Robotics

**Unit 3 User’s Guide**

Introduction to the Arduino

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**CONTENT OF UNIT 3 SLIDES**

**Unit 3 : Introduction to Arduino**

**Section 1: Microcontrollers**

* The Arduino
* Examples of what can be built (pictures and videos online are fine)
* Arduino Specifics
* Basic hardware overview
  + power pins, etc

**Section 2: Basic software overview**

* IDE
* The loop and setup functions
* combining hardware and software
  + intro to digital write and digital pins
  + pinMode(output)
* LED project
* Analogwrite
* PWM
* LED brightness control
* Digital reads

**Section 3:pinmode(input)**

* button project
* Analog Reads and the analog pins
* the Map function
* pot for LED brightness project
* Some project that involves all four
* Getting information from the Arduino
* The serial Monitor
* Serial Writes
* printing input from a pot

# OVERVIEW

# Students will explore the use of microcontrollers through different means. This unit is an introduction to Arduino. Students will explore Microcontrollers through different means. Students will learn the basics of electric Arduino Uno board and the Arduino IDE. Student will learn why the Arduino board was chosen. At the end of this unit students should be able to build a circuit using a breadboard, an Arduino board and an LED. Students will learn to control an LED brightness using a potentiometer and an Arduino uno. This unit contain several activities that illustrated the above descriptions.

# FOCUS STANDARDS

# From our experience implementing this unit, we have selected these focus standards.

* Describe what Microcontrollers are.
* Describe what an Arduino Uno is.
* Describe what an Arduino IDE is.
* Go over Breadboard to refresh their memory briefly.
* Explain all the pins (used in this unit) that are located on the Arduino board.
* Explain the difference between Analog and digital pins.
* Describe how to use the following commands : digitalRead analogWrite and delay.
* Show how to get the Arduino IDE to connect to your specific board.
* Explain the serial Monitor on the Arduino IDE.

# OBJECTIVES

These set objectives are to be checked at the end of this unit. Students should know the minimum of the following objectives to move forward.

* Students should know what a microcontroller is and why they are used.
* Students should what an Arduino Uno is.
* Student should be able to tell the difference between the pins and other ports located on the Arduino Uno.
* Students should know Power is delivered to the Arduino Board and how we can the Arduino to power other components.
* Student should know what The Arduino IDE is and how it used to program the Arduino board.
* Students should know how to use the Pinmode command in the IDE.
* Compare and contrast Input vs Output.
* Students should know how to open The serial monitor and what it displayed.

# SAMPLE ACTIVITIES

The activities listed below are to be completely by the end of this unit. All of are designed and built using the material covered in this unit.

* **The Arduino IDE**

**How to use and do the following:**

* + **Tools**
    - **Connect a new board**
  + **Identify all the important buttons**
  + **Set up and Loop function**
  + **DigitalWrite**
  + **Delays**
  + **AnalogWrite**
* **A blinking LED**
* **Analog Read Challenge**
* **The Serial Monitor Challenge**

# TERMINOLOGY

* **Microcontroller** : is like a small computer
* **Arduino Uno** : s a microcontroller that is very popular with hobbyists and is inexpensive.
* **Pins and Ports:** 
  + **USB**
  + **Barrel Jack**
  + **Ground Pins**
  + **Reset Button**
  + **Voltage Pins**
  + **Digital Pins**
  + **Analog Pins**
* **Arduino IDE**
* **Inputs**
* **Outputs**
* **PWM**
* **Variables types**
  + **Integer (int)**
* **Arduino Commands**
  + **pinMode**
  + **digitalWrite**
  + **digitalRead**
  + **delay**
  + **analogWrite**
  + **analogRead**
  + **Serial.begin**
* **PinMode**
* **Analog vs Digital**
* **Serial Monitor**

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