



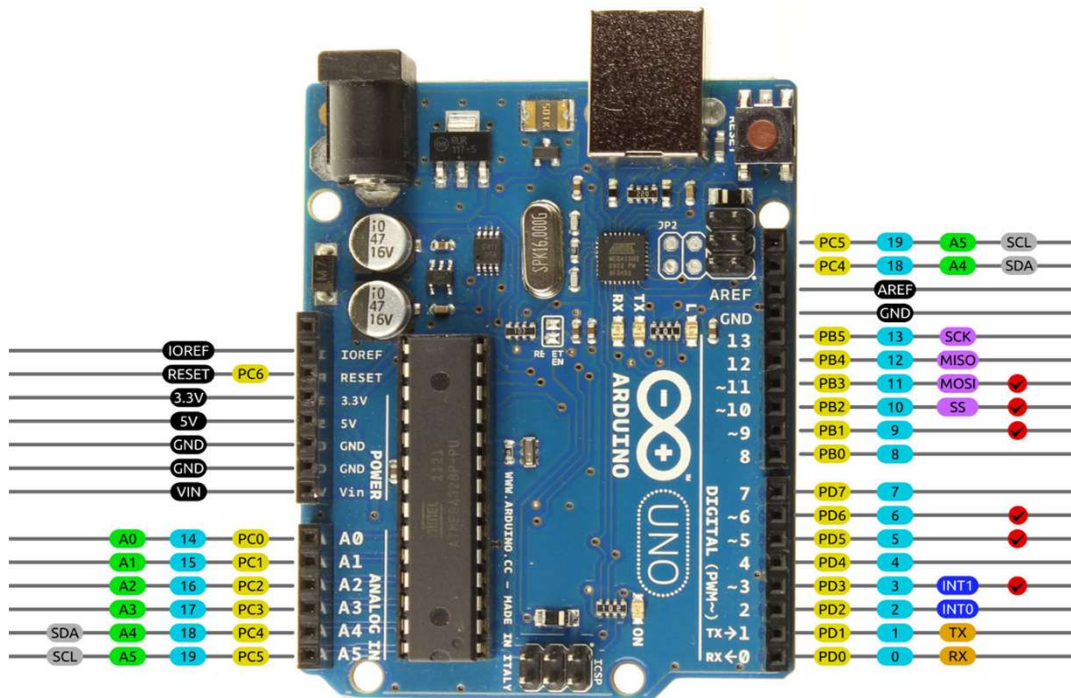
EE3704 Embedded System

Chapter 5

Presented by
Asst. Prof. Dr.Narong Aphiratsakun

Chapter 5: Analog Input

Arduino Uno R3 Pinout



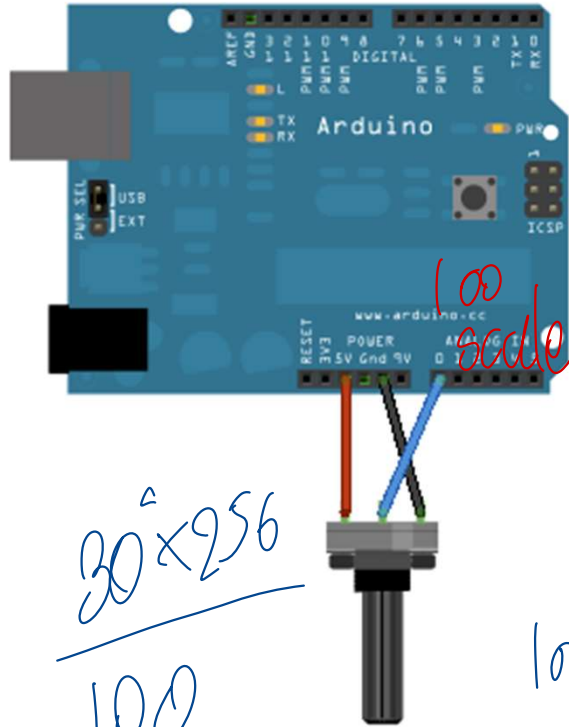
Function:

