Component Design Document for DIO

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# *1. Introduction*

## Objective

This component is used to allow micro controller to interface with hardware layer as it is a very important part of MCAL layer which is between Microcontroller and HAL layer, we use it to configure controller pins to be used for LEDS and switches and so on we use it to read to and write pins

## Context Diagram

DIO\_ReadPin() DIO\_WritePin()

DIO\_Init()

DIO\_H

# *External Interface*

## STD\_TYPES.h

### Types

|  |  |
| --- | --- |
| Data Type | Description |
| unsigned char u8 | This is unsigned integer it’s range from 0 up to 255 |

## BIT\_MATH.h

### 2.2.1 Symbol <#defines>

SET\_BIT (var,bitno) : this macro is used to set(set it to one) certain bit it takes the u8 variable which include desired bit and number of bit that we want to set.

CLR\_BIT (var,bitno): this macro is used to clear (set it to zero)certain bit it takes the u8 variable which include desired bit and number of bit that we want to set.

# *Static Design*

## Files

### Used Files

|  |  |
| --- | --- |
| FILE NAME | Description |
| DIO.c | This file contains the definition of the APIs |
| DIO.h | This file contains the prototype of the APIs |
| DIO\_cfg.c | This file contains the configurations of the component which describe the mode of each pin as it is DefaultModeInputWZIntrnalPullup=0or  InputWithExternalPullUp or  Output. |
| DIO\_cfg.h | This file contains the configuration of components as each pin is a assigned to certain component or still ideal not used. |

### Files Inclusion

DIO\_cfg.h

DIO.h

DIO.c

DIO\_cfg.c

BIT\_MATH.h

STD\_TYPES.h

## Types

|  |  |
| --- | --- |
| Req ID | DIO\_001 |
| Covers | HLD\_004 |
| Name | DIO\_PinName\_T |
| Type | Enumeration |
| Range | 0-32 |
| Description | It’s used as index for controller pins as it’s configurable to microcontroller pins and last element is indicator to number of pins |

|  |  |
| --- | --- |
| Req ID | DIO\_001 |
| Covers | HLD\_004 |
| Name | DIO\_Mode\_t |
| Type | Enumeration |
| Range | 0-2 |
| Description | It is used to list the modes of DIO pins |

## Symbol Define <#define>

|  |  |
| --- | --- |
| Req ID | DIO\_001 |
| Covers | HLD\_004 |
| Name | DDRA |
| Type | U8 |
| Range | 0-255 |
| Description | Used to access data direction register of PORTA |

|  |  |
| --- | --- |
| Req ID | DIO\_002 |
| Covers | HLD\_004 |
| Name | DDRB |
| Type | U8 |
| Range | 0-255 |
| Description | Used to access data direction register of PORTB |

|  |  |
| --- | --- |
| Req ID | DIO\_003 |
| Covers | HLD\_004 |
| Name | DDRC |
| Type | U8 |
| Range | 0-255 |
| Description | Used to access data direction register of PORTC |

|  |  |
| --- | --- |
| Req ID | DIO\_004 |
| Covers | HLD\_004 |
| Name | PORTA |
| Type | U8 |
| Range | 0-255 |
| Description | Used to access data register of PORTA |

|  |  |
| --- | --- |
| Req ID | DIO\_005 |
| Covers | HLD\_004 |
| Name | PORTB |
| Type | U8 |
| Range | 0-255 |
| Description | Used to access data register of PORTB |

|  |  |
| --- | --- |
| Req ID | DIO\_006 |
| Covers | HLD\_004 |
| Name | PORTC |
| Type | U8 |
| Range | 0-255 |
| Description | Used to access data register of PORTC |

|  |  |
| --- | --- |
| Req ID | DIO\_007 |
| Covers | HLD\_004 |
| Name | PINA |
| Type | U8 |
| Range | 0-2555 |
| Description |  |

|  |  |
| --- | --- |
| Req ID | DIO\_008 |
| Covers | HLD\_004 |
| Name | PINB |
| Type | U8 |
| Range | 0-2555 |
| Description |  |

|  |  |
| --- | --- |
| Req ID | DIO\_009 |
| Covers | HLD\_004 |
| Name | PINC |
| Type | U8 |
| Range | 0-2555 |
| Description |  |

## Const

|  |  |
| --- | --- |
| Req ID | DIO\_010 |
| Covers | HLD\_004 |
| Name | const DIO\_Mode\_t DIO\_Mode |
| Type | Structure |
| Range | 0-4 |
| Description | This structure |

## Interface (Services)

|  |  |  |  |
| --- | --- | --- | --- |
| Req ID | DIO\_011 | | |
| Covers | HLD\_004 | | |
| Name/protoTypes | void DIO\_Int(void) | | |
| Service ID | 0x01 | | |
| Re-entrant / Non re- entrant | Non re\_entrant | | |
| Synchronous/Asynchronous | Synchronous | | |
| Return Value | | ---------- | ---------- |
| Input parameter | | ---------- | ---------- |
| Output parameter | | ---------- | ---------- |
| Input /Output Parameter | | ---------- | ---------- |

|  |  |  |  |
| --- | --- | --- | --- |
| Req ID | DIO\_012 | | |
| Covers | HLD\_004 | | |
| Name/protoTypes | void DIO\_WritePin(u8 PinNameCpy,u8 ValueCpy) | | |
| Service ID | 0x02 | | |
| Re-entrant / Non re- entrant | Non\_re\_entrant | | |
| Synchronous/Asynchronous | Synchronous | | |
| Return Value | | ---------- | DESCRIPTION |
| Input parameter | | NAME | DESCRIPTION |
| Output parameter | | NAME | DESCRIPTION |
| Input /Output Parameter | | NAME | DESCRIPTION |

|  |  |  |  |
| --- | --- | --- | --- |
| Req ID | DIO\_013 | | |
| Covers | HLD\_004 | | |
| Name/protoTypes | u8 DIO\_ReadPin(u8 PinNameCpy) | | |
| Service ID | 0x03 | | |
| Re-entrant / Non re- entrant | Non\_re\_entrant | | |
| Synchronous/Asynchronous | Synchronous | | |
| Return Value | | NAME | DESCRIPTION |
| Input parameter | | NAME | DESCRIPTION |
| Output parameter | | NAME | DESCRIPTION |
| Input /Output Parameter | | NAME | DESCRIPTION |

# *Configuration Parameters*

## Pre-compile time

### #define PORTA ((u8\*)0x3B)

### #define DDRA ((u8\*)0x3A)

### #define PINA ((volatile u8\*)0x39)

### #define PORTB ((u8\*)0x38)

### #define DDRB ((u8\*)0x37)

### #define PINB ((volatile u8\*)0x36)

### #define PORTC ((u8\*)0x35)

### #define DDRC ((u8\*)0x34)

### #define PINC ((volatile u8\*)0x33)

### #define PORTD ((u8\*)0x32)

### #define DDRD ((u8\*)0x31)

### #define PIND ((volatile u8\*)0x30)

## Link time

### < el variable el const ely bn3ml beh configuration zy fel dio>

## Post-build

### <lma el configuration tb2a bt3ml fel run-time>

# *Configuration Constrains*

<Example Number of pins for anything configurable >

# *Integration Constrains*

<I need to clarify here what I need before use this component like call Init() and the pre-requests and if there’s a task what it’s minimum periodicity >

# *History*

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Date** | **Reason For Changes** | **Version** |
| Christine Ramsis | 19th April 2018 | Create the template | 1.0 |
| Christine Ramsis | 19th April 2018 | External interface | 1.1 |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

<The changes happened in the documents>

**Appendix A: Glossary**