Automotive door control system

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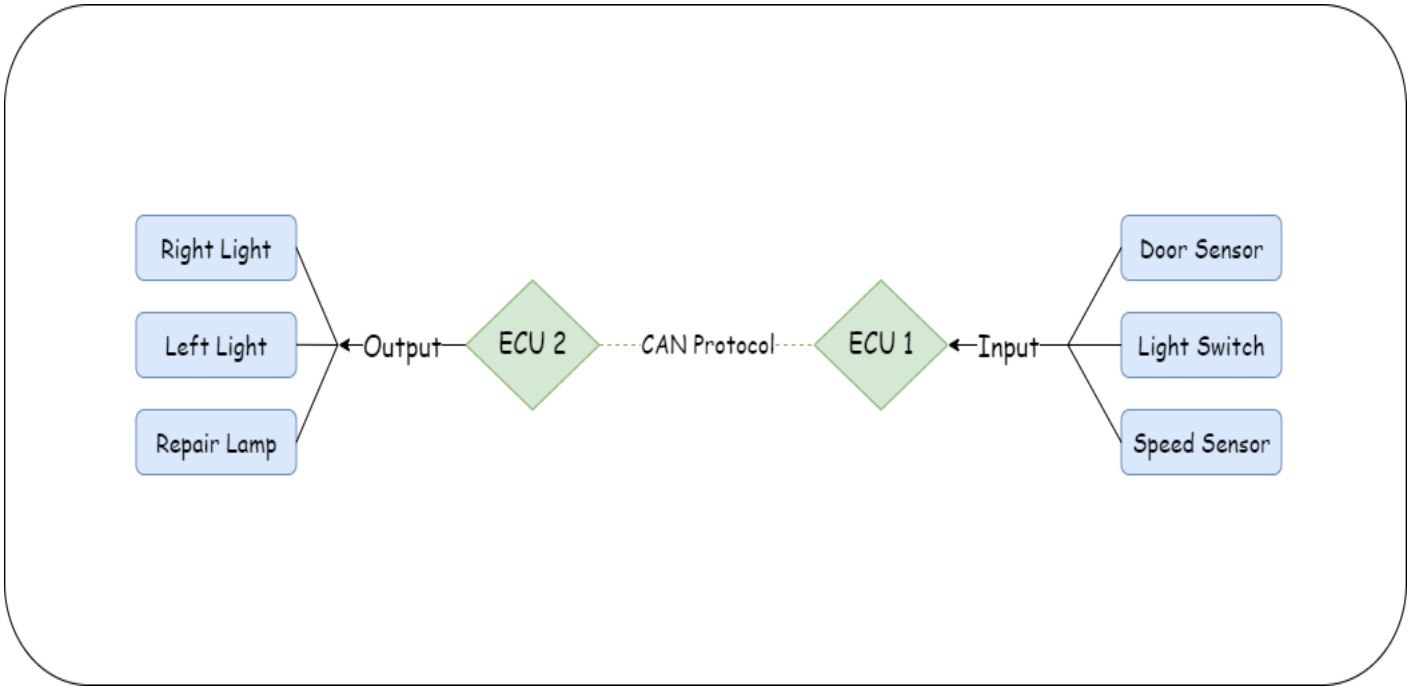
