Static Design

For ECU 1:

-ECU 1 connected to Door sensor, Light switch, and Speed sensor, all input devices.

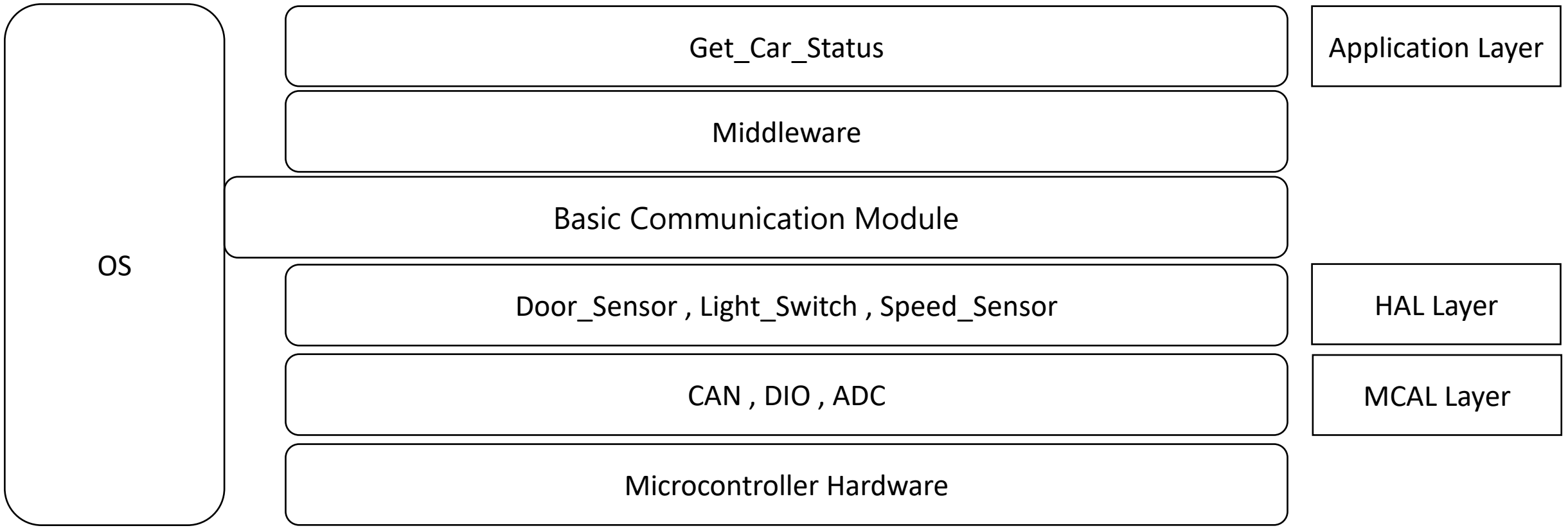
Assume:

-Door sensor and light switch sensor are digital sensors.

-Speed sensor is analog sensor so we will use ADC module .

For ECU 1:

1-Make the layered architecture



For ECU 1:

2-Specify ECU components and modules

a) Microcontroller

b) Door Sensor , Light Switch and Speed Sensor

c) Door Sensor , Light Switch and Speed Sensor modules

d) CAN , DIO , ADC modules

For ECU 1:

3-Provide full detailed APIs for each module as well as a detailed description for the used typedefs.

Function Name:	DIO_Init(void)	
Arguments	Inputs	N/A
		description
	Outputs	N/A
		description
	Input/Output	N/A
		description
Return	E_OK	0
	E_NOK	1
Description:	Initiate DIO peripheral	

For ECU 1:

Function Name:	DIO_Read(u8 PortNum,u8 PinNum)		
Arguments	Inputs	PortNum	char
		Access port	
		PinNum	char
		Access pin	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	1	
	E_NOK	0	
Description:	read value of pin		

For ECU 1:

Function Name:	ADC_Init(void)		
Arguments	Inputs	N/A	
		description	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Initiate ADC peripheral		

For ECU 1:

Function Name:	ADC_ReadChannel(u8 Channel_Num)		
Arguments	Inputs	Channel_Num	char
		Access channel	
	Outputs	N/A	char
		description	
	Input/Output	N/A	
		description	
Return	E_OK	1	
	E_NOK	0	
Description:	Get value of ADC conversion		

For ECU 1:

Function Name:	CAN_Init(void)		
Arguments	Inputs	N/A	
		description	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Initiate CAN peripheral		

For ECU 1:

Function Name:	CAN_SendByte(u8 Data)		
Arguments	Inputs	Data	char
		Sending Value	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Sending data over CAN bus		

For ECU 1:

Function Name:	DoorSensor_Read(void)		
Arguments	Inputs	N/A	
		description	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	1	
	E_NOK	0	
Description:	Get door sensor value		

For ECU 1:

