Getting started with Input-Output Ports

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Embedded Real-Time Systems (ERTS) Lab
Indian Institute of Technology, Bombay

IIT Bombay
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General Purpose Input/Output
RGB LED and User Switch
DHT11 Sensor

Getting started with ATmega 2560
Overview of Ports
GPIO header

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General Purpose Input/Output **Getting started with ATmega 2560**
RGB LED and User Switch Overview of Ports
DHT11 Sensor GPIO header

Getting started with ATmega 2560

- AVR architecture based micro-controller.

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- Combines 256KB ISP flash memory, 8KB SRAM, 4KB EEPROM.

- Consists of 100 pins.

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- Consists of 6 timers/counters, PWM, 4 UARTs, 16-channel 10 bit A/D converter and much more.

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What are Ports?

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What are Ports?

- Junctions where peripheral devices are connected.

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    1. ATmega 2560 has ten 8-bit Ports

       Port x;   x = A to F and H, J, K, L

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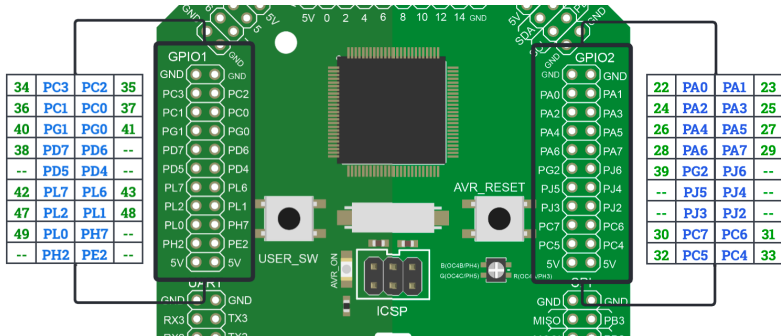
  2 ATmega 2560 has one 6-bit Port

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- All Port pins can be individually configured as Input/Output.

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GPIO header on eYFi-Mega

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RGB LED and Switch Interfacing

RGB LED and Switch Interfacing
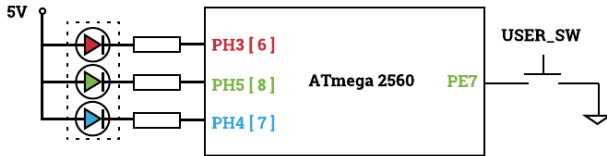
RGB LED and Switch Interfacing
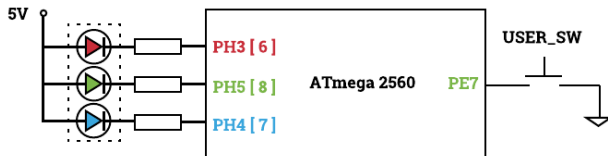
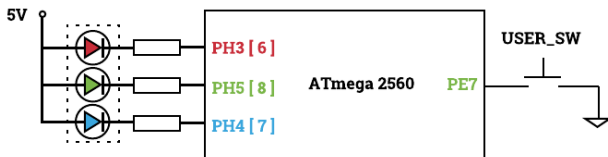- RGB LED Interfacing (Common Anode):

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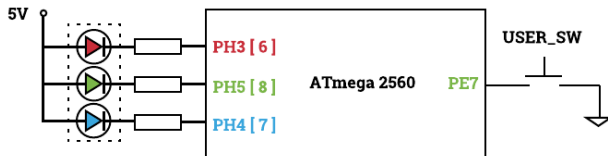
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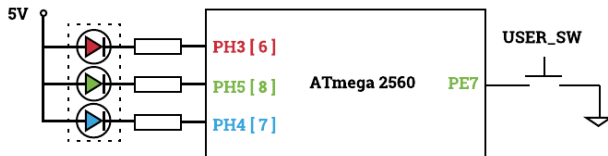 - a PHx = 1 → LED OFF.

RGB LED and Switch Interfacing

- RGB LED Interfacing (Common Anode):
  - **a** PHx = 1 → LED OFF.
  - **b** PHx = 0 → LED ON.

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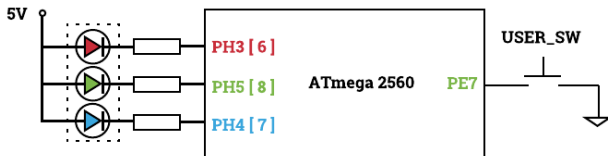 - b. PHx = 0 → LED ON.

