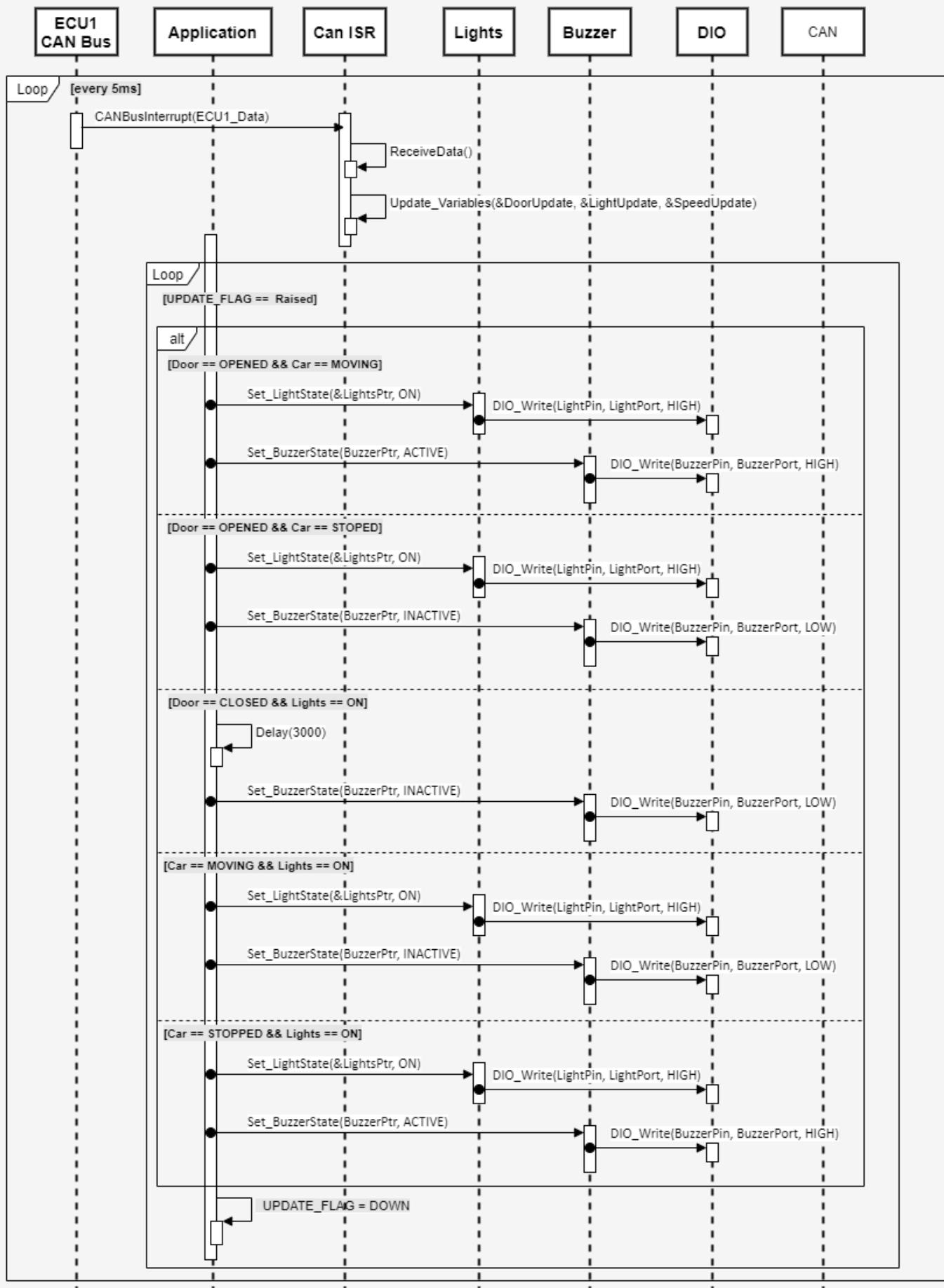
If the door is closed while the lights were ON → Lights are OFF after 3 seconds

If the car is moving and the light switch is pressed → Buzzer OFF, Lights ON

If the car is stopped and the light switch is pressed → Buzzer ON, Lights ON



➤ ECU2 Sequence Diagram



➤ **ECU2 CPU Load**