

Experiment 5

Title: - Interfacing LED to Arduino UNO

Pre-Lab. Requisites: -

1. Software Language C/C++
2. Working of Arduino Board.

Objectives:-

Write a program to blink a LED after every 1 second delay

Apparatus:-

1. Arduino UNO Board.
2. LED, Resistor.
3. Connecting Wires
4. Arduino Software

Theory: -

1. Introduction of Arduino UNO Board:-

Arduino is an open source physical computing platform for creating interactive objects that stand alone or collaborate with software on computer.

The Arduino UNO processing board based on ATmega328P Microcontroller is illustrated in Fig.1. Working clockwise from the left; the board is equipped with a USB connector to allow programming the processor from a host PC. The board may also be programmed using In System Programming (ISP) techniques. A 6-pin ISP programming connector is on the opposite side of the board from the USB connector.

The board is equipped with a USB-to-serial converter to allow compatibility between the host PC and UNO for serial communication. The UNO is also equipped with several small surface mount LEDs to indicate serial transmission (TX) and reception (RX) and an extra LED for project use. The header strip at the top of the board provides access for an analog reference signal, pulse width modulation (PWM) signals, digital input/output (I/O), and serial communications. The header strip at the bottom of the board provides analog inputs for the analog-to-digital (ADC) system and power supply terminals. Finally, the external power supply connector is provided at the bottom left corner of the board. The top

and bottom header strips conveniently mate with an Arduino shield (to be discussed shortly) to extend the features of the host processor.

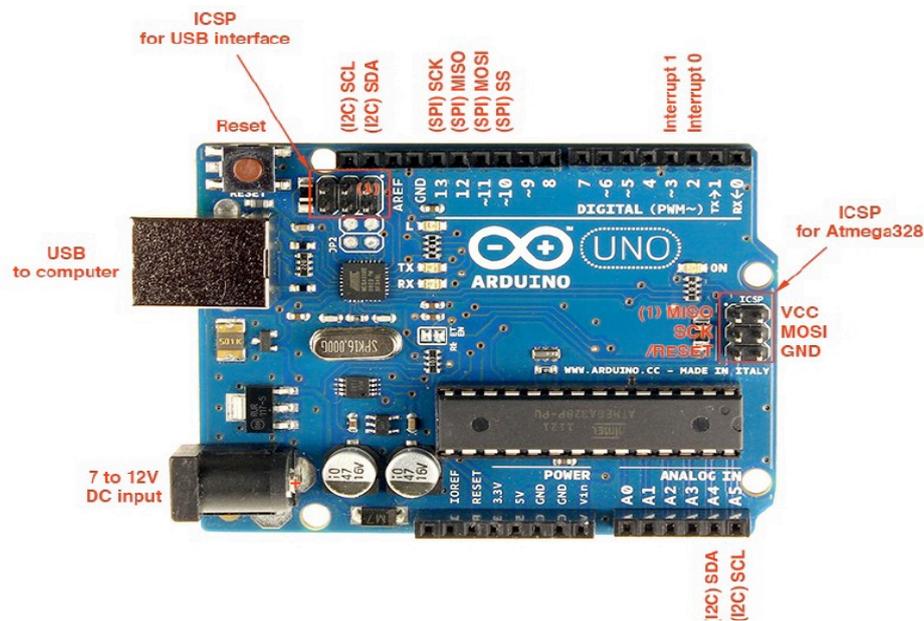


Figure 1: Arduino UNO R3 Processing Board

2. ARDUINO HOST PROCESSOR—THE ATMEGA328

The host processor for the Arduino UNO is the Atmel ATmega328P Microcontroller. Atmega 328P is a Advanced Virtual RISC(AVR) microcontroller. It is based on the Reduced Instruction Set Computer (RISC) concept which allows the processor to complete 16 million instructions per second (MIPS) when operating at 16 MHz. It is 28 pin IC. It has 3 ports, PORTB (8 pins), PORTC (7 pins) and PORTD(8 pins). Some pins of the I/O ports are multiplexed with an alternate function from the peripheral features on the device. In general, when a peripheral is enabled, that pin may not be used as a general-purpose I/O pin.

The features of Atmega 328P is categorized into the following systems:-
Memory system, Port system, Timer system, Analog-to-digital converter (ADC), Interrupt system, and the Serial communications.