RGB LED and Switch Interfacing
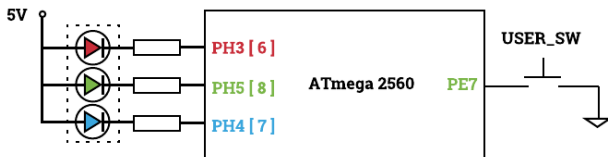
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- Switch Interfacing:
  - **a** PE7 = 1 → Switch not pressed.

RGB LED and Switch Interfacing

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  - **a** PHx = 1 → LED OFF.
  - **b** PHx = 0 → LED ON.

- Switch Interfacing:
  - **a** PE7 = 1 → Switch not pressed.
  - **b** PE7 = 0 → Switch pressed.

Assignment 1

Assignment 1

1. **Problem Statement:**
   Follow the following Diwali pattern on RGB LED:

   - Red
   - Green
   - Blue
   - Yellow (Red + Green)
   - Cyan (Green + Blue)
   - Magenta (Blue + Red)

   Repeat the cycle continuously.

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Overview

- Measures temperature and humidity

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- Temperature Range: 0 to 50 deg. C (+/- 2 deg. C)

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- Temperature Range: 0 to 50 deg. C (+/- 2 deg. C)

- Humidity Range: 20 to 95 % (+/- 5 %)

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- Sampling Rate: 1 Hz (one reading every sec.)

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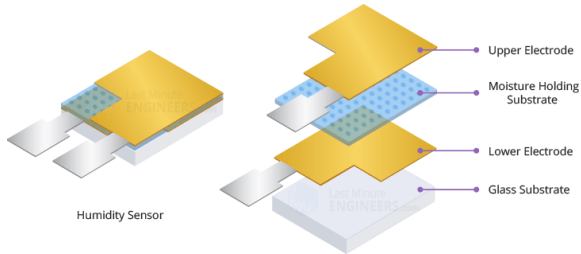Working Principle
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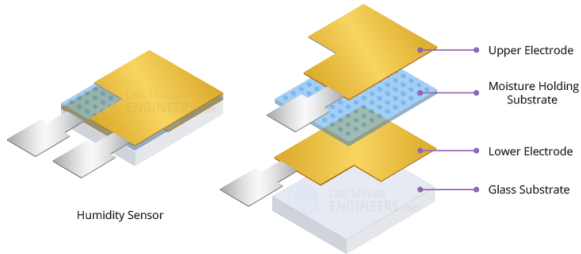Working Principle
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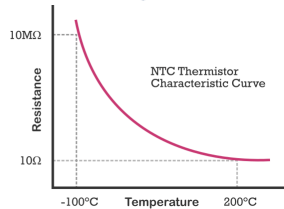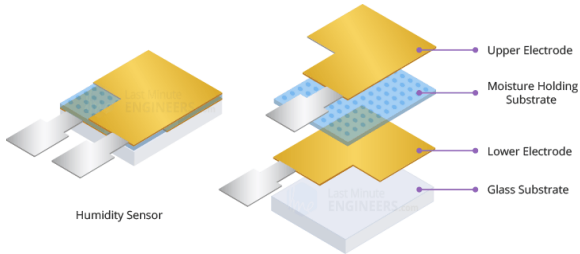
- Max. Current drawn: 2.5 mA (while measurement)

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Working

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Working

Humidity Sensor

- Upper Electrode
- Moisture Holding Substrate
- Lower Electrode
- Glass Substrate

NTC Thermistor

NTC Thermistor Characteristic Curve

Resistance

$10M\Omega$

10Ω

$-100°C$ Temperature $200°C$

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https://www.circuitgeeks.com/arduino-dht11-and-dht22-sensor-tutorial/

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Pinout

VCC
Data
NC
GND

VCC
Data
GND

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Assignment 2

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Assignment 2

1. **Problem Statement:**
   Printing the values of DHT11 on Serial Monitor

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Assignment 2

1. **Problem Statement:**
   Printing the values of DHT11 on Serial Monitor
   - **DHT11 Data Pin** » **PA3 [25]**

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Assignment 2

① **Problem Statement:**
Printing the values of DHT11 on Serial Monitor

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② **Code:**

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❷ **Code:**

```
#include <DHT.h>              // include the DHT sensor library

DHT dht(25, DHT11);           // configure the sensor
dht.begin();                  // initialize the sensor

h = dht.readHumidity();       // get humidity value
t = dht.readTemperature();    // get temperature value

// printing the values on Serial Monitor
Serial.print("Humidity = ");
Serial.print(h);
Serial.print("Temperature = ");
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Thank You!

Post your queries on: helpdesk@e-yantra.org