Project 3

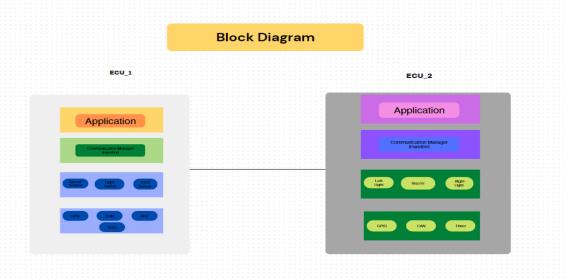
Static Design

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

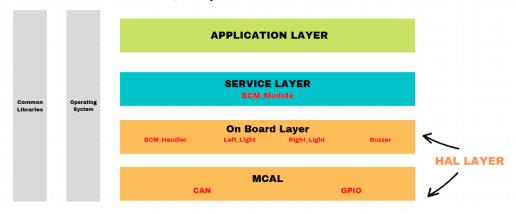
- GPIO
- CAN
- RTOS
- BCM Module
- LIB
- Communication Handler
- Right Light
- Left Light
- Buzzer

Layered Architecture

ECU_1's Layered Architecture

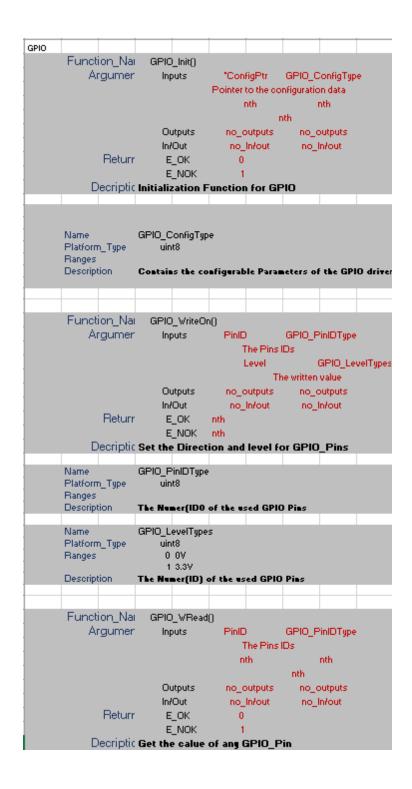


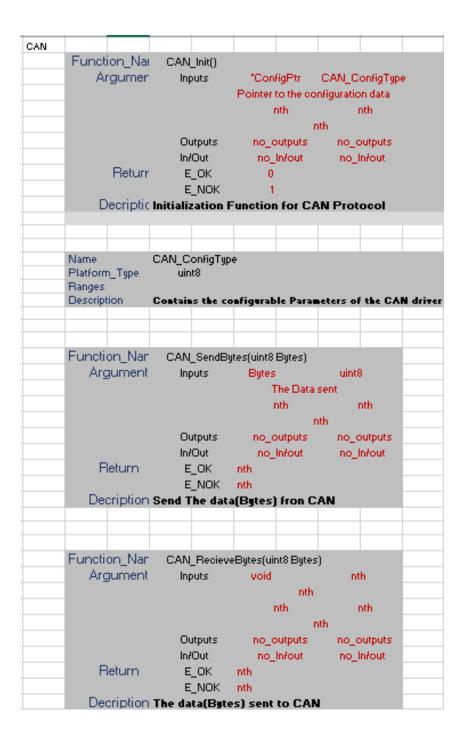
ECU_2's Layered Architecture

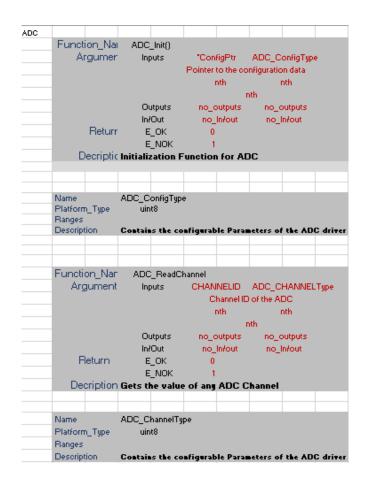


APIs & Types

ECU_1









Door Sensor					Light Switch					
	Function_Nar	DoorSensor_	Init()			Function_Nar	LightSwitch_In	it()		
	Argumer	Inputs	void	nth		Argumer	Inputs	void	nth	
				nth					nth	
			nth	nth				nth	nth	
				nth					nth	
		Outputs	no_outputs	no_outputs			Outputs	no_outputs	no_outputs	
		In/Out	no_ln/out	no_infout			In/Out	no_ln/out	no_ln/out	
	Return		no_inrout	no_inrout		Return		no_inrout	no_inrout	
	netuir	E_OK				netuir	E_OK			
	Description	E_NOK	'			Desdede	E_NOK	1		
	Decription	initialization t	he door senso	r		Decription	Initialization t	he Light Switc	h	
	Function Nat	GetVal Doors	Sensor()			Function_Nar	GetVal LightS	witch()		
