Project 3

Static Design

Egypt Future Work Digital Scholarship (FWD)

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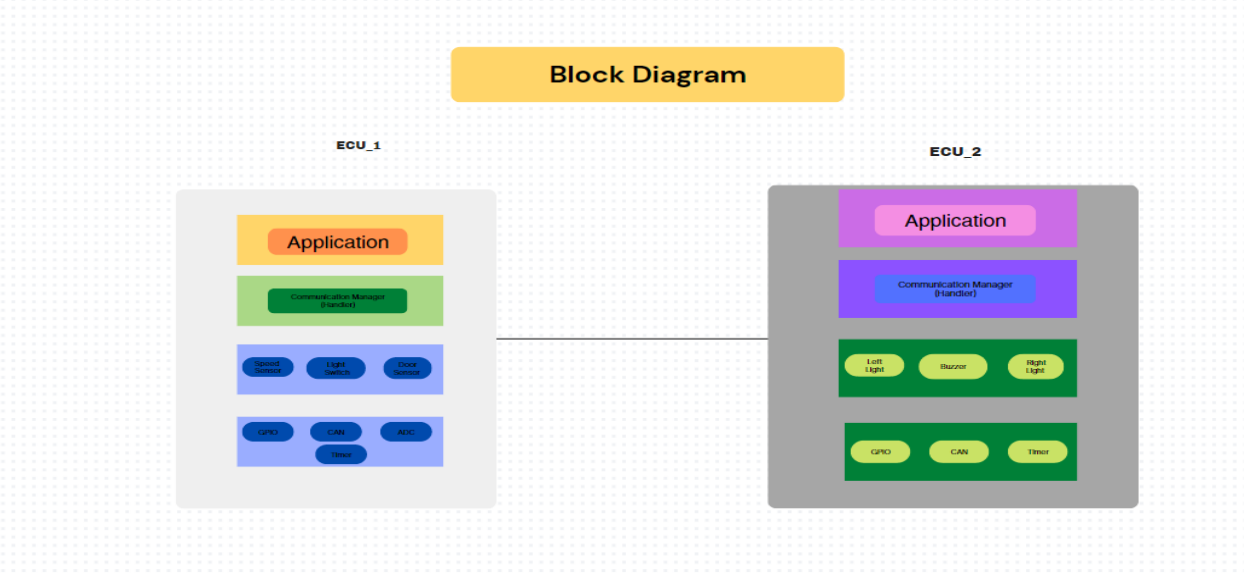
Connect Sessions: Monday 8:00-10:00 PM



