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Description automatically generated

Digital Watch Project PO2\_DGW‏

(LCD)

Table 1 Status Table

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Document Name** | **Author** | **Version** | **Date** | **Status** |
| LCD\_CDD | Rasha ,Samuel, Abdollah, Saher, Yousef , Maghraby, Samira | 1.0 | 17/3/2023 | Proposed |

Table 2 Document History

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Version** | **Description of Change** | **Author** | **Date** | **Document Status** |
| 1 | Initial creation of LCD\_CDD Document | Rasha ,Samuel, Abdollah, Saher, Yousef , Maghraby, Samira | 17/3/2023 | Proposed |

Table 3 Reference Table

|  |  |  |
| --- | --- | --- |
| Reference Input Documents | Version | Status |
| SRS | 1.2 | Proposed |
| GDD | 1.1 | Proposed |

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# LCD software context diagram

Diagram

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Figure . LCD context diagram.

# LCD sequence diagram

Chart, diagram, box and whisker chart

Description automatically generated

Figure LCD sequence diagram.

# Component ʹs parameters

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_01\_V01. | | |
| **Author** | | | Rasha Saad | | |
| **Parameter\_Name** | | CLCD\_u8\_RS\_PORT CLCD\_u8\_RS\_PIN | **Date** | 17/3/2023 | |
| **Description** | | These two parameters are used to configure register/select pin to a given port and pin in microcontroller | **Scope** | | Local |
| **Type** | | | CLCD\_u8\_RS\_PORT | | |
| **Type**  **Range** | CLCD\_u8\_RS\_PIN | | u8 | | |
| CLCD\_u8\_RS\_PORT | | u8 | | |
| **Range**  **Default value** | CLCD\_u8\_RS\_PIN | | It can take the following values : ’A’ , ’B’ , ’C’, ’D’ | | |
| CLCD\_u8\_RS\_PORT | | It can take the following values : 0,1,2,3,4,5,6,7 | | |
| **Default value** | CLCD\_u8\_RS\_PIN | | ‘D’ | | |

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| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_02\_V01. | | |
| **Author** | | | Rasha Saad | | |
| **Parameter\_Name** | | CLCD\_u8\_RW\_PORT, CLCD\_u8\_RW\_PIN | **Date** | 17/3/2023 | |
| **Description** | | These two parameters are used to configure read/write pin to a given port and pin in microcontroller | **Scope** | | Local |
| **Type** | | | CLCD\_u8\_Rw\_PORT | | |
| **Type**  **Range** | CLCD\_u8\_Rw\_PIN | | u8 | | |
| CLCD\_u8\_RW\_PORT | | u8 | | |
| **Range**  **Default value** | CLCD\_u8\_RW\_PIN | | It can take the following values : ’A’ , ’B’ , ’C’, ’D’ | | |
| CLCD\_u8\_RW\_PORT | | It can take the following values : 0,1,2,3,4,5,6,7 | | |
| **Default value** | CLCD\_u8\_RW\_PIN | | ‘D’ | | |

