

Microcontroller Basics

UQMARS

March 25, 2023

Microcontroller Development Board options

- Arduino Family
 - Arduino Uno (ATmega328P)
 - Arduino Mega (ATmega2560)
 - Ardiono Nano (ATmega328P)
- Raspberry Pi Family
 - Raspberry Pi Model B
 - Raspberry Pi Zero
 - Raspberry Pi Pico
- Espressif Family
 - ESP8266 Development Boards
 - ESP32 Development Boards

How to choose your board

The best way to choose the board that suits you is to fully analyse what you need the board for. Knowing your use case will allow you put constraints on various factors such as cost, size, number of GPIO pins, power usage, memory ..

Basic Microcontroller Programming - Intro to the Arduino IDE

Introduction to IDE

Installing Arduino IDE from website.

Checking whether you can find your board - Install CP2102 USB to UART Bridge Driver

Adding the ESP32 Add-on to the Arduino IDE

Introduce the IDE what the power it offers. Such as Serial Monitor ...

Introduce basics of setup and block loop

Simple Blink LED

Blinking an LED is the equivalent to hello world in the embedded world. The figure below shows how the LED can be wired to a GPIO pin.

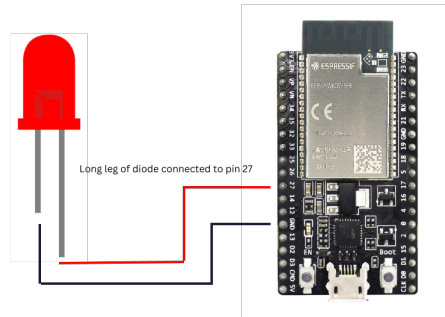


Figure 1: LED Wiring

Button Input to turn on LED

Teaches students how to handle input.

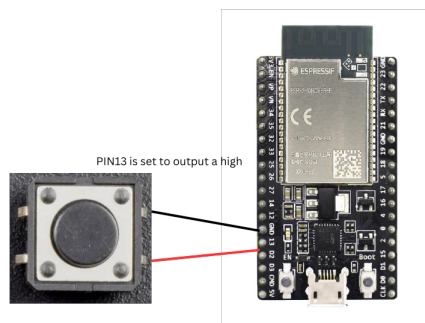


Figure 2: Button Wiring

PWM

PWM for things such as motors and SG90 servos.

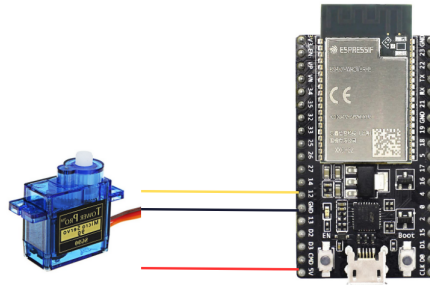


Figure 3: Servo wiring

Advanced Lessons

Wireless Communication

Wireless communication is essential for remotely operated devices/robotics. Although not required, you are usually encouraged to use wireless communication in the ENGG1100 and METR2800 group projects. Alternatively, many groups use a long USB cable to remotely operate their machine - yuck. After this tutorial you will hopefully gain the confidence to blah blah....

How to program Microcontroller with C

<https://docs.espressif.com/projects/esp-idf/en/latest/esp32/>