Experiment Details

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| --- | --- |
| Department Name | PRODUCTION DEPARTMENT |
| Class | FINAL YEAR |
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| Subject Name | INDUSTRIAL AUTOMATION & ROBOTICS |
| Experiment No. | 1 |
| Experiment Name | BUZZER INTERFACING ON ATMEGA 2560 MICROCONTROLLER |

Version History

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| --- | --- | --- | --- | --- |
| Sr. No. | Version Number | Created By | Approved By | Date |
| 1 | v1.0 | Sushant More | Mr. V.D.Kamble | DD/MM/YYYY |
|  |  |  |  |  |

AIM:

BUZZER INTERFACING ON ATMEGA 2560 MICROCONTROLLER

THEORY:

1. **What are ports**

Junctions where peripheral devices are connected.

Peripheral devices can be:

**Input Device:**

Example: Switch, Sensors, etc...

**Output Device:**

Example: Buzzer, LCD, Motors, LED, etc...

1. **Ports in ATmega2560**
2. ATmega 2560 is a 100 pin micro-controller.
3. 86 pins can be used as Input/Output pins.
4. Pins are grouped together and called as PORT.
5. ATmega 2560 has ten 8-bit PORTs
6. PORT x;x = A to F and H, J, K, L
7. ATmega 2560 has one 6-bit PORT PORT G;
8. All Port pins can be individually configured as Input/Output.

**2.1 Accessing the Ports**

1. **Each Port has three associated registers with it:**
2. **DDRx x = A to H and J, K, L**
3. **PORTx x = A to H and J, K, L**
4. **PINx x = A to H and J, K, L**

**2.2 Understanding the DDRx register**

Data Direction Register

Purpose: To define Port pins as Input/Output

a. DDRx = 0 → PORTx is defined as Input.

b. DDRx = 1 → PORTx is defined as Output.

Example: For Port B, make lower nibble as Input and upper nibble as Output.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **D7** | **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |

**2.3 Understanding the PINx register**

Purpose:

* To read data present on Port x pins.
* Save the value of register in a variable.

**Example:**

Read data from Port C PORTC =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 |

x = PINC

x = 0xF0

**2.4 Understanding the PORTx register**

Case 1: When Port x is defined as Output

Purpose: Send data on Port x pins

Example: DDRA =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **D7** | **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** |
| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

DDRA = 0xFF PORTA = 0xFF

Case 2: When Port x is defined as Input

Purpose: Activate/deactivate Pull-up resistor

a. PORTx= 0xFF : Activate Pull-Up on all pins of Port x

b. PORTx= 0x00 : Deactivate Pull-Up on all pins of Port x

Example:

DDRA =

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **D7** | **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

DDRA = 0x00 PORTA = 0xFF

Purpose: Activate/deactivate Pull-up resistor

a. PORTx= 0xFF : Activate Pull-Up on all pins of Port x

b. PORTx= 0x00 : Deactivate Pull-Up on all pins of Port x

Example:

DDRA = DDRA = 0x00

PORTA = 0xFF

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **D7** | **D6** | **D5** | **D4** | **D3** | **D2** | **D1** | **D0** |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

Pull-Up is activated for all Pins of PORTA.

PRE TEST:

Q1) ATMega 2560 is -----pin microcontroller

a) 60 Pin b ) 80 Pin c) 100 Pin d) 25 Pin

Q2) ---- Pins Can be used as Input /Output Pins

a) 60 Pin b ) 86 Pin c) 100 Pin d) 25 Pin

Q3) ATmega has ---- 8 Bit Ports

a) 10 b ) 6 c) 1 d) 5

Q4) ATmega has ---- 6 Bit Ports

a) 1 b ) 6 c) 1 d) 5

Q5) Port is defined as Output port when DDRx is taken as

a) 1 b ) 0 c) 2 d) 5

PROCEDURE:

Configure PC.3 pin as Output. DDRC = 0x08; // 0000 1000

To turn ON the buzzer set PC.3 output HIGH PORTC = 0x08; // 0000 1000

To turn OFF the buzzer set PC.3 output LOW PORTC = 0x00; // 0000 0000

POST TEST:

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REFERENCES:

Eyantra website IITB