

Project 2

Smart Home

Layers Report

Group 1

Layers Structure

**MCAL Drivers**

ADC Driver

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | ADC\_readChannel | |
| Input | uint8 | channel\_num |
| Return | uint16 | |
| Description |  | |

DIO Driver

Type Definitions

|  |  |
| --- | --- |
| Name | Dio\_LevelType |
| Type | Enum |
| Values | STD\_LOW |
| STD\_HIGH |

|  |  |
| --- | --- |
| Name | Dio\_PinDirectionType |
| Type | Enum |
| Values | DIO\_PIN\_IN |
| DIO\_PIN\_OUT |

|  |  |
| --- | --- |
| Name | Dio\_PortName |
| Type | Enum |
| Values | PORTA |
| PORTB |
| PORTC |
| PORTD |
| PORTE |
| PORTF |

|  |  |
| --- | --- |
| Name | Dio\_IntType |
| Type | Enum |
| Values | FALLING\_EDGE |
| RISING\_EDGE |
| BOTH\_EDGES |
| LOW\_LEVEL |
| HIGH\_LEVEL |

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | DIO\_Init | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Return | void | |
| Description | Connect the clock to the required port and configure it as digital I/O | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_SetPinDirection | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Dio\_PinDirectionType | pins\_direction |
| Return | void | |
| Description | Set required pins as inputs or outputs. | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_SetPinPullUp | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Return | Void | |
| Description | Set internal pull up resistor of required pins | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_SetPinPullDown | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Return | Void | |
| Description | Set internal pull down resistor of required pins | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_ReadPort | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Return | uint8 | pins\_level |
| Description | Return value of the pins selected by pins\_mask in the port selected by port\_name | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_WritePort | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Dio\_LevelType | pins\_level |
| Return | void | |
| Description | Change pins selected by pins\_mask in the port selected by port\_name to the value pins\_level | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_FlipPort | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Return | void | |
| Description | Toggle value of the pins selected by pins\_mask in the port selected by port\_name | |

|  |  |  |
| --- | --- | --- |
| Name | DIO\_EnableExtInt | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Dio\_IntType | int\_source |
| Return | void | |
| Description | Enable external interrupt for required pins based on interrupt source | |

PWM Driver

Type Definitions

|  |  |
| --- | --- |
| Name | PWMChannel |
| Type | Enum |
| Values | PWM0 |
| PWM1 |
| PWM2 |
| PWM3 |
| PWM4 |
| PWM5 |
| PWM6 |
| PWM7 |

|  |  |
| --- | --- |
| Name | PWMModule |
| Type | Enum |
| Values | PWMModule0 |
| PWMModule1 |

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | PWM\_Init | |
| Input | PWMModule | module |
| PWMChannel | channel |
| uint16 | period |
| uint16 | duty |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | PWM\_SetDuty | |
| Input | PWMModule | module |
| PWMChannel | channel |
| uint16 | duty |
| Return | void | |
| Description |  | |

**ECUAL Drivers**

Button Driver

Type Definitions

|  |  |
| --- | --- |
| Name | InputMode |
| Type | Enum |
| Values | PULL\_DOWN |
| PULL\_UP |

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | Button\_Init | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| InputMode | mode |
| Return | void | |
| Description | Initialized the port selected by port\_name and set the direction of selected pins by pins\_mask to input then set internal pull up/down resistor of selected pins based on selected mode | |

|  |  |  |
| --- | --- | --- |
| Name | Button\_ActOnRisingEdge | |
| Input | Dio\_PortName | port\_name |
| uint8 | pin\_Number |
| Pointer to void Function | \*pAction |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | Button\_ActOnFallingEdge | |
| Input | Dio\_PortName | port\_name |
| uint8 | pin\_Number |
| Pointer to void Function | \*pAction |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | Button\_ActOnHighLevel | |
| Input | Dio\_PortName | port\_name |
| uint8 | pin\_Number |
| Pointer to void Function | \*pAction |
| Return | void | |
| Description | Read pin number of the button selected by pin\_Number from port selected by port\_name and take required action selected by pAction pointer to function while button is on high level state | |

