FWD Design Project

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Contents

[System Schematic 3](#_Toc116237776)

[ECU 1 API 4](#_Toc116237777)

[ECU 2 API 8](#_Toc116237778)

[ECU 1 Typedefs used 12](#_Toc116237779)

[ECU 2 Typedefs 13](#_Toc116237780)

[ECU 1 Layered Architecture 14](#_Toc116237781)

[ECU 2 Layered Architecture 15](#_Toc116237782)

[ECU 1 Folder Structure 16](#_Toc116237783)

[ECU 2 Folder Structure 17](#_Toc116237784)

[ECU 1 State Machine 18](#_Toc116237785)

[ECU 2 State Machine 19](#_Toc116237786)

[ECU 1 Sequence Diagram 20](#_Toc116237787)

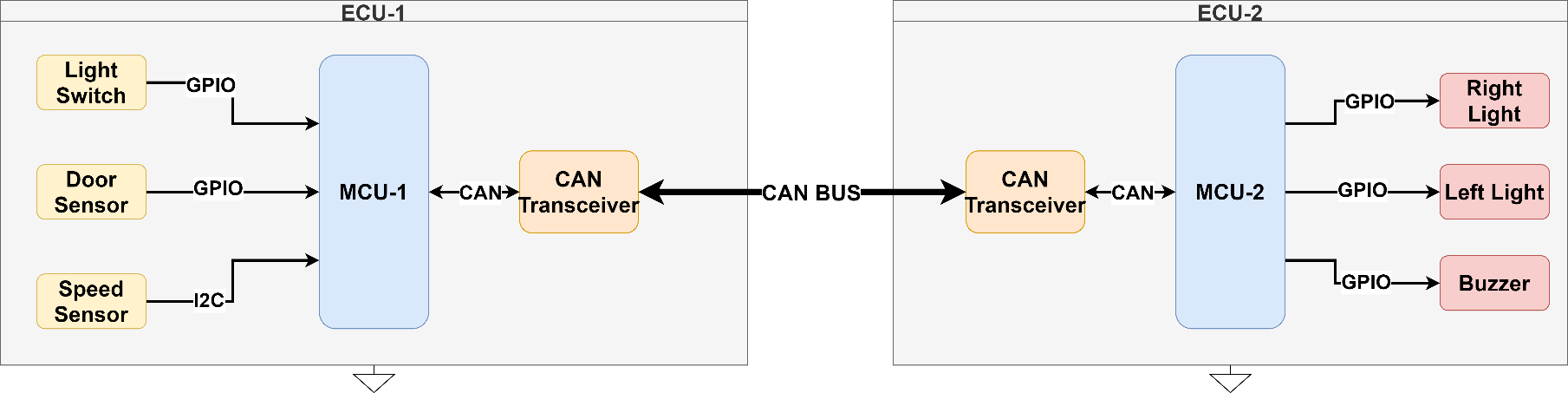
[ECU 2 Sequence Diagram 21](#_Toc116237788)

[CPU Load 22](#_Toc116237789)

[Bus Load Calculation 23](#_Toc116237790)

Static Design

# System Schematic



# ECU 1 API

|  |  |
| --- | --- |
| **ECU Name** | ECU 1 |
| **Module name** | DIO |
| **API Name** | DIO\_Init |
| **API Description** | Intializes the DIO Module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | DIO |
| **API Name** | DIO\_Read |
| **API Description** | Gets Pin Value |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | PortNum : uint8, pinNumber : uint8 |
| **Parameters (out)** | pinValue : bool |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | DIO |
| **API Name** | DIO\_Write |
| **API Description** | Writes Pin Value |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | PortNum : uint8, pinNumber : uint8, value : bool |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |

|  |  |
| --- | --- |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | RCC |
| **API Name** | RCC\_Init |
| **API Description** | Intializes the RCC Module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | RCC |
| **API Name** | RCC\_Enable |
| **API Description** | Enables the RCC On a periphral |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Periphral : enum |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Door |
| **API Name** | DoorSensor\_SendState |
| **API Description** | Send door data to ecu2 |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | None |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Speed |
| **API Name** | SpeedSensor\_SendState |
| **API Description** | send speed data to ecu2 |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | None |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Light |
| **API Name** | LightSwitch\_SendState |
| **API Description** | send switch data to ecu2 |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | None |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | BCM |
| **API Name** | BCM\_Init |
| **API Description** | intialize bcm module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | BCM |
| **API Name** | BCM\_SendMessage |
| **API Description** | send messege through bcm |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | MessageId : uint8, Message : uint 32 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Canif |
| **API Name** | CanIf\_Init |
| **API Description** | intitialize the canif |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |

