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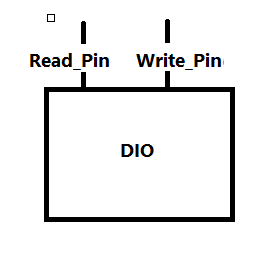
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# Introduction and functional overview

## Objective

The objective of this module is giving ability to other modules to deal with the pins of microcontroller.

## Context Diagram



## Acronyms and abbreviations

Acronyms and abbreviations that have a local scope.

|  |  |
| --- | --- |
| ***Abbreviation / Acronym:*** | ***Description:*** |
| DIO | Digital input output. |
| Reg | Register. |

# External interfaces

## Std\_Types

### Types

|  |  |
| --- | --- |
| Name | Description |
| U8 | Unsigned char. |
| U16 | Unsigned short Int. |
| U32 | Unsigned long Int. |
| f32 | Float. |
| f64 | Double. |
| S8 | Short char. |
| S16 | Signed short Int. |
| S32 | Signed long Int. |

### Interfaces

### None because DIO in MCAL layer which interact directly with the hardware.

### Constants

None.

### Variables

None.

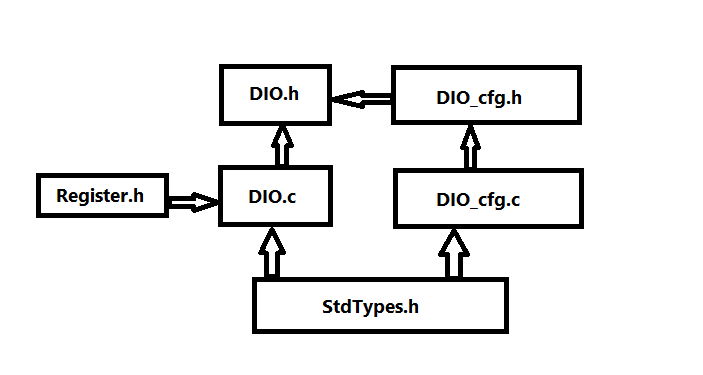
# Static Design

## File structure

### Used Files

|  |  |
| --- | --- |
| ***File*** | ***Description*** |
| DIO.h | This file includes all prototype of function, #defines, extern constant, types which will be accessible to the other modules. |
| DIO.c | This file includes all function implementation and constant. |
| DIO\_cfg.h | This file includes all configurations for DIO module.  EX: output pin, input pin |
| DIO\_cfg.c | This file includes all configuration variable, constant and function which is needed for other files. |

### File inclusion



## Types

### Imported types

|  |  |  |
| --- | --- | --- |
| ***Module*** | ***Imported Type*** | Description |
| DIO | PORT\_NAME | It is enumeration include ports names. |
| MODE | It is enumeration include modes of the pins. |
| LEVEL | It is enumeration include the level of the pin High or Low. |
| DIO\_cfg\_t | It is structure type which save pin mode. |

### Types Definitions

#### 

|  |  |  |  |
| --- | --- | --- | --- |
| ***Name:*** | PORT\_NAME | | |
| ***Type:*** | Enumeration | | |
| ***Range:*** | 0 : 31 |  | From PA0 : PD7 |
| ***Description:*** | It is enumeration include ports names from 0 to 31 and the last one is 32 which referrer to the number of the pins. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Name:*** | MODE | | |
| ***Type:*** | Enumeration | | |
| ***Range:*** | 0 : 2 |  | 0->INPUT\_WITH\_PUR  1-> OUTPUT  2> INPUT\_WITHOUT\_PUR |
| ***Description:*** | It is enumeration include modes of the pins input with pull-up resistance ,input without pull-up resistance and output. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Name:*** | LEVEl | | |
| ***Type:*** | Enumeration | | |
| ***Range:*** | 0 : 1 |  | 0->LOW  1->HIGH |
| ***Description:*** | It is enumeration include the level of the pin High is one and Low is zero. | | |

|  |  |  |  |
| --- | --- | --- | --- |
| ***Name:*** | DIO\_cfg\_t | | |
| ***Type:*** | Structure | | |
| ***Range:*** | 0:31 |  | Every element is consist of mode of the pins. |
| ***Description:*** | It is structure type which save pin mode. | | |

## Function definitions

This is a list of functions provided for upper layer modules.