`analogRead();`

AVR DIGITAL ANALOG POWER SERIAL SPI I2C PWM INTERRUPT

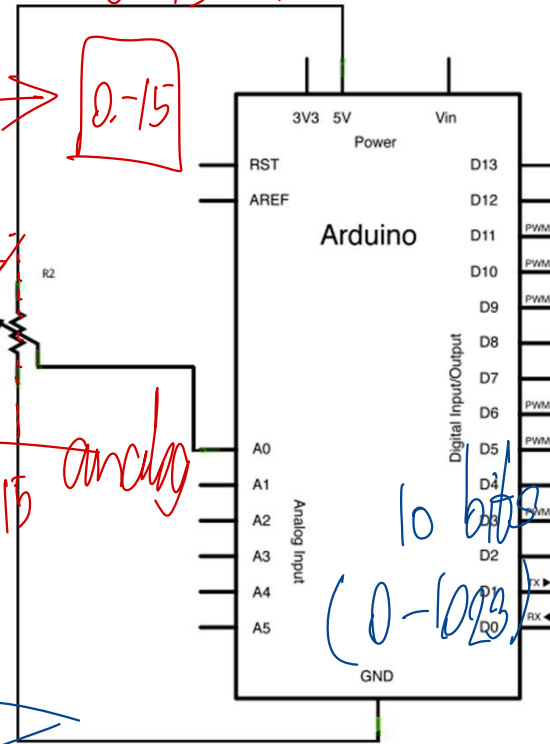
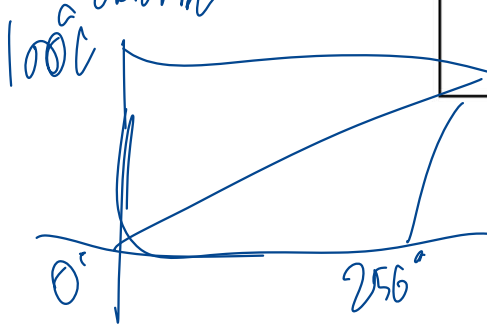
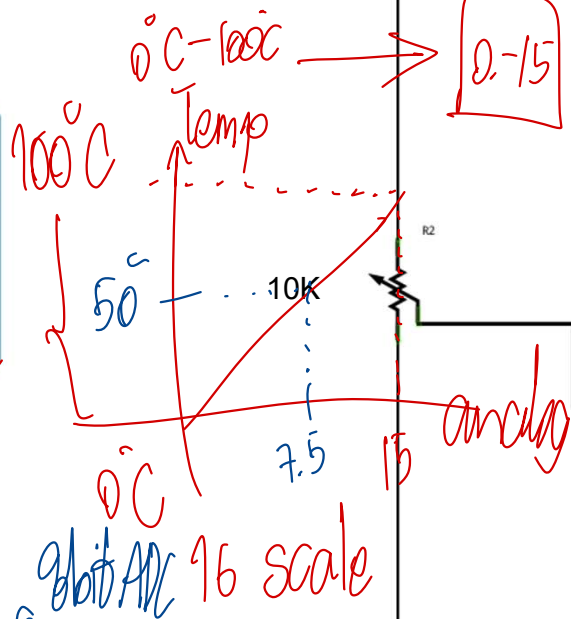
Analog : real data
 temp sensor → data → ADC and digital converter
 range of data 0°C - 100°C
 30°C
 N.C. Read
 4 bits ADC
 ADC and digital converter

Chapter 5: Analog Input



$$\frac{30 \times 256}{100}$$

0°C - 100°C → 0-15 (4 bits)



↑ ADC number at bit
 ↑ resolution

Arduino (5V)
 10 bits
 (0-1023)
 10 Bit ADC

$$\begin{matrix} 5V & = & 1023 \\ \uparrow & & \uparrow \\ 0V & = & 0 \end{matrix}$$

variable output

changing resistance



Chapter 5: Analog Input

Example 5.1: With Potentiometer

- Read the Value from Analog port (Pin A0)
- 0 to 5 V (10bit ADC)
- Serial Monitor will Show between
- 0 V = 0
- 5 V = 1023