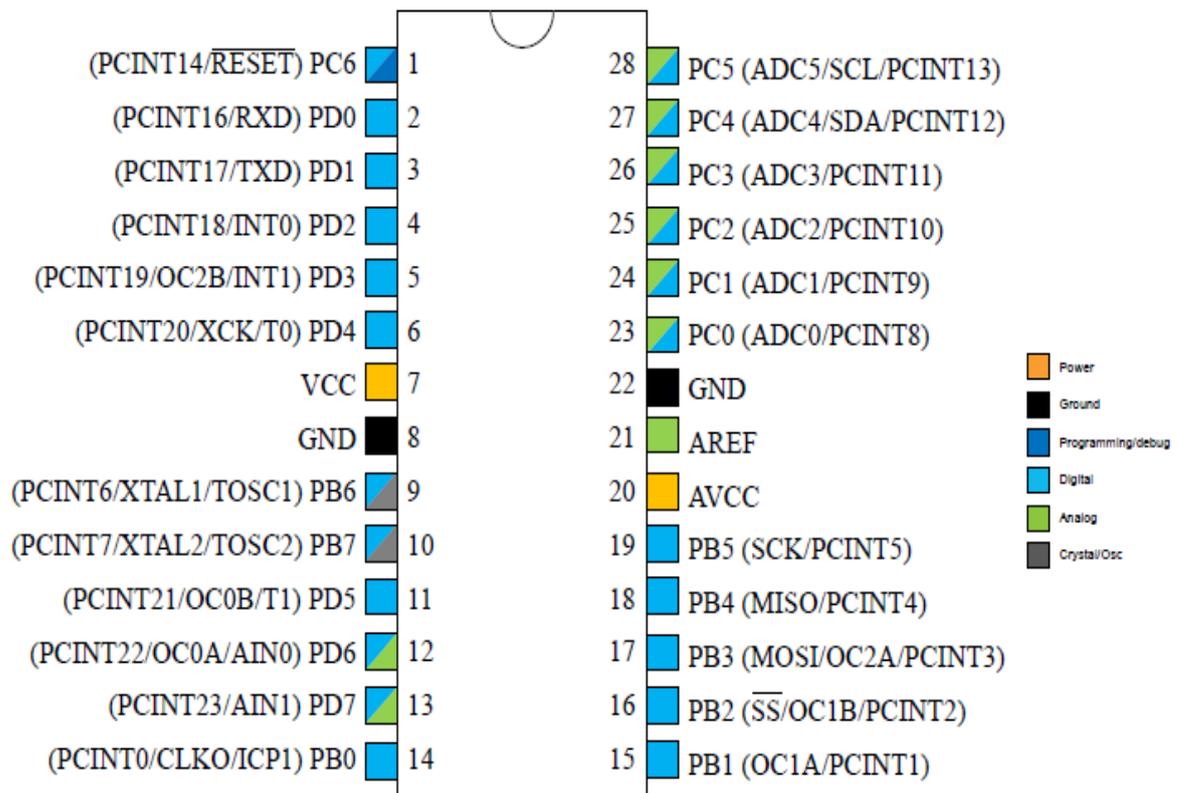


Fig2: Pin diagram of Atmega 328P

3. Interfacing Diagram

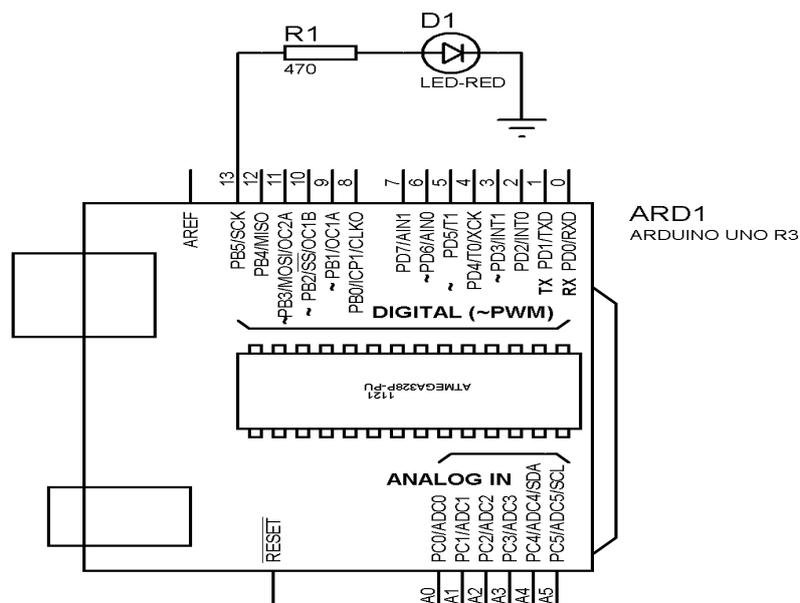


Figure3: Interfacing LED with Atmega 328P

General Input Output Port Structure:

The ports are bi-directional I/O ports with optional internal pull-ups. The following figure shows the functional description of one I/O-port pin, here generically called Pxn.