|  |  |  |
| --- | --- | --- |
| Name | Button\_ActOnLowLevel | |
| Input | Dio\_PortName | port\_name |
| uint8 | pin\_Number |
| Pointer to void Function | \*pAction |
| Return | void | |
| Description | Read pin number of the button selected by pin\_Number from port selected by port\_name and take required action selected by pAction pointer to function while button is on low level state | |

LCD Driver

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | LCD\_sendCommand | |
| Input | uint8 | command |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_displayCharacter | |
| Input | uint8 | data |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_displayString | |
| Input | const char \* | Str |
| Return | void | |
| Description |  | |

|  |  |
| --- | --- |
| Name | LCD\_init |
| Input | void |
| Return | void |
| Description |  |

|  |  |
| --- | --- |
| Name | LCD\_clearScreen |
| Input | void |
| Return | void |
| Description |  |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_displayStringRowColumn | |
| Input | uint8 | row |
| uint8 | col |
| const char \* | Str |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_goToRowColumn | |
| Input | uint8 | row |
| uint8 | col |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_intgerToString | |
| Input | int | data |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_displayCharacter4bit | |
| Input | uint8 | data |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LCD\_sendCommand4bit | |
| Input | uint8 | command |
| Return | void | |
| Description |  | |

LM35 Temperature Sensor Driver

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | LM35TS\_init | |
| Input | UARTNUM | uartnum |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LM35TS\_READ | |
| Input | UARTNUM | uartnum |
| Return | float | |
| Description |  | |

RGB LED Driver

Type Definitions

|  |  |  |
| --- | --- | --- |
| Name | LED\_RGB\_Color | |
| Type | Enum | |
| Values | dark | 0x00 |
| red | 0x02 |
| blue | 0x04 |
| pink | 0x06 |
| Green | 0x08 |
| Yellow | 0x0A |
| Sky | 0x0C |
| White | 0x0E |

Function Definitions

|  |  |
| --- | --- |
| Name | RGB\_LED\_Init |
| Input | Void |
| Return | Void |
| Description |  |

|  |  |  |
| --- | --- | --- |
| Name | RGB\_LED\_Set\_Color | |
| Input | LED\_RGB\_Color | color |
| Return | Void | |
| Description |  | |

Stepper Motor Driver

Type Definitions

|  |  |
| --- | --- |
| Name | Stepper\_Pin\_Color |
| Type | Enum |
| Values | Stepper\_Blue |
| Stepper\_Pink |
| Stepper\_Red |
| Stepper\_Orange |
| Stepper\_Yellow |

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | StepperMotor\_Init | |
| Input | Dio\_PortName | port\_name |
| Return | Void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | StepperMotor\_ClkWise | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Float32 | cycle |
| Return | Void | |
| Description | Change the values of the selected pins in the selected port to rotate the stepper motor in CW direction | |

|  |  |  |
| --- | --- | --- |
| Name | StepperMotor\_AntiClkWise | |
| Input | Dio\_PortName | port\_name |
| uint8 | pins\_mask |
| Float32 | cycle |
| Return | Void | |
| Description | Change the values of the selected pins in the selected port to rotate the stepper motor in CCW direction | |

|  |  |
| --- | --- |
| Name | StepperMotor\_Stop |
| Input | void |
| Return | void |
| Description |  |

Temperature Sensor Driver

Function Definitions

|  |  |  |
| --- | --- | --- |
| Name | TempSensor\_Init | |
| Input | ADC\_Channel | Channel |
| Return | void | |
| Description |  | |

|  |  |  |
| --- | --- | --- |
| Name | LM35TS\_READ | |
| Input | ADC\_Channel | Channel |
| Return | float32 | |
| Description |  | |