	Function_Nai GetVal_DoorSensor() Argumer Inputs PinID		PinID	GPIO_PinIDType		Argumer	Inputs PinID		GPIO_PinIDType	
	1119011101	mpats.		Pin Id of the GPIO		1119011101	mpats.	1 1112	Pin Id of the GPI	
			nth	nth				nth	nth	
				nth					nth	
		Outsute					Outsub			
		Outputs	no_outputs	no_outputs			Outputs	no_outputs	no_outputs	
	Datama	In/Out	no_In/out	no_ln/out		Determina	In/Out	no_In/out	no_Infout	
	Return	E_OK		OPENED		Return	E_OK	Lights a		
	B 1.0	E_NOK		CLOSED		B 1.0	E_NOK		are OFF	
	Decription	Get the state	of the door se	nsor		Decriptic (Get the state	of the Light S	ritch	
peed Sensor										
	Function_Nar	SpeedSensor	_Init()							
	Argumer	Inputs	void	nth						
				nth						
			nth	nth						
				nth						
		Outputs	no_outputs	no_outputs						
		In/Out	no_In/out	no_in/out						
	Return	E_OK	0	no_mou						
	riotali	E_NOK	1							
	Decription		he speed sens	or						
	Decripati	IIIICIAIIZACIUII C	ne speeu sens	UI						
	E No.	0.001.0	10. 0							
	Function_Nar									
	Argumer	Inputs		ADC_CHANNELType						
				IDC Channel						
			nth	nth						
				nth						
		Outputs	no_outputs	no_outputs						
		In/Out	no_Infout	no_In/out						
	Return	E_OK	Vehicle	is moving						
		E_NOK		is stopping						
			of the Speed s							