ECUs Components

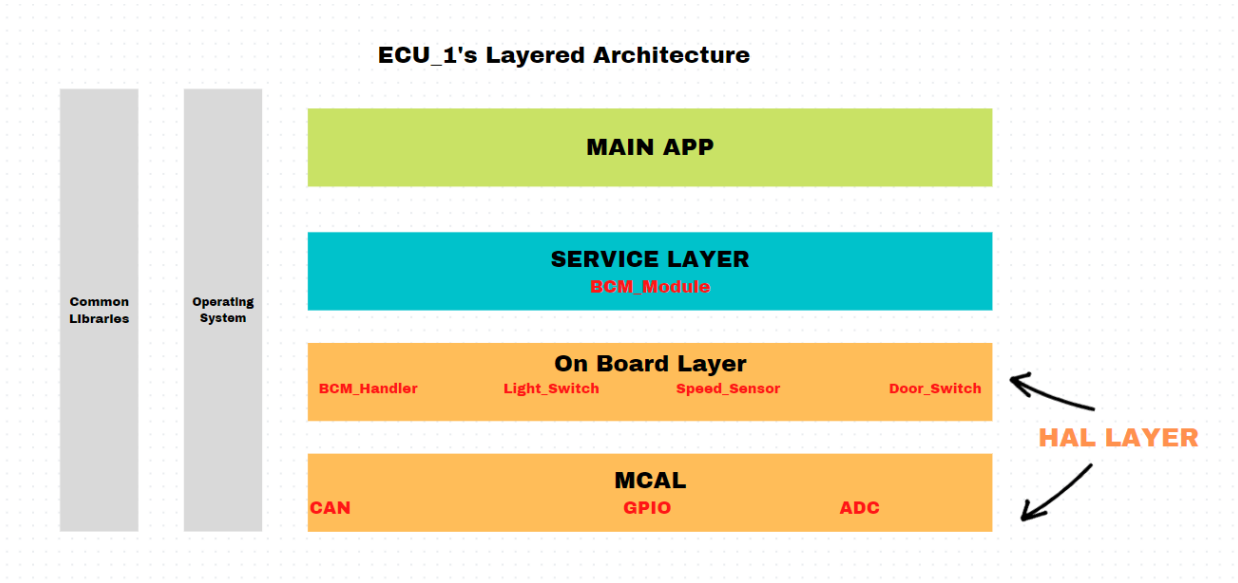
ECU_1

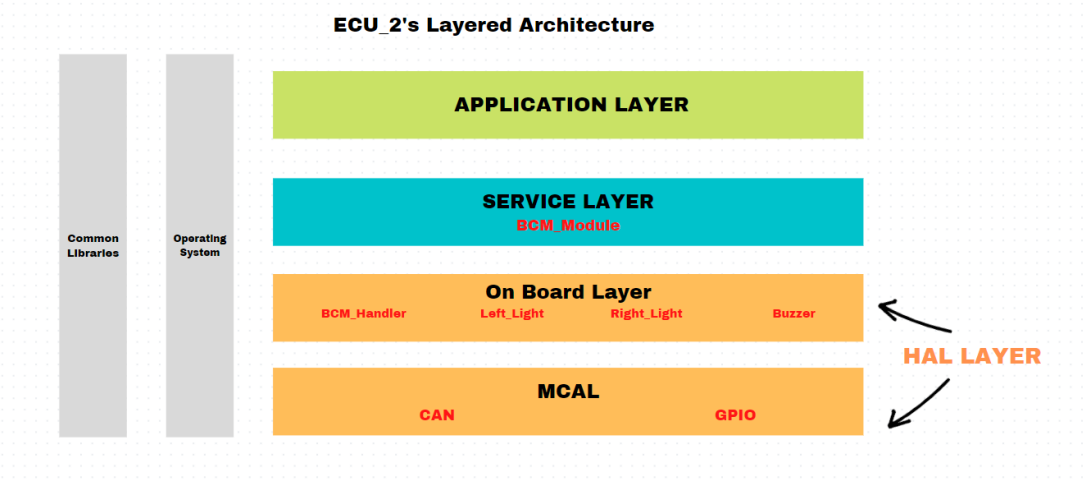
- GPIO
- CAN
- RTOS
- ADC
- BCM Module
- LIB
- Communication Handler
- Door Switch
- Light Switch
- Speed Sensor

ECU_2

- GPIO
- CAN
- RTOS
- BCM Module
- LIB
- Communication Handler
- Right Light
- Left Light
- Buzzer

Layered Architecture





APIs & Types

ECU_1

GPIO

Function_Nai	GPIO_Init()			
Argumer	Inputs	*ConfigPtr	GPIO_ConfigType	
		Pointer to the configuration data		
		nth	nth	
		nth		
	Outputs	no_outputs	no_outputs	
	In/Out	no_In/out	no_In/out	
Returr	E_OK	0		
	E_NOK	1		
Decriptic	**Initialization Function for GPIO**			

Name	GPIO_ConfigType
Platform_Type	uint8
Ranges	
Description	**Contains the configurable Parameters of the GPIO driver**

Function_Nai	GPIO_WriteOn()			
Argumer	Inputs	PinID	GPIO_PinIDType	
		The Pins IDs		
		Level	GPIO_LevelTypes	
		The written value		
	Outputs	no_outputs	no_outputs	
	In/Out	no_In/out	no_In/out	
Returr	E_OK	nth		
	E_NOK	nth		
Decriptic	**Set the Direction and level for GPIO_Pins**			

Name	GPIO_PinIDType
Platform_Type	uint8
Ranges	
Description	**The Numer(ID0 of the used GPIO Pins**

Name	GPIO_LevelTypes
Platform_Type	uint8
Ranges	0 0V
	1 3.3V
Description	**The Numer(ID) of the used GPIO Pins**

Function_Nai	GPIO_WRead()			
Argumer	Inputs	PinID	GPIO_PinIDType	
		The Pins IDs		
		nth	nth	
		nth		
	Outputs	no_outputs	no_outputs	
	In/Out	no_In/out	no_In/out	
Returr	E_OK	0		
	E_NOK	1		
Decriptic	**Get the calue of ang GPIO_Pin**			

