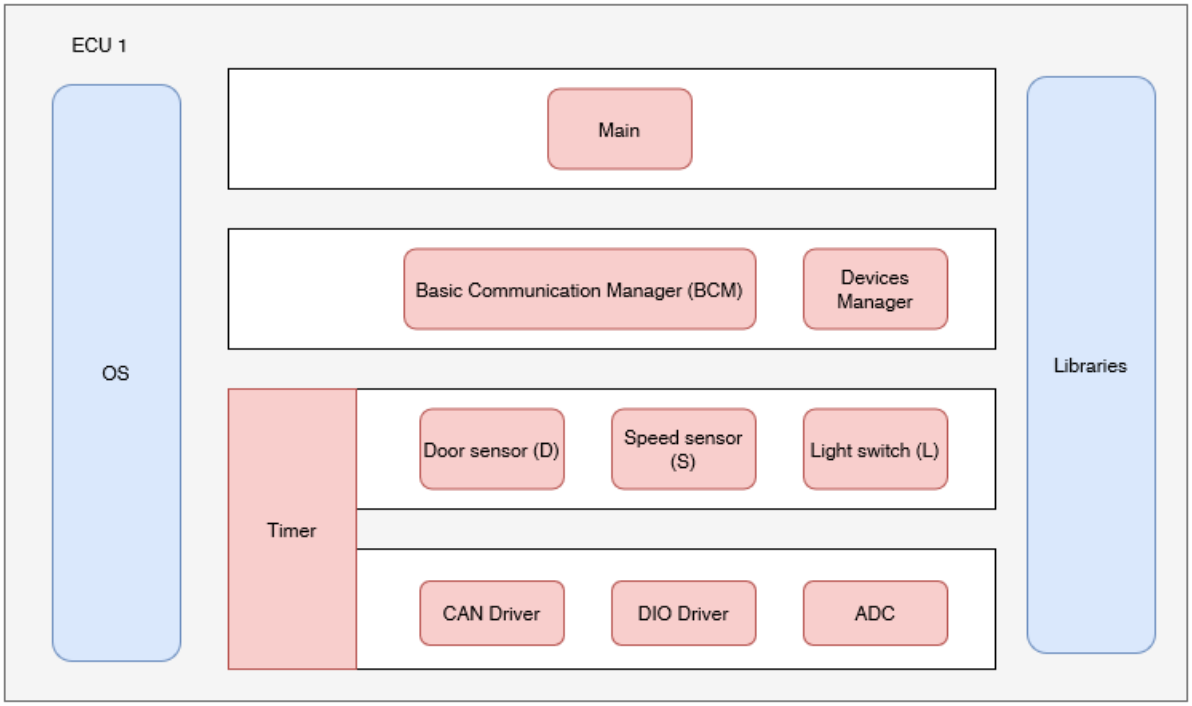
- The First ECU
  - The layered Architecture



  - The APIs
    - DIO Module

API name	Void DIO_init(void)
Description	Initialize the DIO with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	U8 DIO_read_Pin(u8 Port_Num,u8 pin_Num);
Description	Read the value from the DIO pin.
Sync/Async	Sync
Parameters	Port number , Pin number
Reentrant	Non reentrant
Return	Pin Value (U8)

API name	Void DIO_write_Pin(u8 Port_Num,u8 pin_Num, U8 value);
Description	Write the required value on the specific Pin
Sync/Async	sync
Parameters	Port number , Pin number and value to write .
Reentrant	Non reentrant
Return	void

API name	U8 DIO_read_Port(u8 Port_Num);
Description	Read the value from the DIO Port.
Sync/Async	Sync
Parameters	Port number
Reentrant	Non reentrant
Return	Port Value (U8) in case 8 pins port

- CAN Module

API name	Void CAN_init(void);
Description	Initialize the CAN with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void CAN_transmit(u8 CanPin_ID,u64 message);
Description	Send a required message via specific pin id
Sync/Async	sync
Parameters	Can pin number , message
Reentrant	Non reentrant
Return	void

- ADC Module

API name	Void ADC_init(void);
Description	Initialize the ADC with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	U64 ADC_ReadValue (u8 channel);
Description	Read value from the ADC channel
Sync/Async	sync
Parameters	ADC channel number
Reentrant	Non reentrant
Return	Read value

- Timer Module

API name	Void timer_init (void);
Description	Initialize the Timer with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void timer_set_ISR(void (*callback)(void *));
Description	Set ISR for the overflow of the configured timer.
Sync/Async	Sync
Parameters	Pointer to function
Reentrant	Non reentrant
Return	Pin Value (U8)

- Speed Sensor Module

API name	Void SpeedSensor_init(void)	API name	U16 SpeedSensor_getSpeed(void)
Description	Initialize the Speed Sensor with fixed configurations.	Description	Get the speed .
Sync/Async	sync	Sync/Async	Sync
Parameters	void	Parameters	void
Reentrant	Non reentrant	Reentrant	Non reentrant
Return	void	Return	Speed Value (U16)