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| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_03\_V01. | | |
| **Author** | | | Samuel Medhat | | |
| **Parameter\_Name** | | CLCD\_u8\_E\_PORT, CLCD\_u8\_E\_PIN | **Date** | 17/3/2023 | |
| **Description** | | These two parameters are used to configure enable pin to a given port and pin in microcontroller | **Scope** | | Local |
| **Type** | | | CLCD\_u8\_E\_PORT | | |
| **Type**  **Range** | CLCD\_u8\_E\_PIN | | u8 | | |
| CLCD\_u8\_E\_PORT | | u8 | | |
| **Range**  **Default value** | CLCD\_u8\_E\_PIN | | It can take the following values : ’A’ , ’B’ , ’C’, ’D’ | | |
| CLCD\_u8\_E\_PORT | | It can take the following values : 0,1,2,3,4,5,6,7 | | |
| **Default value** | CLCD\_u8\_E\_PIN | | ‘D’ | | |
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| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_04\_V01. | | |
| **Author** | | | Samuel Medhat | | |
| **Parameter\_Name** | | CLCD\_u8\_DATAS\_PORT, CLCD\_u8\_Dx | **Date** | 17/3/2023 | |
| **Description** | | These two parameters are used to configure data pins from 0 to 7 to a given port and pin in microcontroller | **Scope** | | Local |
| **Type** | | | CLCD\_u8\_DATA\_PORT | | |
| **Type**  **Range** | CLCD\_u8\_Dx | | u8 | | |
| CLCD\_u8\_DATA\_PORT | | u8 | | |
| **Range**  **Default value** | CLCD\_u8\_Dx | | It can take the following values : ’A’ , ’B’ , ’C’, ’D’ | | |
| CLCD\_u8\_DATA\_PORT | | It can take the following values : 0,1,2,3,4,5,6,7 | | |
| **Default value** | CLCD\_u8\_Dx | | ‘A’ | | |
|  | |  | | |

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| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_05\_V01. | | |
| **Author** | | | Abdollah Mahmoud | | |
| **Parameter\_Name** | | CLCD\_u8\_CLR\_CMD | **Date** | 17/3/2023 | |
| **Description** | | This parameter is used to define clear command according to LCD datasheet | **Scope** | | Local |
| **Type** | | | CLCD\_u8\_CLR\_CMD | | |
| **Default value** | CLCD\_u8\_CLR\_CMD | | u8 | | |
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| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_06\_V01. | | |
| **Author** | | | Abdollah Mahmoud | | |
| **Parameter\_Name** | | CLCD\_u8\_LINE\_ONE  CLCD\_u8\_LINE\_TWo | **Date** | 17/3/2023 | |
| **Description** | | This parameter is used to define values for line one and two in LCD | **Scope** | | Local |
| **Type** | | | CLCD\_u8\_LINE\_ONE  CLCD\_u8\_LINE\_TWo | | |
| **Default value** | CLCD\_u8\_LINE\_ONE  CLCD\_u8\_LINE\_TWo | | u8  u8 | | |
|  |  | |  | | |

# Component ʹs application programming interfaces (APIs)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_07\_V01. | | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_09\_V01.0  Req\_PO2\_DGW\_GDD\_10\_V01.0.  Req\_PO2\_DGW\_GDD\_12\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | | |
| **Author** | Saher Ghanem | **Date** | | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidInitialize | **Scope** | | Public | | |
| **Description** | | This function is used to initialize LCD according to datasheet | | | | |
| **Inputs** | | **Type** | **Name** | | **Description** | **Range** |
| void | NA | | NA | NA |
| **Outputs** | | void | NA | | NA | NA |
| **Algorithm** | | Diagram  Description automatically generated | | | | |

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| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_08\_V01. | | | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_09\_V01.0  Req\_PO2\_DGW\_GDD\_10\_V01.0.  Req\_PO2\_DGW\_GDD\_12\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | | | |
| **Author** | Saher Ghanem | **Date** | | 17/3/2023 | | | |
| **API\_Name** | CLCD\_voidWriteCmd | **Scope** | | | private | | |
| **Description** | | This function is used to write command on LCD | | | | | |
| **Inputs** | | **Type** | **Name** | | | **Description** | **Range** |
| U8 | Copy\_u8Data | | | Data | 0 to 255 |
| **Outputs** | | void | NA | | | NA | NA |
| **Algorithm** | | Diagram  Description automatically generated | | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_09\_V01. | | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_09\_V01.0  Req\_PO2\_DGW\_GDD\_10\_V01.0.  Req\_PO2\_DGW\_GDD\_12\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | | |
| **Author** | Yousef Ahmed | **Date** | | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidWriteData | **Scope** | | private | | |
| **Description** | | This function is used to write data on LCD | | | | |
| **Inputs** | | **Type** | **Name** | | **Description** | **Range** |
| U8 | Copy\_u8Data | | Data | 0 to 255 |
| **Outputs** | | void | NA | | NA | NA |
| **Algorithm** | | Diagram  Description automatically generated | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_10\_V01. | | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_09\_V01.0  Req\_PO2\_DGW\_GDD\_10\_V01.0.  Req\_PO2\_DGW\_GDD\_12\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | | |
| **Author** | Yousef Ahmed | **Date** | | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidSetDataPort | **Scope** | | Private | | |
| **Description** | | This function is used to set data port | | | | |
| **Inputs** | | **Type** | **Name** | | **Description** | **Range** |
| U8 | Copy\_u8Data | | Data | 0 to 255 |
| **Outputs** | | void | NA | | NA | NA |
| **Algorithm** | | Diagram  Description automatically generated | | | | |