CAN

Function_Nai	CAN_Init()			
Argumer	Inputs	*ConfigPtr	CAN_ConfigType	
		Pointer to the configuration data		
		nth	nth	
		nth		
	Outputs	no_outputs	no_outputs	
	In/Out	no_In/out	no_In/out	
Returr	E_OK	0		
	E_NOK	1		
Decriptic	**Initialization Function for CAN Protocol**			

Name	CAN_ConfigType
Platform_Type	uint8
Ranges	
Description	**Contains the configurable Parameters of the CAN driver**

Function_Nar	CAN_SendBytes(uint8 Bytes)			
Argument	Inputs	Bytes	uint8	
		The Data sent		
		nth	nth	
		nth		
	Outputs	no_outputs	no_outputs	
	In/Out	no_In/out	no_In/out	
Return	E_OK	nth		
	E_NOK	nth		
Decription	**Send The data(Bytes) fron CAN**			

Function_Nar	CAN_RecieveBytes(uint8 Bytes)			
Argument	Inputs	void	nth	
		nth		
		nth	nth	
		nth		
	Outputs	no_outputs	no_outputs	
	In/Out	no_In/out	no_In/out	
Return	E_OK	nth		
	E_NOK	nth		
Decription	**The data(Bytes) sent to CAN**			

ADC

Function_Nai	ADC_Init()		
Argumer	Inputs	*ConfigPtr	ADC_ConfigType
		Pointer to the configuration data	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Initialization Function for ADC**		

Name	ADC_ConfigType
Platform_Type	uint8
Ranges	
Description	**Contains the configurable Parameters of the ADC driver**

Function_Nar	ADC_ReadChannel		
Argument	Inputs	CHANNELID	ADC_CHANNELType
		Channel ID of the ADC	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Return	E_OK	0	
	E_NOK	1	
Decription	**Gets the value of ang ADC Channel**		

Name	ADC_ChannelType
Platform_Type	uint8
Ranges	
Description	**Contains the configurable Parameters of the ADC driver**

BCM

Function_Nar	BCM_SendBytes(uint8 Bytes)		
Argument	Inputs	Bytes	uint8
		The Bytes sent	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Return	E_OK	Operation sucssedes	
	E_NOK	Operation failed	
Decription	**Send The data(Bytes) through BCM**		

BCM_SendBytesHandler

Function_Nar	BCM_SendBytesHandler(uint8 Bytes)		
Argument	Inputs	Bytes	uint8
		The Bytes sent	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Return	E_OK	Operation sucssedes	
	E_NOK	Operation failed	
Decription	**Send The data(Bytes) through BCM Handler To CAN**		

Door Sensor

Function_Nai	DoorSensor_Init()		
Argumer	Inputs	void	nth
			nth
		nth	nth
			nth
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Initialization the door sensor**		

Function_Nai	GetVal_ DoorSensor()		
Argumer	Inputs	PinID	GPIO_PinIDType
			Pin Id of the GPIO
		nth	nth
			nth
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	Door is OPENED	
	E_NOK	Door is CLOSED	
Decriptic	**Get the state of the door sensor**		

Light Switch

Function_Nai	LightSwitch_Init()		
Argumer	Inputs	void	nth
			nth
		nth	nth
			nth
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Initialization the Light Switch**		

Function_Nai	GetVal_ LightSwitch()		
Argumer	Inputs	PinID	GPIO_PinIDType
			Pin Id of the GPIO
		nth	nth
			nth
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	Lights are ON	
	E_NOK	Lights are OFF	
Decriptic	**Get the state of the Light Switch**		

Speed Sensor

Function_Nai	SpeedSensor_Init()		
Argumer	Inputs	void	nth
			nth
		nth	nth
			nth
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Initialization the speed sensor**		

Function_Nai	GetVal_ SpeedSensor()		
Argumer	Inputs	CHANNEL	ADC_CHANNELType
			ID of ADC Channel
		nth	nth
			nth
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	Vehicle is moving	
	E_NOK	Vehicle is stopping	
Decriptic	**Get the state of the Speed sensor**		