Chapter5_example_1

```
int Analog_Input_Value;

void setup()
{
    pinMode(A0, INPUT);
    Serial.begin(9600);
}

void loop()
{
    Analog_Input_Value = analogRead(A0);

    Serial.println(Analog_Input_Value);

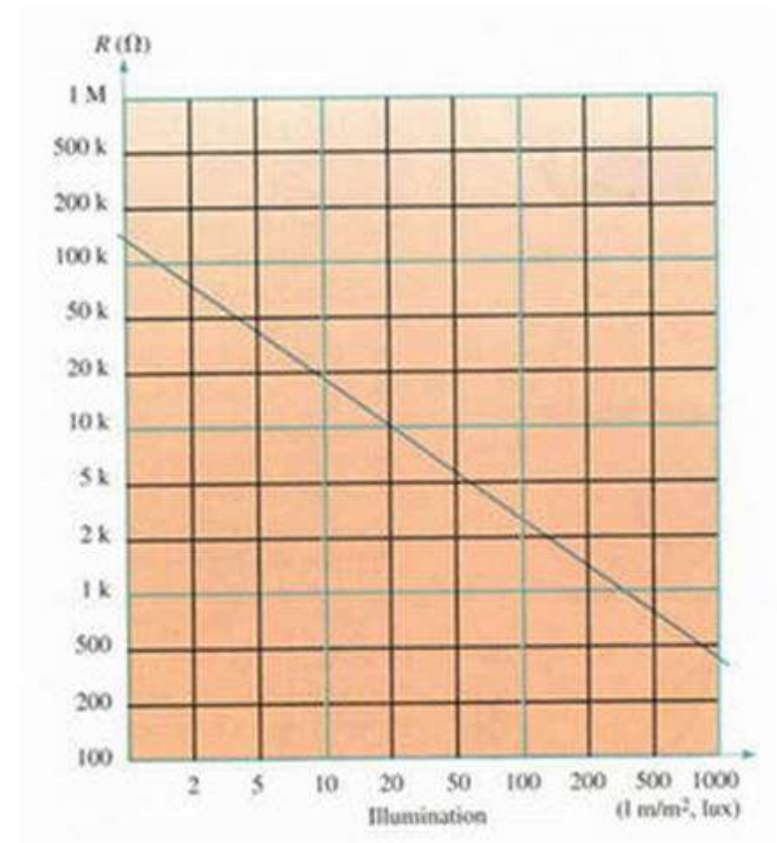
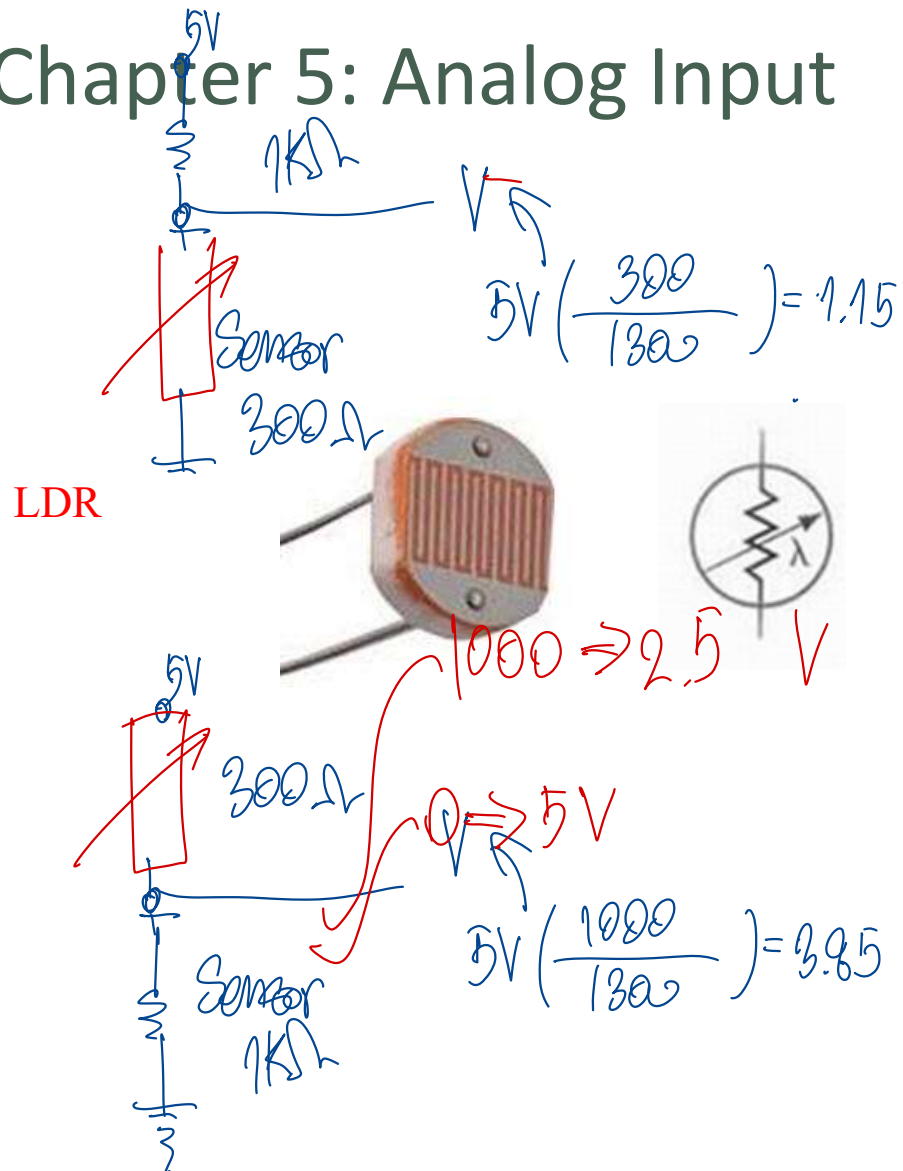
    delay(100);
}
```