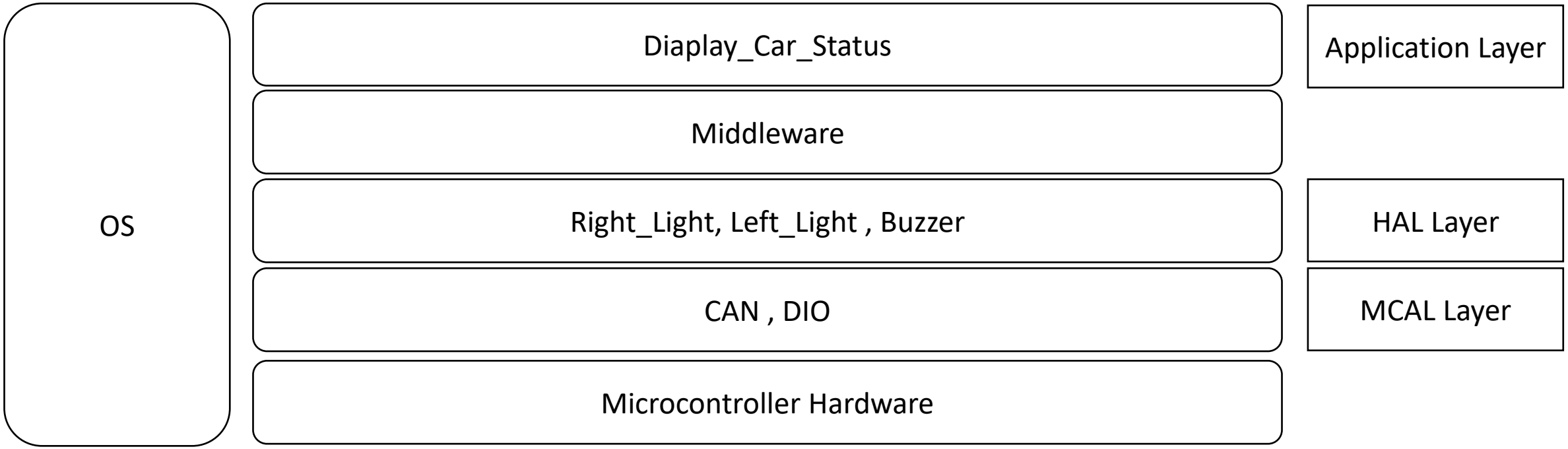
Function Name:	LightSwitch_Read(void)		
Arguments	Inputs	N/A	
		description	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	1	
	E_NOK	0	
Description:	Get light switch value		

For ECU 1:

Function Name:	SpeedSensor_Read(void)		
Arguments	Inputs	N/A	
		description	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	1	
	E_NOK	0	
Description:	Get speed sensor value		

For ECU 2:

1-Make the layered architecture



For ECU 2:

2-Specify ECU components and modules

a) Microcontroller

b) Right Light, Left Light and Buzzer

c) Right Light, Left Light and Buzzer modules

d) CAN and DIO modules

For ECU 2:

Function Name:	CAN_Init(void)		
Arguments	Inputs	N/A	
		description	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Initiate CAN peripheral		

For ECU 2:

Function Name:	CAN_ReceiveByte(void)	
Arguments	Inputs	N/A
		description
	Outputs	N/A
		description
	Input/Output	N/A
		description
Return	E_OK	1
	E_NOK	0
Description:	Receiving data over CAN bus	

For ECU 2:

Function Name:	DIO_Init(void)	
Arguments	Inputs	N/A
		description
	Outputs	N/A
		description
	Input/Output	N/A
		description
Return	E_OK	0
	E_NOK	1
Description:	Initiate DIO peripheral	

For ECU 2:

Function Name:	DIO_Write(u8 PortNum,u8 PinNum,u8 Value)		
Arguments	Inputs	PortNum	char
		Access port	
		PinNum	char
		Access pin	
		Value	char
		Define value	
	Outputs	N/A	
		description	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	read value of pin		

For ECU 2:

Function Name:	Right_Light(u8 value)		
Arguments	Inputs	value	char
		Value gets by CAN bus	
	Outputs	one	char
		LED ON	
		zero	char
		LED OFF	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Display state of right light		

For ECU 2:

Function Name:	Left_Light(u8 value)		
Arguments	Inputs	value	char
		Value gets by CAN bus	
	Outputs	one	char
		Light ON	
		zero	char
		Light OFF	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Display state of left light		

For ECU 2:

Function Name:	Buzzer(u8 value)		
Arguments	Inputs	value	char
		Value gets by CAN bus	
	Outputs	one	char
		Buzzer ON	
		zero	char
		Buzzer OFF	
	Input/Output	N/A	
		description	
Return	E_OK	0	
	E_NOK	1	
Description:	Display state of Buzzer		