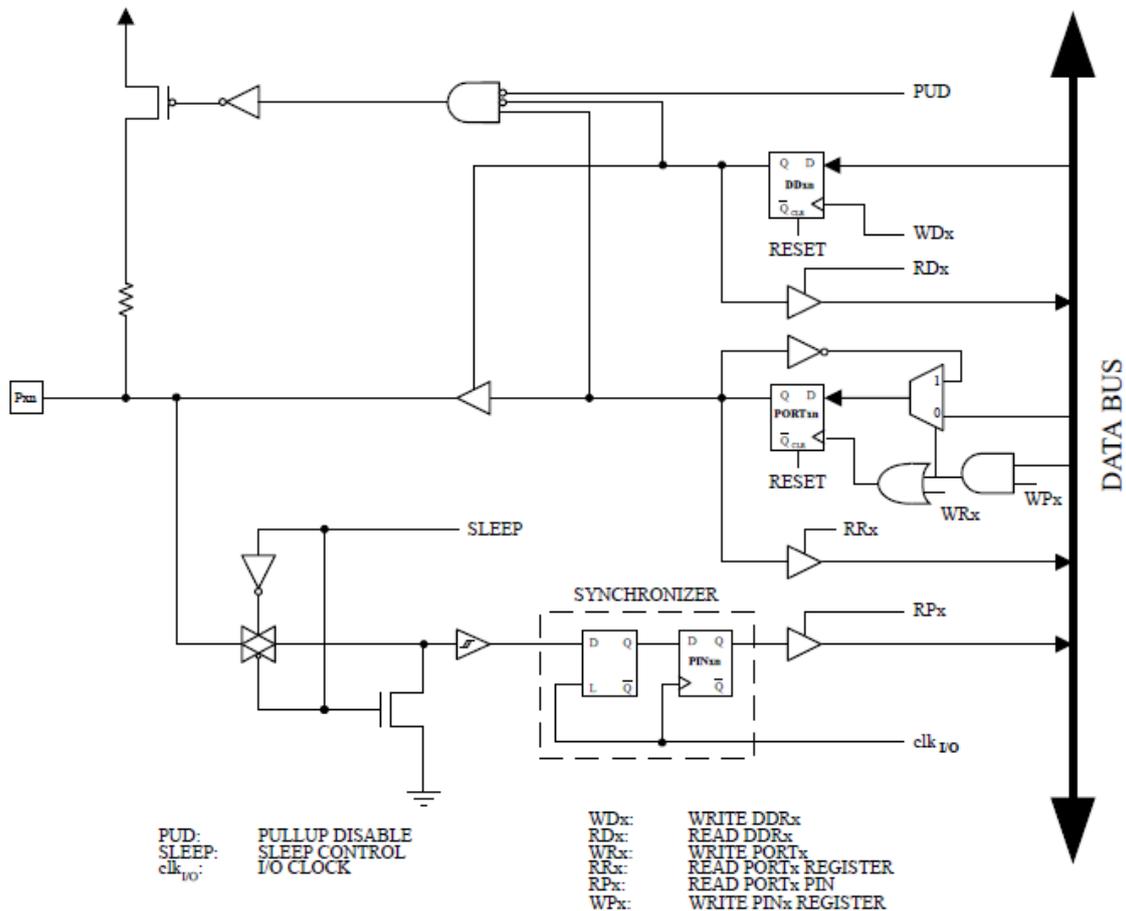


Fig 2.1: General Digital I/O port pin structure

4. Algorithm

1. Start
2. Configure port pin as output pin where LED is connected.
3. Send logic 1 to port pin.
4. Give a delay of 1 second.
5. Send logic 0 to port pin.
6. Give a delay of 1 second.
7. Go to step 2
8. Stop

5. Comments & Conclusion: -