Chapter 5: Analog Input

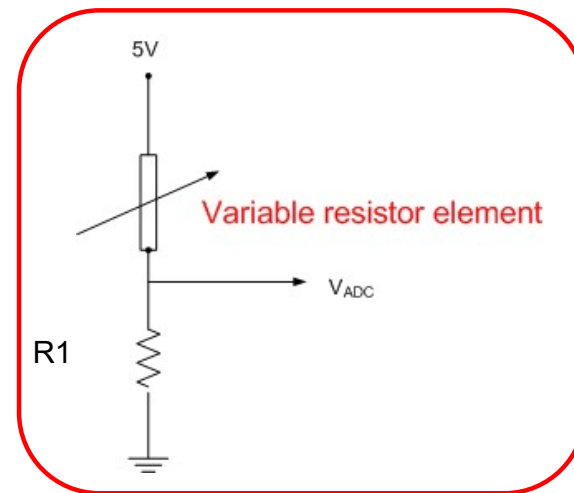
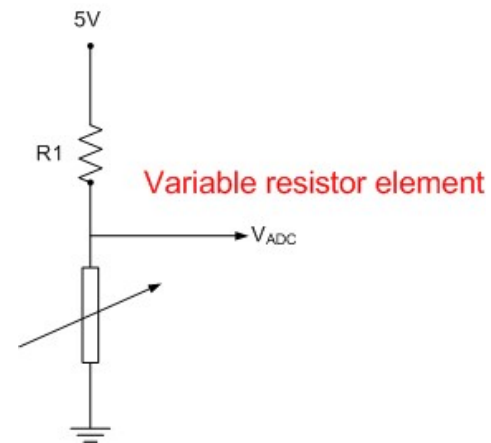
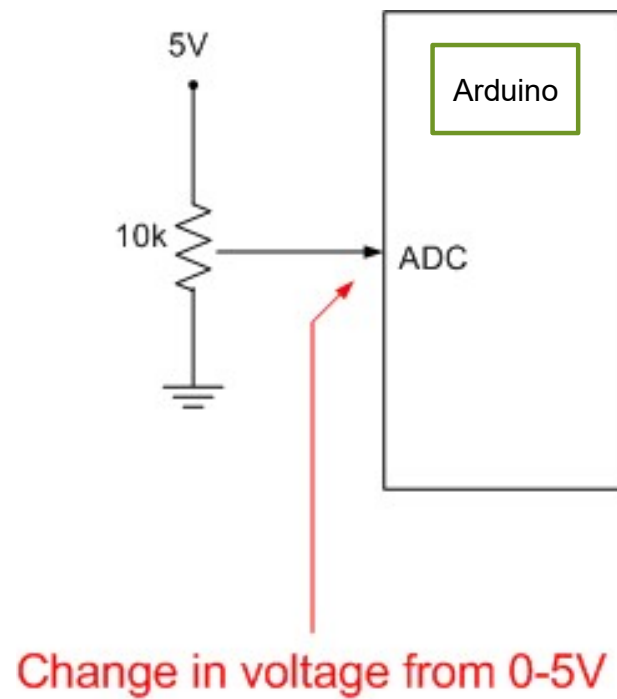
Example 5.2: Perform LED operation when Analog data is as follow