|  |  |
| --- | --- |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Canif |
| **API Name** | CanIf\_Transmit |
| **API Description** | transmit throught the canif |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | ID : uint16, data : uint32 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Canif |
| **API Name** | CanIf\_SetTrcvMode |
| **API Description** | sets the treanceivers mode |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Mode : uint8 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Can |
| **API Name** | Can\_Init |
| **API Description** | intialize can module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 1 |
| **Module name** | Can |
| **API Name** | Can\_Write |
| **API Description** | write throught the can |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | ID : uint16, data : uint32 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| ECU 2 API **ECU Name** | ECU 2 |
| **Module name** | Switch |
| **API Name** | LightSwitch\_ReciveState |
| **API Description** | recive switch data to ecu2 |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | None |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | Buzzer |
| **API Name** | Buzzer\_Control |
| **API Description** | sends buzzer data to ecu2 |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | None |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | Light |
| **API Name** | Light\_Control |
| **API Description** | sends light data to ecu2 |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | None |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |

|  |  |
| --- | --- |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | DIO |
| **API Name** | DIO\_Init |
| **API Description** | Intializes the DIO Module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
| **ECU Name** | ECU 2 |
| **Module name** | DIO |
| **API Name** | DIO\_Read |
| **API Description** | Gets Pin Value |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | PortNum : uint8, pinNumber : uint8 |
| **Parameters (out)** | pinValue : bool |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | DIO |
| **API Name** | DIO\_Write |
| **API Description** | Writes Pin Value |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | PortNum : uint8, pinNumber : uint8, value : bool |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | RCC |
| **API Name** | RCC\_Init |
| **API Description** | Intializes the RCC Module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | RCC |
| **API Name** | RCC\_Enable |
| **API Description** | Enables the RCC On a periphral |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Periphral : enum |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | BCM |
| **API Name** | BCM\_Init |
| **API Description** | intialize bcm module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | BCM |
| **API Name** | BCM\_SendMessage |
| **API Description** | send messege through bcm |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | MessageId : uint8, Message : uint 32 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | Canif |
| **API Name** | CanIf\_Init |
| **API Description** | intitialize the canif |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |

|  |  |
| --- | --- |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | Canif |
| **API Name** | CanIf\_Transmit |
| **API Description** | transmit throught the canif |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | ID : uint16, data : uint32 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
| **ECU Name** | ECU 2 |
| **Module name** | Canif |
| **API Name** | CanIf\_SetTrcvMode |
| **API Description** | sets the treanceivers mode |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Mode : uint8 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | Can |
| **API Name** | Can\_Init |
| **API Description** | intialize can module |
| **Sync/Async** | Synchrounous |
| **Reentrancy** | None |
| **Parameters(in)** | Configuration : Struct |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |
|  |  |
| **ECU Name** | ECU 2 |
| **Module name** | Can |
| **API Name** | Can\_Write |
| **API Description** | write throught the can |
| **Sync/Async** | Asynchrounous |
| **Reentrancy** | Reentrent |
| **Parameters(in)** | ID : uint16, data : uint32 |
| **Parameters (out)** | None |
| **Parameters(in/out)** | None |
| **Return Type** | errorr\_t |