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| --- | --- | --- | --- | --- | --- | --- |
| **Req\_ID** | | | Req\_PO2\_DGW\_LCD\_CDD\_11\_V01. | | | |
| **Covers** | | | Req\_PO2\_DGW\_GDD\_10\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | |
| **Author** | Mohamed Maghraby | | **Date** | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidWriteString | | **Scope** | | Public | |
| **Description** | | | This function is used to write string on LCD | | | |
| **Inputs** | | **Type** | **Name** | | **Description** | **Range** |
| const char\* | Copy\_pchString | | Pointer to array of characters to be written into LCD |  |
| **Outputs** | | void | NA | | NA | NA |
| **Algorithm** | | | Diagram  Description automatically generated | | | |

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| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_12\_V01. | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_11\_V01.0  Req\_PO2\_DGW\_SRS\_10\_V01.2  Req\_PO2\_DGW\_SRS\_11\_V01.2  Req\_PO2\_DGW\_SRS\_12\_V01.2  Req\_PO2\_DGW\_SRS\_13\_V01.2  Req\_PO2\_DGW\_SRS\_15\_V01.2  Req\_PO2\_DGW\_SRS\_16\_V01.2  Req\_PO2\_DGW\_SRS\_17\_V01.2  Req\_PO2\_DGW\_SRS\_18\_V01.2 | | | |
| **Author** | Mohamed Maghraby | **Date** | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidGoToXYPos | **Scope** | | Public | |
| **Description** | | This function is used to move LCD cursor to a specific location on LCD | | | |
| **Inputs** | **Type** | **Name** | | **Description** | **Range** |
| u8  u8 | Copy\_u8XPos  Copy\_u8YPos | | Column position  Row position | 0 to 255  0 to 255 |
| **Outputs** | void | NA | | NA | NA |
| **Algorithm** | Diagram  Description automatically generated | | | | |
| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_13\_V01. | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_12\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | |
| **Author** | Samira Saeid | **Date** | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidWriteNum | **Scope** | | Public | |
| **Description** | | This function is used to write number on LCD. | | | |
| **Inputs** | **Type** | **Name** | | **Description** | **Range** |
| u32 | Copy\_u32Num | | Number to be written onto the LCD | u32 |
| **Outputs** | void | NA | | NA | NA |
| **Algorithm** | | Diagram  Description automatically generated | | | |

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| --- | --- | --- | --- | --- | --- |
| **Req\_ID** | | Req\_PO2\_DGW\_LCD\_CDD\_14\_V01. | | | |
| **Covers** | | Req\_PO2\_DGW\_GDD\_09\_V01.0  Req\_PO2\_DGW\_SRS\_06\_V01.2  Req\_PO2\_DGW\_SRS\_08\_V01.2 | | | |
| **Author** | Samira Saeid | **Date** | 17/3/2023 | | |
| **API\_Name** | CLCD\_voidClear | **Scope** | | Public | |
| **Description** | | This function is used to clear LCD. | | | |
| **Inputs** | **Type** | **Name** | | **Description** | **Range** |
| void | NA | | NA | NA |
| **Outputs** | void | NA | | NA | NA |
| **Algorithm** | | Diagram  Description automatically generated | | | |