- Analog Input (A0)
 - Value 0 - 255 : only AH-LED1 ON (Pin2)
 - Value 256 - 511 : only AH-LED2 ON (Pin3)
 - Value 512 - 767 : only AH-LED3 ON (Pin4)
 - Value 768 - 1023 : only AH-LED4 ON (Pin5)
- Show circuit diagram, Coding, results (LEDs and serial data of analog value)

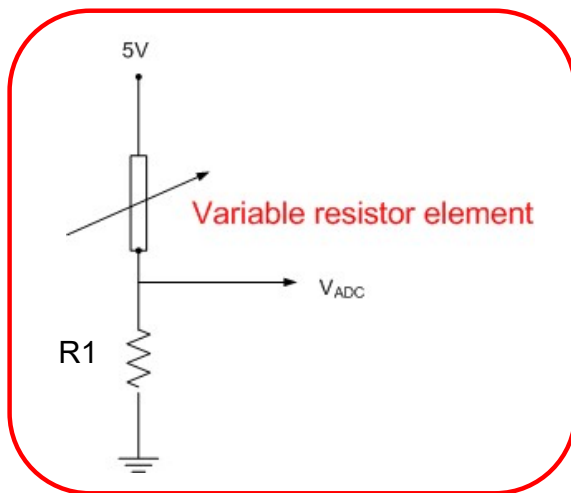
Chapter 5: Analog Input



Chapter 5: Analog Input



Chapter 5: Analog Input



When Light is Bright , Analog data = 1000

When Light is mid-Bright , Analog data = 600

When Light is dim , Analog data = 600

Chapter 5: Analog Input

Example 5.3: Perform LED operation when Analog data from LDR is

- LDR is at A0
 - Light is bright : (AH) LED1 ON
 - Light is moderate : (AH) LED1 and LED2 ON
 - Light is dim : (AH) LED1, LED2 and LED3 ON
- *AL-LEDS: Pin 2,3,4
- Show circuit diagram, Coding, results (LEDs and serial data of analog value)

Chapter 5: Analog Input as digital input/output

Set Analog port Ax to be digital input/output

- Analog ports can be set as digital input or output by pinMode (or DDRx) functions.

```
void setup()
{
    Serial.begin(9600);
    pinMode(A5, OUTPUT);
}

void loop()
{
    digitalWrite(A5, HIGH);
    delay(1000);
    digitalWrite(A5, LOW);
    delay(1000);
}
```