- Door Sensor Module

API name	Void DoorSensor_init(void)	API name	U8 DoorSensor_getStatus(void);
Description	Initialize the Door Sensor with fixed configurations.	Description	Get the Door state.
Sync/Async	sync	Sync/Async	Sync
Parameters	void	Parameters	void
Reentrant	Non reentrant	Reentrant	Non reentrant
Return	void	Return	Door state (u8)

- Light Switch Module

API name	Void LightSwitch_init(void)	API name	U8 LightSwitch_getStatus(void)
Description	Initialize the Light Switch with fixed configurations.	Description	Get the Light Switch.
Sync/Async	sync	Sync/Async	Sync
Parameters	void	Parameters	void
Reentrant	Non reentrant	Reentrant	Non reentrant
Return	void	Return	Light Switch state (u8)

- Communication handler Manager

API name	Void BCM_Manger(u64 Manger_Message,u8 bus);
Description	Make the app layer to choose the bus to send the message with .
Sync/Async	sync
Parameters	Message,bus
Reentrant	Non reentrant
Return	Void

- Device Manager

API name	Void Device_Manger(u8 Device);
Description	Make the app layer to choose the Device to get the message from .
Sync/Async	sync
Parameters	Device
Reentrant	Non reentrant
Return	void

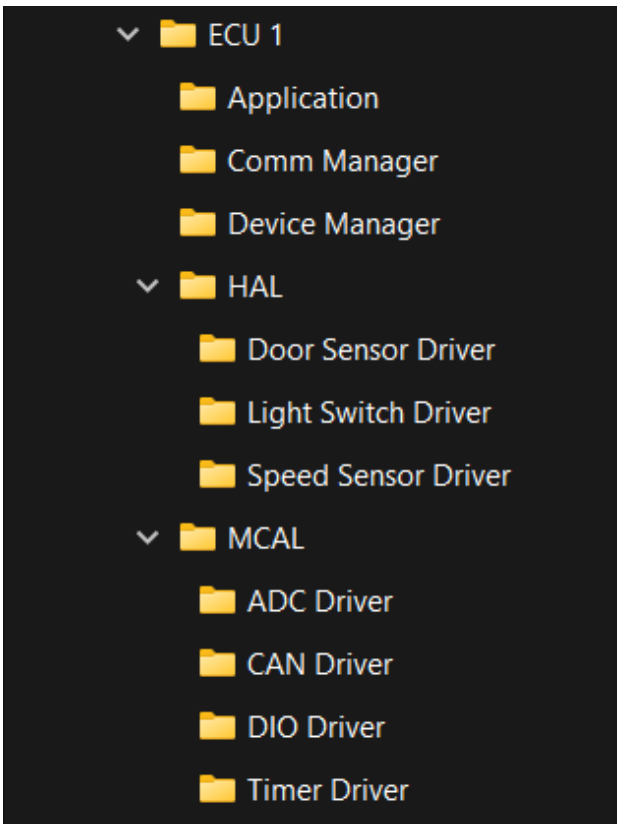
- Main App

API name	Void SendDoorStatus (void);
Description	ECU 1 will send Door status messages periodically to ECU 2 through the CAN protocol .
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