### 

|  |  |  |
| --- | --- | --- |
| ***Service name:*** | DIO\_Init | |
| ***Syntax:*** | void DIO\_Init(void); | |
| ***Service ID[hex]:*** | DIO-001 | |
| ***Sync/Async:*** | Sync. | |
| ***Reentrancy:*** | None. | |
| ***Parameters (in):*** | None. |  |
| ***Parameters***  ***(in/out):*** | None. | |
| ***Parameters (out):*** | None. | |
| ***Return value:*** | None. |  |
| ***Description:*** | This function initiates all register which related to the DIO module.  Ex: DDR, Port, Pin. | |

|  |  |  |
| --- | --- | --- |
| ***Service name:*** | DIO\_WritePin | |
| ***Syntax:*** | DIO\_WritePin(DIO\_PinName name,LEVEL level); | |
| ***Service ID[hex]:*** | DIO-002 | |
| ***Sync/Async:*** | Sync. | |
| ***Reentrancy:*** | None. | |
| ***Parameters (in):*** | name, level. | Name PA0 -> PD7 is the name of the pin.  Level is HIGH or LOW. |
| ***Parameters***  ***(in/out):*** | None. | |
| ***Parameters (out):*** | None, | |
| ***Return value:*** | None. |  |
| ***Description:*** | This function writes the level on the Port register.  Ex: PORTA is HIGH. | |

|  |  |  |
| --- | --- | --- |
| ***Service name:*** | DIO\_ReadPin | |
| ***Syntax:*** | LEVEL DIO\_ReadPin(DIO\_PinName, name); | |
| ***Service ID[hex]:*** | DIO-003 | |
| ***Sync/Async:*** | Sync. | |
| ***Reentrancy:*** | None. | |
| ***Parameters (in):*** | name. | PA0->PD7 is the name of the pin. |
| ***Parameters***  ***(in/out):*** | None. | |
| ***Parameters (out):*** | None. | |
| ***Return value:*** | LEVEL | Level is HIGH or LOW. |
| ***Description:*** | This function returns the input value to the pin through the pin register.  EX:PINA | |

## Call-back notifications

This chapter lists all functions provided by the DIO module to lower layers.

The DIO module does not provide any callback notifications.

## Scheduled functions

This chapter lists all functions called directly by the Basic Software Module Scheduler.

The DIO module has no scheduled functions.

# Dynamic Design

## Mode Management

None.

## Sequence Diagram

## C:\Users\felo\AppData\Local\Temp\DIO sequance Diagram.png

# Shared Resources

There are no shared resources between DIO module and other modules.

There is one global variable between all the function in the module

DIO\_cfg : is an array from type structure which contain the mode of the

Pins of the microcontroller.

# Configuration specification

This chapter defines configuration parameters and their clustering into containers.

## Containers and configuration parameters

The following chapters summarize all configuration parameters.

### Variants

Configuration variants describe sets of configuration parameters:

* VARIANT-PRE-COMPILE (PC)

Only parameters with "Pre-compile time" configuration are allowed in this variant.

* VARIANT-LINK-TIME (LT)

Only parameters with "Pre-compile time" and "Link time" are allowed in this variant.

* VARIANT-POST-BUILD (PB)

Parameters with "Pre-compile time", "Link time" and "Post-build time" are allowed in this variant.

Parameters

### 

### Parameters

#### 

|  |  |  |  |
| --- | --- | --- | --- |
| ***Name*** | DIO\_cfg | | |
| ***Description*** | This parameter is array of type structure which define the mode of the pins of microcontroller. | | |
| ***Multiplicity*** | 1 | | |
| ***Type*** | Scaler | | |
| ***Default value*** | -- OUTPUT | | |
| ***Configuration Class*** | ***Pre-compile time*** | | |
| ***Configuration Class***  ***Scope / Dependency*** | ***Link time*** | X | All Variants |
| ***Post-build time*** | -- |  |
| scope: Global | -- |  |

# Configuration Constraints

-The number of pins in the microcontroller is 32 pin.

-The number of Timer peripheral is three one 16 bit timer and two 8 bit timer.

# Integration Constraints

-Initialization function is required to use the DIO module.