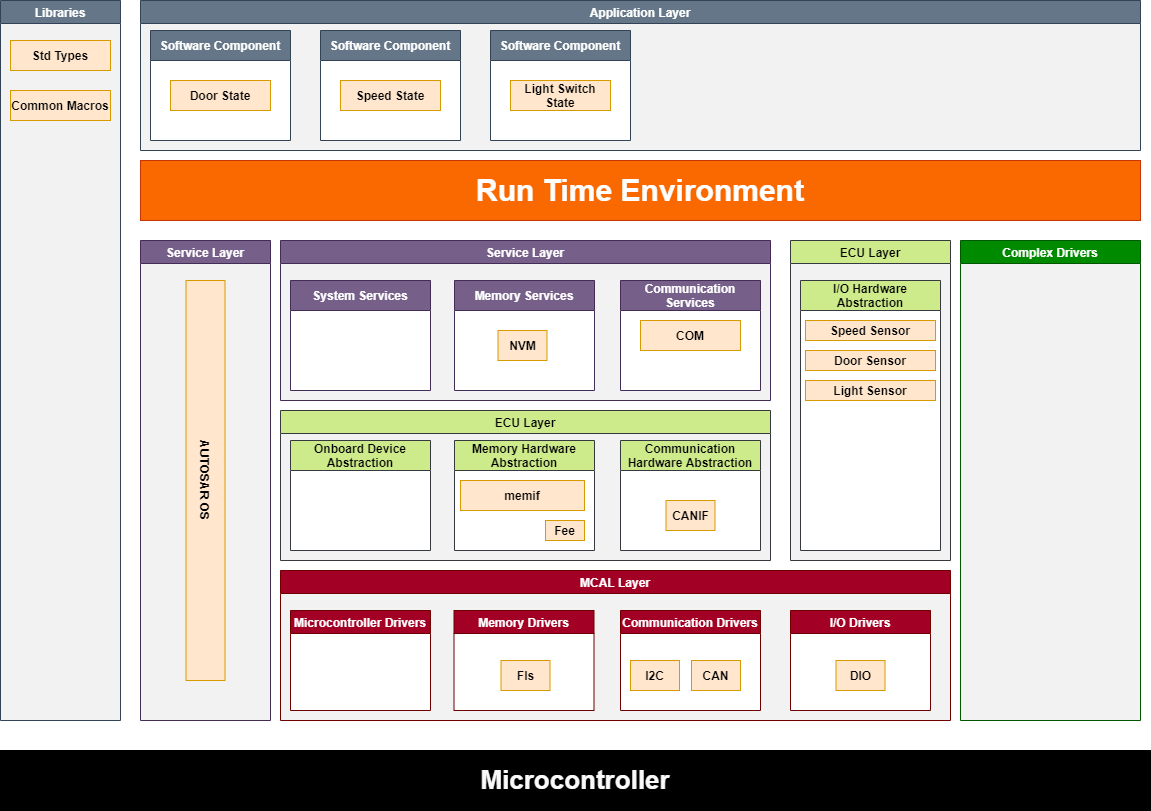
# ECU 1 Typedefs used

|  |  |  |
| --- | --- | --- |
| **typedef** | DoorStatus | uint8 |
| **typedef** | SpeedValue | uint16 |
| **typedef** | DioChannelType | uint11 |
| **typedef** | DioChannelType | uint8 |

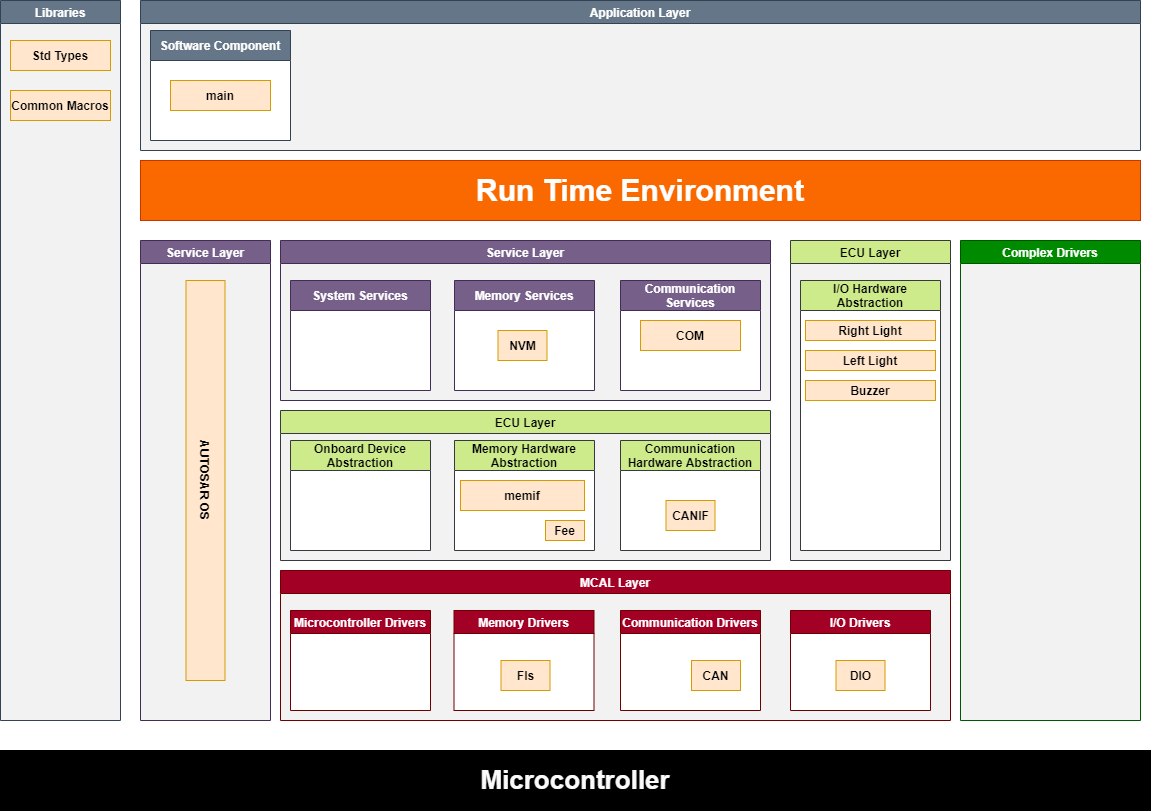
# ECU 2 Typedefs

|  |  |  |
| --- | --- | --- |
| **typedef** | DioChannelType | uint8 |
| **typedef** | LightLevelType | uint9 |
| **typedef** | BuzzerLevelType | uint10 |
| **typedef** | DioChannelType | uint11 |

