



Digital Watch Project PO2\_DGW

*Table 1 status table*

Document	Author	Version	Update Date	Status
HSI	SAHER	1.1	15/2/2023	Released

*Table 2 Document history*

Version	Description of Change	Author	Date of last update	Status
1.0	- Initial creation of the document.	SAHER	11/2/2023	Draft
1.1	- Updated the HSI	SAHER	15/2/2023	Released

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# 1. INTRODUCTION

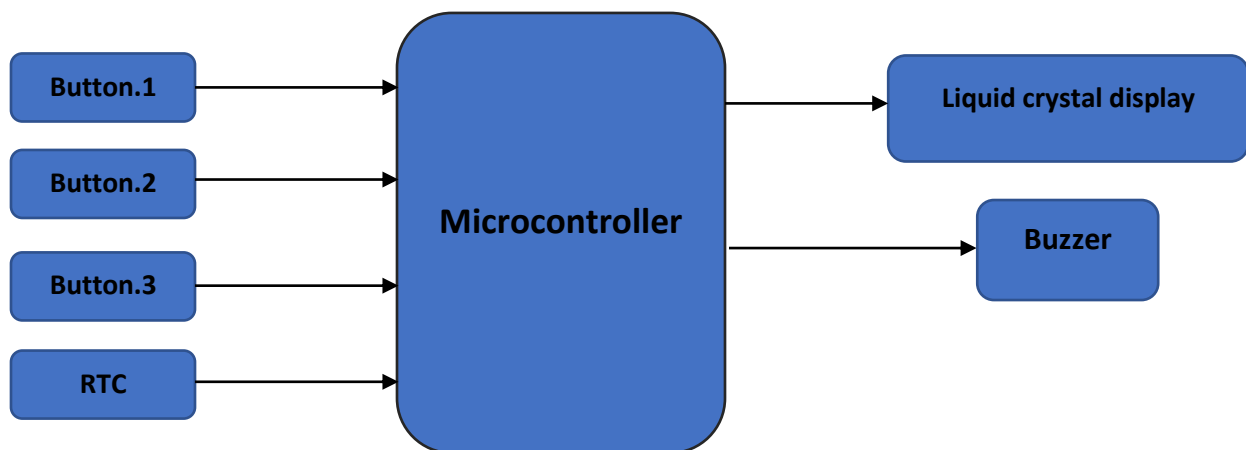
## 1.1 Purpose

This document identifies all the Hardware Software Interface (HSI) data that reference a digital watch described in PO3\_DGW\_Digital watch (CRS) document.

## 1.2 Hardware components

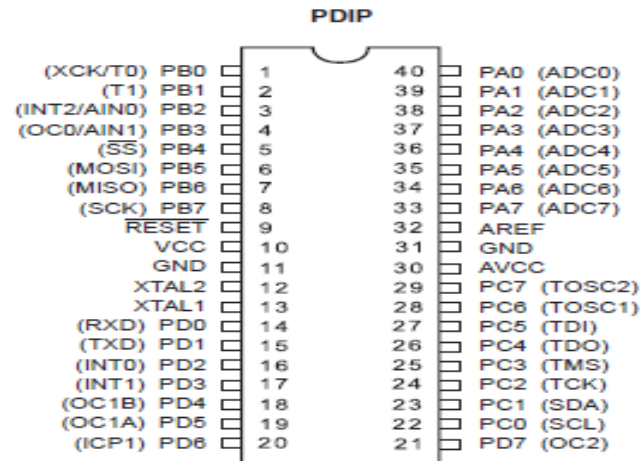
1. AVR 8-bit Microcontroller with 32 Kbytes In-System Programmable Flash.
2. LMB161A Character LCD.
3. Tactical buttons.
4. Buzzer.
5. Lithium battery 5v.
6. Real Time Clock Module (RTC)