ECU_2

GPIO					
	Function_Nai	GPIO_Init()			
	Argumer	Inputs	*ConfigPtr	GPIO_ConfigType	
			Pointer to the configuration data		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Returr	E_OK	0		
		E_NOK	1		
	Decriptic	**Initialization Function for GPIO**			
	Name	GPIO_ConfigType			
	Platform_Type	uint8			
	Ranges				
	Description	**Contains the configurable Parameters of the GPIO driver**			
	Function_Nai	GPIO_WriteOn()			
	Argumer	Inputs	PinID	GPIO_PinIDType	
			The Pins IDs		
			Level	GPIO_LevelTypes	
			The written value		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Returr	E_OK	nth		
		E_NOK	nth		
	Decriptic	**Set the Direction and level for GPIO_Pins**			
	Name	GPIO_PinIDType			
	Platform_Type	uint8			
	Ranges				
	Description	**The Numer(ID0 of the used GPIO Pins**			
	Name	GPIO_LevelTypes			
	Platform_Type	uint8			
	Ranges	0	0V		
		1	3.3V		
	Description	**The Numer(ID) of the used GPIO Pins**			
	Function_Nai	GPIO_WRead()			
	Argumer	Inputs	PinID	GPIO_PinIDType	
			The Pins IDs		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Returr	E_OK	0		
		E_NOK	1		
	Decriptic	**Get the calue of ang GPIO_Pin**			

CAN					
	Function_Nai	CAN_Init()			
	Argumer	Inputs	*ConfigPtr	CAN_ConfigType	
			Pointer to the configuration data		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Return	E_OK	0		
		E_NOK	1		
	Decriptic	**Initialization Function for CAN Protocol**			
	Name	CAN_ConfigType			
	Platform_Type	uint8			
	Ranges				
	Description	**Contains the configurable Parameters of the CAN driver**			
	Function_Nar	CAN_SendBytes(uint8 Bytes)			
	Argument	Inputs	Bytes	uint8	
			The Data sent		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Return	E_OK	nth		
		E_NOK	nth		
	Decription	**Send The data(Bytes) fron CAN**			
	Function_Nar	CAN_RecieveBytes(uint8 Bytes)			
	Argument	Inputs	void	nth	
			nth		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Return	E_OK	nth		
		E_NOK	nth		
	Decription	**The data(Bytes) sent to CAN**			

BCM					
	Function_Nar	BCM_GetBytes(uint8 Bytes)			
	Argument	Inputs	void	nth	
			nth		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Return	E_OK	nth		
		E_NOK	nth		
	Decription	**Get The data(Bytes) sent through BCM**			
BCM_SendBytesHandler					
	Function_Nar	BCM_ReadBytesHandler(uint8 Bytes)			
	Argument	Inputs	void	nth	
			nth		
			nth	nth	
			nth		
		Outputs	no_outputs	no_outputs	
		In/Out	no_In/out	no_In/out	
	Return	E_OK	nth		
		E_NOK	nth		
	Decription	**GetThe data(Bytes) sent through BCM Handler To CAN**			

Left Lights

Function_Nai	LeftLight_ON()		
Argumer	Inputs	PinID	GPIO_PinIDType
		Pin Id of the GPIO	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Turn Left Lights ON**		

Function_Nai	LeftLight_OFF()		
Argumer	Inputs	PinID	GPIO_PinIDType
		Pin Id of the GPIO	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Turn Left Lights OFF**		

Right Lights

Function_Nai	RightLight_ON()		
Argumer	Inputs	PinID	GPIO_PinIDType
		Pin Id of the GPIO	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Turn Right Lights ON**		

Function_Nai	RightLight_OFF()		
Argumer	Inputs	PinID	GPIO_PinIDType
		Pin Id of the GPIO	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Turn Right Lights OFF**		

Buzzer

Function_Nai	Buzzer_ON()		
Argumer	Inputs	PinID	GPIO_PinIDType
		Pin Id of the GPIO	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Buzzer is activated**		

Function_Nai	Buzzer_OFF()		
Argumer	Inputs	PinID	GPIO_PinIDType
		Pin Id of the GPIO	
		nth	nth
		nth	
	Outputs	no_outputs	no_outputs
	In/Out	no_In/out	no_In/out
Returr	E_OK	0	
	E_NOK	1	
Decriptic	**Buzzer is diactivated**		