Function	n Nar	GPIO	Init()					
	umer		uts	*Conl	figPtr	GPIO	ConfigType	
				Pointer				
				nth		nth		
						nth		
		Ou	Itputs	no c	outputs	no	outputs	
			Out	_	In/out		Infout	
В	eturr		OK	0				
			NOK	1				
Dec	riptid			unction	for GI	210		
Name		GPIO_C	onfigTyp	e				
Platform_T		uin						
Ranges								
Description	1	Contain	s the co	afigurab	le Para	meters o	of the GPIO	
Function	. Nai	GPIO	_WriteOr	nΩ				
	umer		uts	PinID		GPIO	PinIDType	
		,			he Pins			
				_	.evel		GPIO_Leve	
						he writter		
		0.	Itputs			no_outputs		
			npars Out		outputs In/out	_		
		IIII	Out	110_	irirout	110	Infout	
	lasti iradi.		OM	- st.				
B	eturr		OK	nth				
		E,	NOK	nth			D D:	
		E,	NOK		level f	or GPI	O_Pins	
	riptic	E,	NOK Direct	nth ion and	level f	or GPI	O_Pins	
Dec	riptic	E Set the	NOK Direct	nth ion and	level f	or GPI	O_Pins	
Dec Name	riptic	Set the GPIO_P	NOK Direct	nth ion and	level f	or GPI	O_Pins	
Dec Name Platform_T	riptic Type	E Set the GPIO_P uin	_NOK Direct inIDType t8	nth ion and			O_Pins	
Dec Name Platform_T Ranges Description	riptic Type	E, Set the GPIO_P uint	NOK Direct inIDType t8	nth ion and			D_Pins	
Dec Name Platform_T Ranges Description Name	riptic Type	Set the GPIO_P uin/ The Num	NOK Direct inIDType t8 her(ID0	nth ion and			D_Pins	
Dec Name Platform_T Ranges Description Name Platform_T	riptic Type	Set the GPIO_P uin/ The Num GPIO_Le uin/	NOK Direct inIDType t8 her(ID0	nth ion and			D_Pins	
Dec Name Platform_T Ranges Description Name	riptic Type	Set the GPIO_P uin The Num GPIO_Le uin 0	_NOK Direct inIDType t8 her(ID0 evelType	nth ion and			O_Pins	
Dec Name Platform_T Ranges Description Name Platform_T	riptic Type	Set the GPIO_P uin The New GPIO_Le uin 0	NOK Direct inIDType t8 er(ID0 evelType t8 0V 3.3V	nth ion and	ed GPI	O Pins	O_Pins	
Dec Name Platform_T Ranges Description Name Platform_T Ranges	riptic Type	Set the GPIO_P uin The New GPIO_Le uin 0	NOK Direct inIDType t8 er(ID0 evelType t8 0V 3.3V	nth ion and of the us	ed GPI	O Pins	O_Pins	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic Type	E Set the GPIO_P uin/ The New GPIO_LG uin/ Uin/ The New The New Man	NOK Direct inIDType 8 evelType 8 0V 3.3V eve(ID)	nth ion and of the us of the us	ed GPI	O Pins	D_Pins	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic	E Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO	NOK Direct inIDType 8 er(ID0 evelType 8 0V 3.3V er(ID)	nth ion and of the us of the us	ed GPIO	O Pins		
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic Type	E Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO	NOK Direct inIDType 8 evelType 8 0V 3.3V eve(ID)	of the us	ed GPI	O Pins O Pins GPIO	D_Pins PinIDType	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic	E Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO	NOK Direct inIDType 8 er(ID0 evelType 8 0V 3.3V er(ID)	of the us Of the us Of the us	ed GPIO	O Pins O Pins GPIO	PinIDType	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic	E Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO	NOK Direct inIDType 8 er(ID0 evelType 8 0V 3.3V er(ID)	of the us Of the us Of the us	ed GPI	O Pins O Pins O Pins O Pins		
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic	E, Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO_Inp	NOK Direct inIDType 8 evelType 8 0V 3.3V eve(ID) _WRead uts	of the us Of the us Of the us	ed GPIO	O Pins O Pins O Pins O Pins O Pins	PinIDType	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description	riptic	E, Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO_Inp	NOK Direct inIDType 8 evelType 8 0V 3.3V eve(ID) WRead uts	of the us Of the us Of the us Of the us	ed GPIC he Pins	O Pins	PinIDType	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description Function Argu	riptic	E, Set the GPIO_P uin/ The New GPIO_Le uin/ 0 1 The New GPIO_Inp	NOK Direct inIDType 8 evelType 8 0V 3.3V eve(ID) WRead outs	of the us Of the us Of the us Of the us Of the us	ed GPIO	O Pins	PinIDType	
Dec Name Platform_T Ranges Description Name Platform_T Ranges Description Function Argu	riptic	E, Set the GPIO_P uin/ The New GPIO_Lin/ O 1 The New GPIO Inp	NOK Direct inIDType 8 evelType 8 0V 3.3V eve(ID) WRead uts	of the us Of the us Of the us Of the us	ed GPIC he Pins	O Pins	PinIDType	