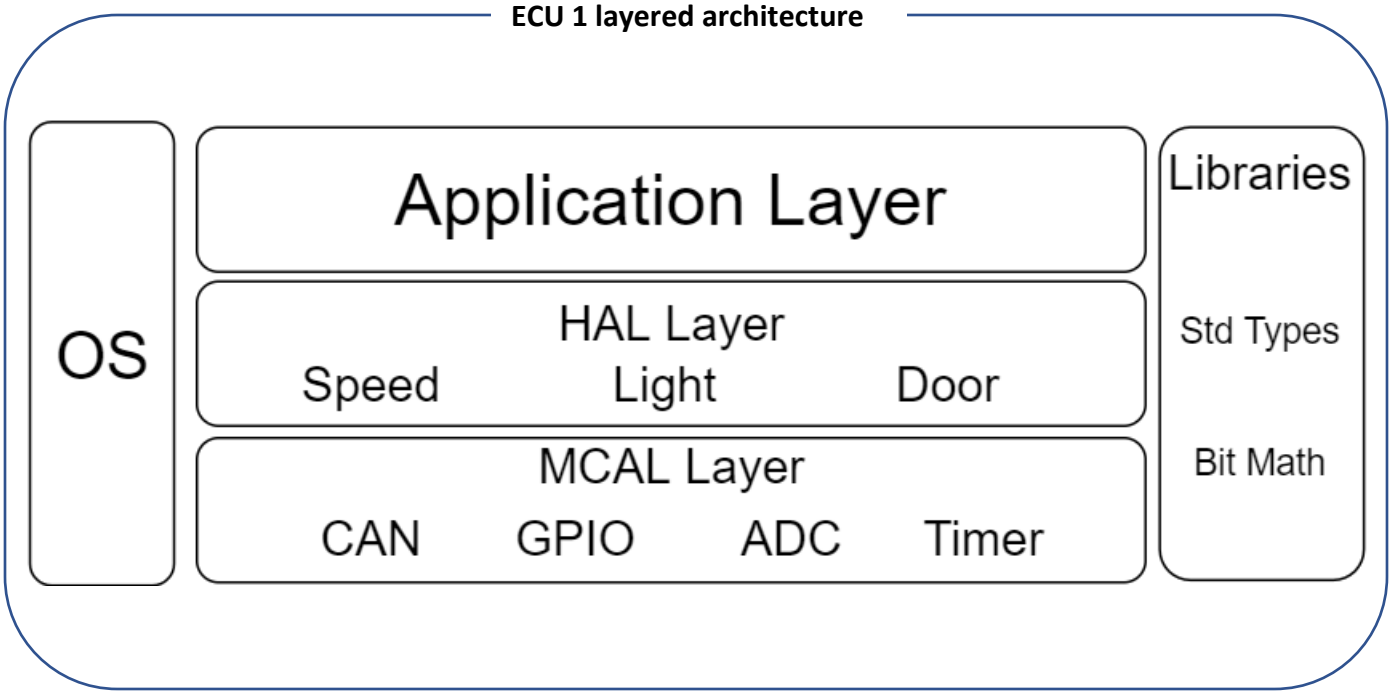
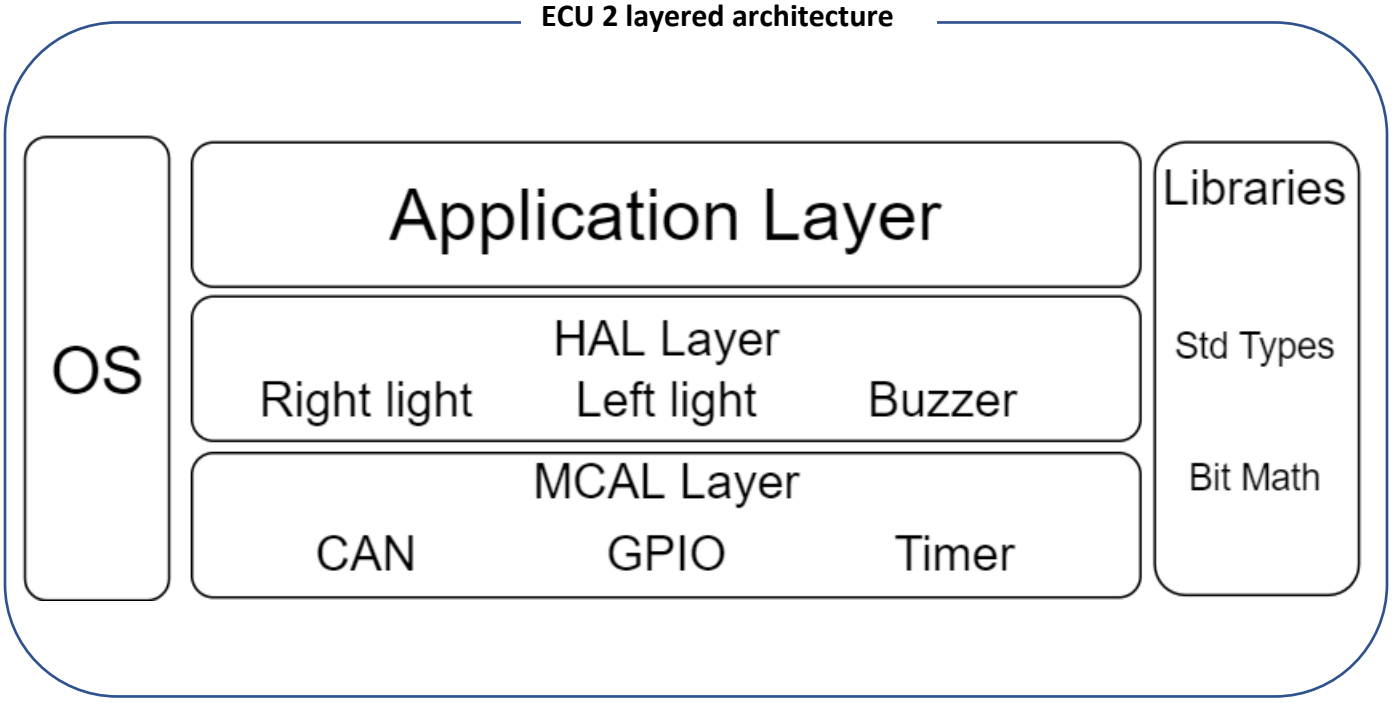
System block diagram design



