

Introduction to ESP32

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Agenda for Discussion

1 Intro to ESP32

- Features
- Peripherals
- Platforms to work with ESP32

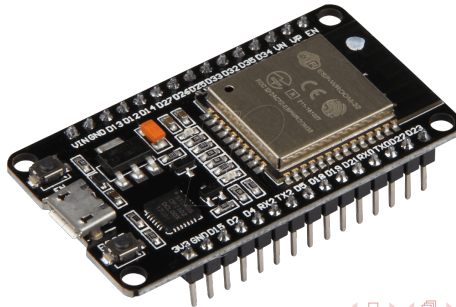
2 Peripherals

- GPIO
- PWM
- ADC
- Interrupts



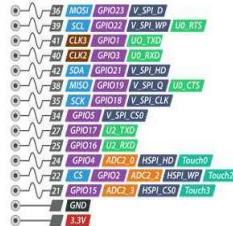
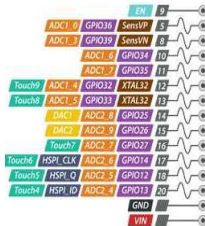
Features

- Dual Core
- 80, 160 or 240 MHz
- ULP co-processor
- 512KB SRAM
- 4-8MB external
- WiFi
- Bluetooth

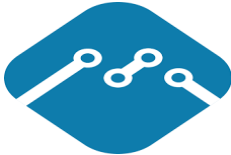
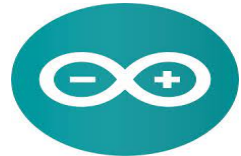


Peripherals

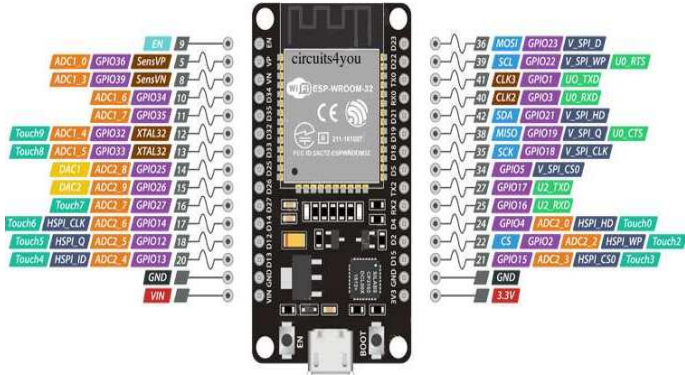
- 12-bit ADC, 18 Channel
- UART : 3
- SPI : 4
- I2C : 2
- Upto 36 GPIO's
- 10 Capacitive touch sensors
- Hall-effect sensor



Platforms to work with ESP32



GPIO



Contd.

- Total 48 pins
- 36 GPIOs
- GPIOs 34 to 39 are GPs – input only pins.
- 10 internal capacitive touch sensors



Program Snippet

Initialization

```
const int buttonPin = 0;  
const int ledPin = 2;  
int buttonState = 0;
```

setup() function

```
void setup()  
{  
  pinMode(ledPin, OUTPUT);  
  pinMode(buttonPin, INPUT);  
}
```



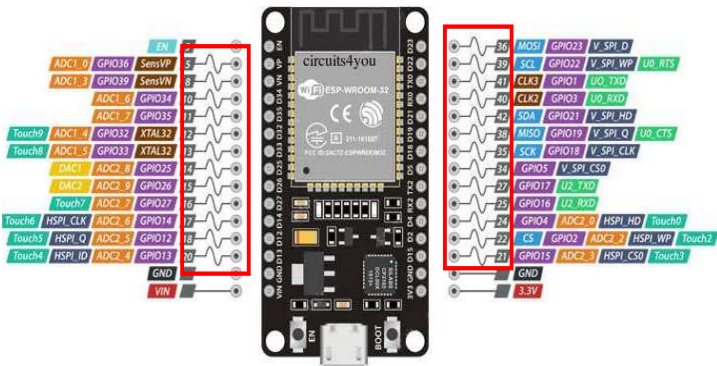
Program Snippet

loop() function

```
void loop()
{
    buttonState = digitalRead(buttonPin);
    if (buttonState == HIGH)
    {
        digitalWrite(ledPin, HIGH);
    }
    else
    {
        digitalWrite(ledPin, LOW);
    }
}
```



PWM



Contd.

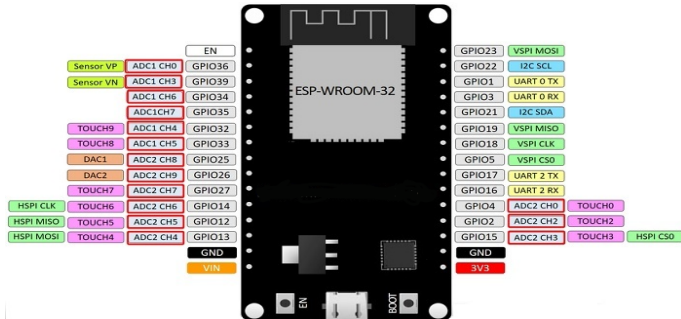
To set a PWM signal, you need to define these parameters in the code:

- Signal's frequency
- Duty cycle
- PWM channel
- GPIO where you want to output the signal



ADC

ESP32 DEVKIT V1 - DOIT



ADC- Functions

- `analogRead()`
- `analogReadResolution(resolution)`
- `analogSetWidth(width)`
- `analogSetCycles(cycles)`
- `adcAttachPin(pin)`
- `adcStart(pin)`, `adcBusy(pin)` and `resultadcEnd(pin)`



Interrupts

- All the GPIO pins can be configured to function as interrupt request inputs.
- `attachInterrupt()`
 - GPIOPin
 - ISR
 - Mode

LOW	Triggers interrupt whenever the pin is LOW
HIGH	Triggers interrupt whenever the pin is HIGH
CHANGE	Triggers interrupt whenever the pin changes value, from HIGH to LOW or LOW to HIGH
FALLING	Triggers interrupt when the pin goes from HIGH to LOW
RISING	Triggers interrupt when the pin goes from LOW to HIGH



Interrupt Service Routine

Interrupt Service Routine is invoked when an interrupt occurs on any GPIO pin. Its syntax looks like below.

ISR

```
void IRAM_ATTR ISR() { Statements; }
```



Thank You!

Post your queries at: helpdesk@e-yantra.org/