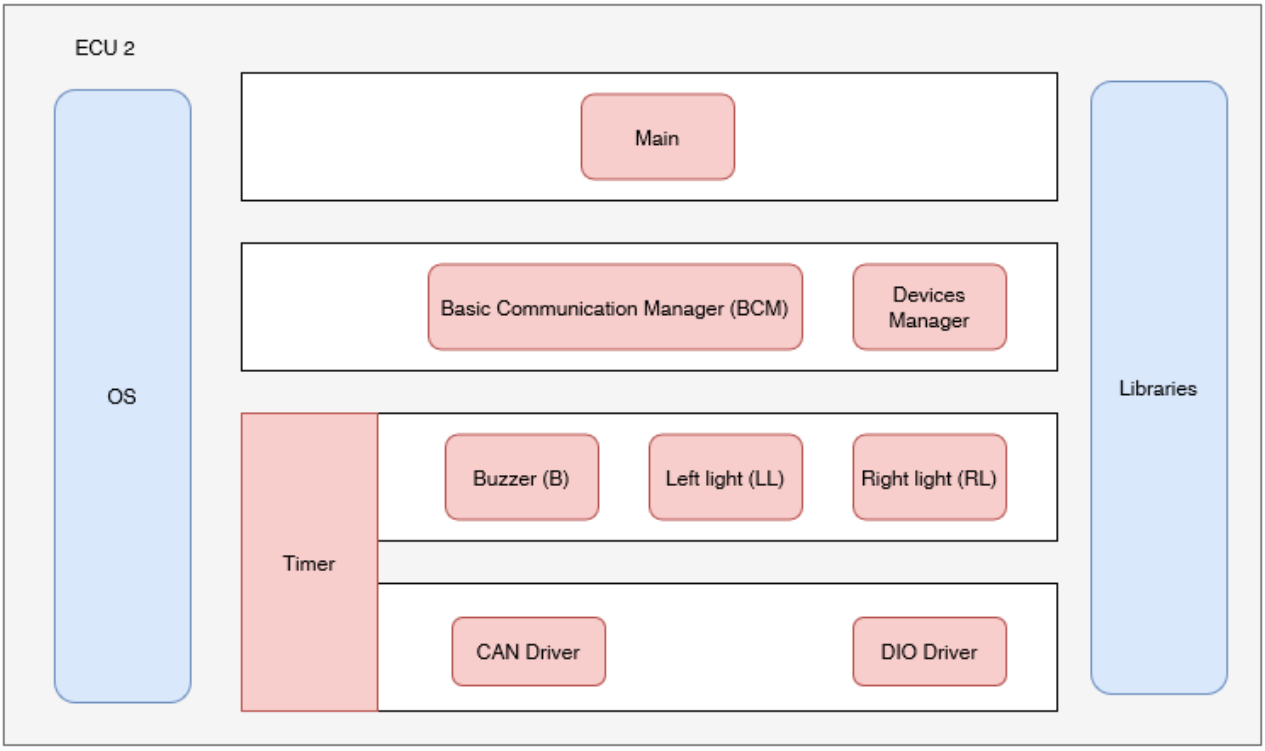
API name	Void SendLightStatus (void);
Description	ECU 1 will send light status messages periodically to ECU 2 through the CAN protocol .
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void SendSpeedStatus (void);
Description	ECU 1 will send Speed status messages periodically to ECU 2 through the CAN protocol .
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

- Folder Structure



- The Second ECU
  - The layered Architecture



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- DIO Module

API name	Void DIO_init(void)
Description	Initialize the DIO with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	U8 DIO_read_Pin(u8 Port_Num,u8 pin_Num);
Description	Read the value from the DIO pin.
Sync/Async	Sync
Parameters	Port number , Pin number
Reentrant	Non reentrant
Return	Pin Value (U8)

API name	Void DIO_write_Pin(u8 Port_Num,u8 pin_Num, U8 value);
Description	Write the required value on the specific Pin
Sync/Async	sync
Parameters	Port number , Pin number and value to write .
Reentrant	Non reentrant
Return	void

API name	U8 DIO_read_Port(u8 Port_Num);
Description	Read the value from the DIO Port.
Sync/Async	Sync
Parameters	Port number
Reentrant	Non reentrant
Return	Port Value (U8) in case 8 pins port

- CAN Module

API name	Void CAN_init(void);
Description	Initialize the CAN with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	U64 CAN_receive(U8 CanPin_ID);
Description	receives message via specific pin id
Sync/Async	sync
Parameters	Can pin number , message
Reentrant	Non reentrant
Return	U64

- Timer Module

API name	Void timer_init (void);
Description	Initialize the Timer with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void timer_set_ISR(void (*callback)(void *));
Description	Set ISR for the overflow of the configured timer.
Sync/Async	Sync
Parameters	Pointer to function
Reentrant	Non reentrant
Return	Pin Value (U8)

- Buzzer Module

API name	Void Buzzer_init(void)
Description	Initialize the Buzzer with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void Set_Buzzer(u8 state) ;
Description	Activate/deactivate the buzzer
Sync/Async	Sync
Parameters	Buzzer state (ON/OFF)
Reentrant	Non reentrant
Return	void

- Left Light Module

API name	Void Left_Light_init(void)
Description	Initialize the Left Light with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void Set_LeftLight(u8 state) ;
Description	Turn light ON/OFF
Sync/Async	Sync
Parameters	Light state (ON/OFF)
Reentrant	Non reentrant
Return	void

- Right Light Module

API name	Void Right_Light_init(void);
Description	Initialize the Right light with fixed configurations.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

API name	Void Set_RightLight (u8 state) ;
Description	Turn light ON/OFF
Sync/Async	Sync
Parameters	Light state (ON/OFF)
Reentrant	Non reentrant
Return	void

- Communication handler Manager

API name	Void BCM_Manger(u64 Manger_Message,u8 bus);
Description	Make the app layer to choose the bus to send the message with .
Sync/Async	sync
Parameters	Message,bus
Reentrant	Non reentrant
Return	void

- Device Manager

API name	Void Device_Manger(u8 Device);
Description	Make the app layer to choose the Device to send the message to .
Sync/Async	sync
Parameters	Device
Reentrant	Non reentrant
Return	void

- Main App

API name	Void RecieveStatus (void);
Description	ECU 2 will Receive Door/Light/Speed status messages periodically from ECU 1 through the CAN protocol.
Sync/Async	sync
Parameters	void
Reentrant	Non reentrant
Return	void

- Folder Structure