ECU 1 layered architecture



ECU 2 layered architecture



ECU 1 components and modules:

- GPIO
- ADC
- CAN
- RTOS
- LIB
- Door switch
- Light switch
- Speed sensor

ECU 2 components and modules:

- GPIO
- CAN
- RTOS
- LIB
- Right light
- Left light
- Buzzer

APIs and data types:

Function name	CAN_Init()	
Arguments	Input	
Return	E_OK	0
	E_NOK	1
Description	This function is used to initialize the CAN driver	

Function name	CAN_SetBaudrate(uint8 Controller, uint16 BaudRateConfig);	
Arguments	u_int8	u_int16
	ControllerID	BaudRateConfig
Return	E_OK	0
	E_NOK	1
Description	This function is used to set baudrate for can	

Function name	CAN_Read(uint8 controller, char * Read_data_array);	
Arguments	Char *	u_int8
	Data_array	controllerID
Return	E_OK	0
	E_NOK	1
Description	This function is used to read a byte of data	

Function name	CAN_Write(uint8 controller, char * Write_data_array);	
Arguments	Char *	u_int8
	Data_array	controllerID
Return	E_OK	0
	E_NOK	1
Description	This function is used to send a byte of data	

Function name	ADC_Init()	
Arguments	Input	
Return	E_OK	0
	E_NOK	1
Description	This function is used to initialize the ADCs pins as set in the configuration files	

Function name	ADC_read_10bit(uint8 port , uint8 pin);	
Arguments	u_int8	Port
	u_int8	Pin
Return	u_init16	ADC RESULT
Description	This function is used to start ADC conversion and return the result	

Function name	GPIO_Init()	
Arguments	INPUT	
Return	void	
Description	This function is used to initialize the GPIO driver	

Function name	GPIO_SetPinDirection(portID, PinNo pin, PinDir direction);		
Arguments	Inputs	port	portID
		Description : Port number	
		pin	PinNo
		Description : Pin number	
		direction	PinDir
		Description : Pin direction	
Return	void		
Description	This function is used to set a pin`s direction to input or output		

Function name	GPIO_GetPinValue(portID, PinNo pin, PinValue value);	
Arguments	Inputs	port portID
		Description : Port number
		pin PinNo
		Description : Pin number
Return	GPIO_HIGH	1
	GPIO_LOW	0
Description	This function is used to get a pin value	

Function name	GPIO_SetPinDirection(portID, PinNo pin, PinDir direction);		
Arguments	Inputs	port	portID
		Description : Port number	
		pin	PinNo
		Description : Pin number	
		direction	PinDir
		Description : Pin direction	
Return	void		
Description	This function is used to set a pin`s direction to input or output		