# ECU 1 Layered Architecture



# ECU 2 Layered Architecture



# ECU 1 Folder Structure

Text

Description automatically generated with low confidence

# ECU 2 Folder Structure

Text

Description automatically generated

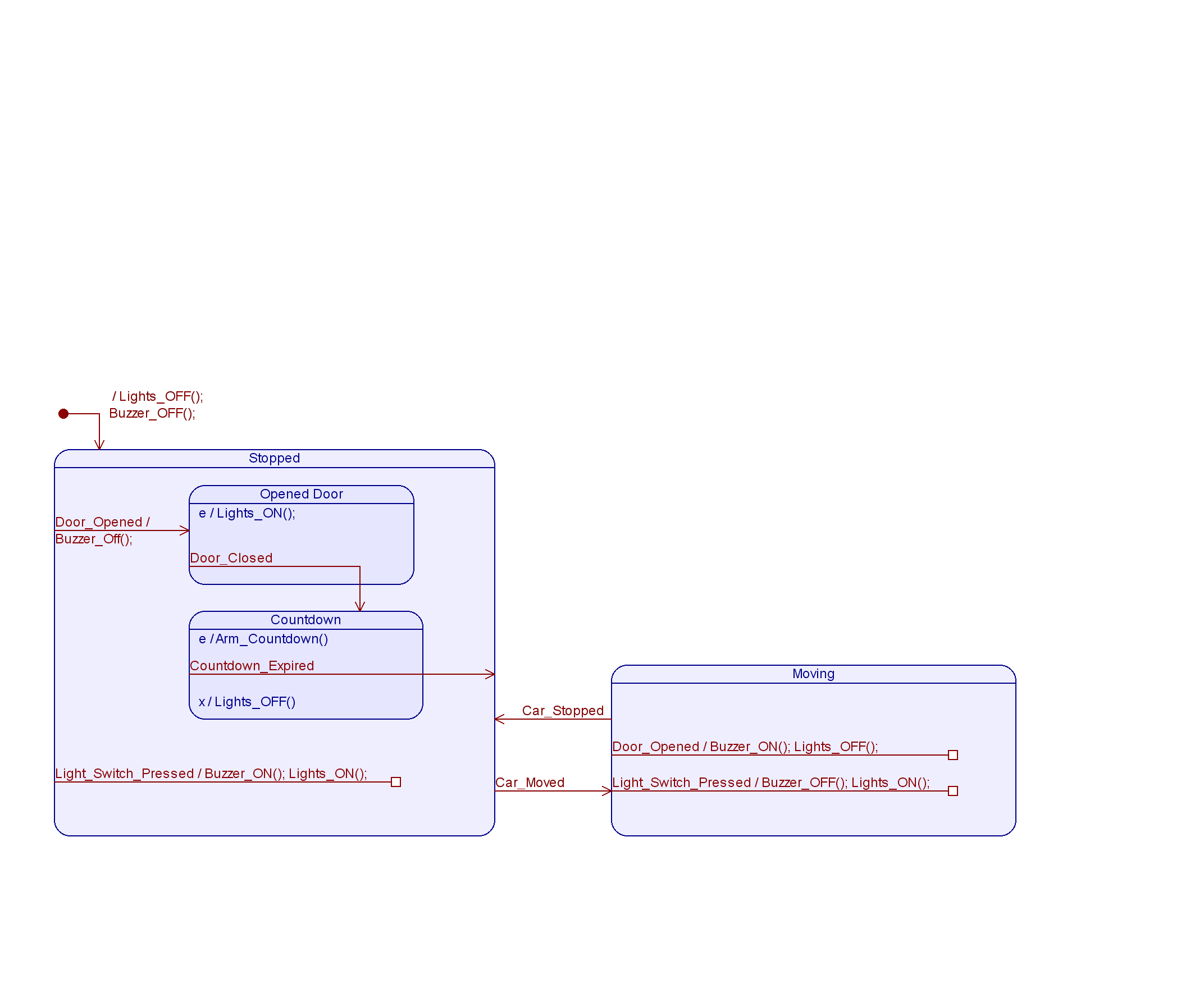
Dynamic Design

# ECU 1 State Machine

Graphical user interface, application, Teams

Description automatically generated

# ECU 2 State Machine



# ECU 1 Sequence Diagram

# ECU 2 Sequence Diagram

Chart, box and whisker chart

Description automatically generated

# CPU Load

Graphical user interface, table

Description automatically generated

# Bus Load Calculation

**Bus Load** = Total bits / 12500 = 32 / 125000 = 0.000256 = 0.0256%