## 1.3 System block diagrams

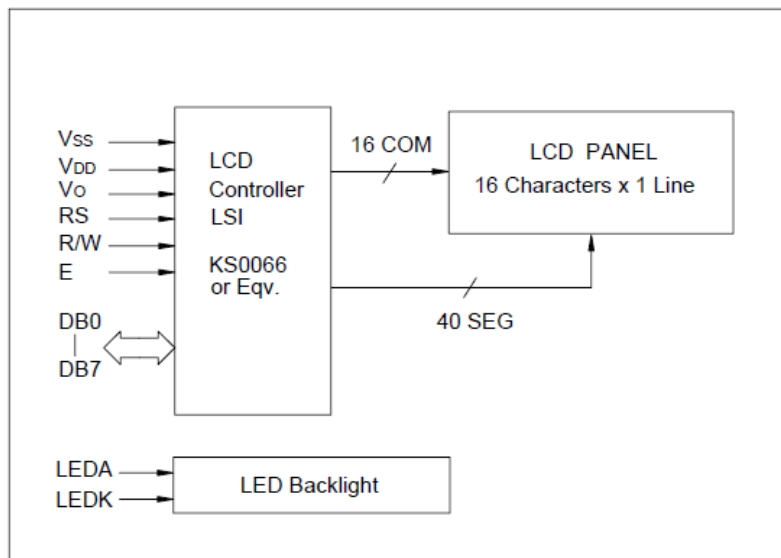


**Figure 1** General block diagram.

## 1.4 Hardware components block diagrams



**Figure 2** Microcontroller Pins configuration.



**Figure 3** LMB161A LCD schematic.



**Figure 4** RTC Module.

## 2. Pins & Ports of ATMEGA32 Connection:

Pin No.	Symbol	Configuration	Function
1	PB0	Output	This pin shall be connected to LCD_RS.
2	PB1	Output	This pin shall be connected to LCD_RW.
3	PB2	Output	This pin shall be connected to LCD_E.
4	PB3	Output	Not used
5	PB4	Output	Not used
6	PB5	Output	Not used
7	PB6	Output	Not used
8	PB7	Output	Not used
9	RESET	RESET	Not used
10	VCC	Digital supply voltage	This pin shall be connected to supply voltage.
11	GND	Ground	Ground
12	XTAL2	XTAL2	Not used
13	XTAL1	XTAL2	Not used
14	PD0	Output	Not used
15	PD1	Output	Not used
16	PD2	Output	Not used
17	PD3	Output	This pin shall be connected to buzzer.
18	PD4	Input & Pullup	This pin shall be connected to button 1.
19	PD5	Input & Pullup	This pin shall be connected to button 2.
20	PD6	Input & Pullup	This pin shall be connected to button 3.
21	PD7	Output	Not used
22	PC0	Output	SCL pin from RTC Module
23	PC1	Output	SDA pin from RTC Module
24	PC2	Output	Not used
25	PC3	Output	Not used
26	PC4	Output	Not used
27	PC5	Output	Not used
28	PC6	Output	Not used
29	PC7	Output	Not used
30	AVCC	AVCC	Not used
31	GND	Ground	Not used
32	AREF	AREF	Not used
33	PA0	Output	This pin shall be connected to LCD_D0.
34	PA1	Output	This pin shall be connected to LCD_D1.
35	PA2	Output	This pin shall be connected to LCD_D2.
36	PA3	Output	This pin shall be connected to LCD_D3.
37	PA4	Output	This pin shall be connected to LCD_D4.
38	PA5	Output	This pin shall be connected to LCD_D5.
39	PA6	Output	This pin shall be connected to LCD_D6.
40	PA7	Output	This pin shall be connected to LCD_D7.

### 3. Hardware software interface requirements

*Table 3 HSI requirements*

HSI requirement	Requirement description
<b>Req_PO3_DGW_HSI_01_V01.1</b>	The tactical switches shall be used to switch between the three modes of the digital watch as follows. Button 1 shall be used to select clock mode.
<b>Req_PO3_DGW_HSI_02_V01</b>	Button 2 shall be used to select alarm mode, and when selected it shall be used to set alarm time.
<b>Req_PO3_DGW_HSI_03_V01</b>	Button 3 shall be used to select stopwatch mode, and when selected it shall be used to stop and reset counting respectively.
<b>Req_PO3_DGW_HSI_04_V01</b>	The active buzzer shall be used to notify the user when the alarm's time hit.
<b>Req_PO3_DGW_HSI_05_V01</b>	The LCD displayer shall be used to display the chosen mode interface according to the user's choice.

*Table 4 Reference document*

Reference document	version	status
PO3_DGW_Digital watch_CRS	1.1	Released