Function name	GPIO_GetPinDirection(portID, PinNo pin);		
Arguments	Inputs	port	portID
		Description : Port number	
		pin	PinNo
		Description : Pin number	
Return	GPIO_INPUT	0	
	GPIO_OUTPUT	1	
Description	This function is used to get pin direction		

Function name	GPIO_SetPinValue(portID, PinNo pin, PinValue value);		
Arguments	Inputs	port	portID
		Description : Port number	
		pin	PinNo
		Description : Pin number	
		value	PinValue
		Description : Pin value	
Return	void		
Description	This function is used to set a pin`s value to high or low		

Function name	GPIO_GetPinValue(portID, PinNo pin, PinValue value);		
Arguments	Inputs	port	portID
		Description : Port number	
		pin	PinNo
		Description : Pin number	
Return	GPIO_HIGH	1	
	GPIO_LOW	0	
Description	This function is used to get a pin value		

Name	PinDir	
Type	Enumeration	
Range	GPIO_INPUT	0
		Description : Set the pin as input
	GPIO_OUTPUT	1
		Description : Set the pin as output
Description	This enumeration is used to choose port	

Name	PinValue	
Type	Enumeration	
Range	GPIO_LOW	0
		Description : Set the pin to low
	GPIO_HIGH	1
		Description : Set the pin to high
Description	This enumeration is used to choose the value	

Name	portID	
Type	Enumeration	
Range	PORT0	0
		Description : Port 0
	PORT1	1
		Description : Port 1
Description	This enumeration is used to choose port	

Name	PinNo	
Type	Enumeration	
Range	PIN0	0
		Description : Choose pin 0
	PIN1	1
		Description : Choose pin 1
	PIN2	2
		Description : Choose pin 2
	PIN3	3
		Description : Choose pin 3
	PIN4	4
		Description : Choose pin 4
	PIN5	5
		Description : Choose pin 5
	PIN6	6
		Description : Choose pin 6
	PIN7	7
		Description : Choose pin 7
Description	This enumeration is used to choose the pin	

Function name	Door_SwitchInit(uint8 port,uint8 pin);	
Arguments	u_init8	Pin
	u_init8	Port number
Return	E_OK	0
	E_NOK	1
Description	This function is used to initialize the door switch	

Function name	Door_SwitchGet();	
Arguments	u_init8	Pin
	u_init8	Port number
Return	bool	Value
Description	This function is used to get the current door switch state	

Function name	Light_SwitchInit(uint8 port,uint8 pin);	
Arguments	u_init8	Pin
	u_init8	Port number
Return	E_OK	0
	E_NOK	1
Description	This function is used to initialize the light switch	

Function name	Light_SwitchGet();	
Arguments	u_init8	Pin
	u_init8	Port number
Return	bool	Value
Description	This function is used to get the current light switch state	

Function name	Speed_sensor_Init(uint8 port,uint8 pin);	
Arguments	u_init8	Pin
	u_init8	Port number
Return	E_OK	0
	E_NOK	1
Description	This function is used to initialize the speed sensor	

Function name	SpeedGet();	
Arguments	u_init8	Pin
	u_init8	Port number
Return	float	Return the speed value in km/hour
Description	This function is used to initialize the Switch input as the given pin and start its corresponding task	

Function name	LightOffAfterDelay (uint64 delay);	
Return	E_OK	Done successfully
	E_NOK	Not successfully
Description	This function is used to turn off the lights after 3s Delay	

Function name	BuzzerON()	
Return	E_OK	Done successfully
	E_NOK	Not successfully
Description	This function is used to turn the buzzer off	

Function name	BuzzerOFF()	
Return	E_OK	Done successfully
	E_NOK	Not successfully
Description	This function is used to turn the buzzer off	

Function name	RightlightON()	
Return	E_OK	Done successfully
	E_NOK	Not successfully
Description	This function is used to turn the right light on	

Function name	RightlightOFF()	
Return	E_OK	Done successfully
	E_NOK	Not successfully
Description	This function is used to turn the right light on	

Function name	LeftlightON()	
Return	E_OK	Done successfully
	E_NOK	Not successfully
Description	This function is used to turn the left light on	