			ion_Nai gumer		_Init() outs	*Conf	iaDte	CAN_ConfigT	upo	
		1-11	20-00-00-0							
				·				onfiguration data		
							ith	nth		
								nth		
					itputs	_	utputs	no_outputs	5	
			Return		Out OK	no_	Infout	no_In/out		
			netuir		NOK	1				
		D	ecriptio				for C	AN Protocol		
-										
		Name		CAN_C	onfigTyp	pe				
		Platform	_Туре	uin	t8					
-		Ranges Descript	ion	Contain	s the c	osfigerah	le Parai	neters of the C	AN driver	
				00211		g				
-	-									
-		Function	on_Nar	CAN	SendP	ytes(uint8 l	Rutes)			
			gument	_	_senub iuts	Bytes		uint8		
			, and there is	,	J.=		he Data			
							ith	nth		
								nth		
-					itputs		utputs	no_outputs	5	
-			eturn		Out	nth	Infout	no_In/out		
			eturri		_OK _NOK	nth				
		Dec	cription			a(Bytes)	fron C	AN		
						`				
		Euncti	on_Nar	CAN	Recieu	eBytes(uir	it8 Butes	ย์		
			gument		uts	void	no Dyne.	nth		
				·			nth			
_						Г	ith	nth		
-				_				nth		
					itputs Out		utputs	no_outputs	5	
		В	eturn		_OK	nth no_	Infout	no_In/out		
					NOK	nth				
		Dec	cription	The da	ta(Byt	es) sent	to CAI	u .		
						1 1				
см										
	Functi	on_Na	г вс	M_GetE	Bytes(u	int8 Bytes)			
	Arg	gumer	nt	Inputs	Vo	id		nth		
							nth			
						nth		nth		
_							nth			
_				Outputs		no_outpu		no_outputs		
_) also more		In/Out		no_Info	it	no_In/out		
		leturn		E_OK E_NOK	nth					
	De	criptio	n Get 1				throw	gh BCM		
	Del	onpao	uet	. ne uat	a(D)(es, sent	amou	gii DCM		
-										
CM_Sen	dBytesH:	andler								
	,		Fund	ction_N	lar i	BCM_Re	adBytes	:Handler(uint8)	Bytes)	
				krgume		Inputs		void	nth	
								nth		
								nth	nth	
								ı	nth	
						Output	S	no_outputs	no_outp	
\rightarrow				р.		In/Out		no_Infout	no_In/ou	it
				Return	1	E_OK				
						E_NO	K ntl	n		

Left Lights									
Earl Eights	Function_Nar	LeftLight_ON()			Buzzer				
	Argumer	Inputs	PinID	GPIO_PinIDType		Function_Nar	Buzzer_ON()		
			Pin	d of the GPIO		Argumer	Inputs	PinID	GPIO_PinIDType
			nth	nth				Pint	d of the GPIO
				th				nth	nth
		Outputs	no_outputs	no_outputs			.	ni 	
	Return	In/Out	no_In/out	no_In/out			Outputs	no_outputs	no_outputs
	meturr	E_OK E_NOK	0			Return	In/Out E_OK	no_In/out 0	no_In/out
	Decription	E_NOK Turn Left Light	r ∩N			netuir	E_NOK	1	
	Decripit	ruin cert cignt	3 014			Decriptio	Buzzer is activ	vated	
	Function_Nar	Lagricus OFFO							
	Argumer	Inputs	PinID	GPIO_PinIDType					
	Argumo	inputs		d of the GPIO		Function_Nar	Ruzzer OFFO		
			nth	nth		Argumer	Inputs	PinID	GPIO PinIDTupe
				th		Al garnor	mpats		d of the GPIO
		Outputs	no_outputs	no_outputs				nth	nth
		In/Out	no In/out	no_In/out				n	
	Return	E_OK	0	_			Outputs	no_outputs	no_outputs
		E_NOK	1				In/Out	no_Infout	no_In/out
	Decriptic 1	Turn Left Light	s OFF			Return	E_OK	0	
							E_NOK	1	
						Decription	Buzzer is diac	tivated	
Right Lights	- c N								
	Function_Nar	"							
	Argumer	Inputs	PinID	GPIO_PinIDType					
			nth Pin	d of the GPIO nth					
				non th					
		Outputs	no_outputs	no_outputs					
		In/Out	no_Infout	no_in/out					
	Return	E_OK	0						
		E_NOK	1						
	Decription	Turn Right Ligh	its ON						
	Function_Nar								
	Argumer	Inputs	PinID	GPIO_PinIDType					
				d of the GPIO					
			nth	nth .					
			n						
		Outputs	no_outputs	no_outputs					
	Data	In/Out	no_In/out	no_In/out					
	Return	E_OK	0						
	Doorintie	E_NOK Turn Right Ligh	te OEE						
	Decription	raili night Ligi	ILS UFF						