



DIO module

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Introduction

This documentation for DIO module in MCAL layer for atmega32 microcontroller using structural methodology by creating struct of pin and doing necessary operation on the struct.

First section for defining new data types to use them in function. Then define macros for sit a specific bit or clear it finally the function details.

First data types

Name	Pin_t
Variable name	U8 Pin_Direction :1
Variable name	U8 Pin_Index:3
Variable name	U8 port_Index :2
Variable name	U8 value
Description	New data type for pins I is struct contain three variables

****Code snippets for declaration****

```
typedef struct{
```

u8 port_index:2;

u8 pin:3;

u8 direction:2;

u8 :1;

}pin_t;

name	logic_t
Var	HIGH=1
VAR	LOW=0
Description	Logic state data type for high and low states

Name	PORT_INDEX
VAR	PORT_A=0
VAR	PORT_B=1
VAR	PORT_C=2
VAR	PORT_D=3
DESCRIPTIION	Enum contain port_indexes

Name	PIN_INDEX
VAR	PIN1
VAR	PIN2
VAR	PIN3
VAR	PIN4
VAR	PIN5
VAR	PIN6
VAR	PIN7
Description	Enum contain pin indexes

Name	ErrorStateType
VAR	E_NOT_OK
VAR	E_OK
VAR	E_NULL_pointer
Description	Enum contain pin indexes

macros

Name	SET_BIT
INPUT	U8 REGISTER
INPUT	U8 BIT_INDEX
OUTPUT	Na
Description	Macro take register and bit index and set this bit

Name	CLEAR_BIT
INPUT	U8 REGISTER
INPUT	U8 BIT_INDEX
OUTPUT	Na
Description	Macro take register and bit index and clear this bit

Name	TOGGLE_BIT
INPUT	U8 REGISTER
INPUT	U8 BIT_INDEX
OUTPUT	Na
Description	Macro take register and bit index and toggle this bit

Name	READ_BIT
INPUT	U8 REGISTER
INPUT	U8 BIT_INDEX
OUTPUT	bit value
Description	Macro take register and bit index and read this bit value

Functions

Name	DIO_EsSetPinDirection
INPUT	Pin_t *pin_obj
RETURN	ErrorStateType ret
Description	Function to initialize the pin with its direction and state. take pointer to variable of pin_t type

Name	DIO_EsSetPinValue
INPUT	Pin_t *pin_obj
INPUT	logic_t value
RETURN	ErrorStateType ret
Description	Function to set the pin with its value take pointer to variable of pin_t type and logic_t variable

Name	DIO_EsReadPinValue
INPUT	Pin_t *pin_obj
INPUT	logic_t *value
RETURN	ErrorStateType ret
Description	Function to read the pin value and return the result into value pointer

Name	DIO_EsTogglePin
INPUT	Pin_t *pin_obj
RETURN	ErrorStateType ret
Description	Function to toggle the pin value

Name	DIO_EsSetPortDirection
INPUT	PORT_INDEX port
INPUT	U8 direction
RETURN	ErrorStateType ret
Description	Function to initialize the port with its direction and state

*note can write generic function first using two mask

```
GenericSet_Value(u8reg,u8pins,u8direction){
```

```
mask1=pins&direction;
```

```
mask2=(~pin)&reg;
```

```
reg=mask1|mask2
```

```
}
```

Name	DIO_EsSetPortValue
INPUT	PORT_INDEX port
INPUT	U8 value
RETURN	ErrorStateType ret
Description	Function to set the port with its value

Name	DIO_EsReadPortValue
INPUT	PORT_INDEX port
OUTPUT	U8 * return_value
RETURN	ErrorStateType ret
Description	Function to read the pin value and return the result into value pointer

Name	DIO_EsTogglePort
INPUT	PORT_INDEX port
RETURN	ErrorStateType ret
Description	Function to toggle the port

Note : check each pin is output not input before toggle