



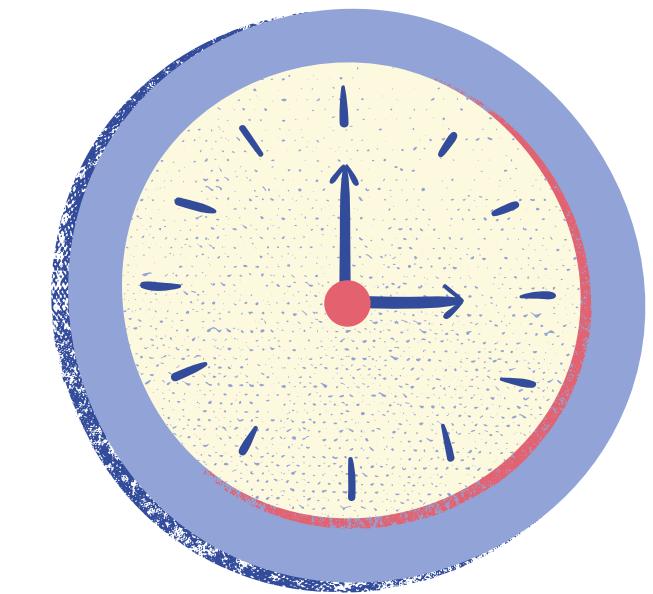
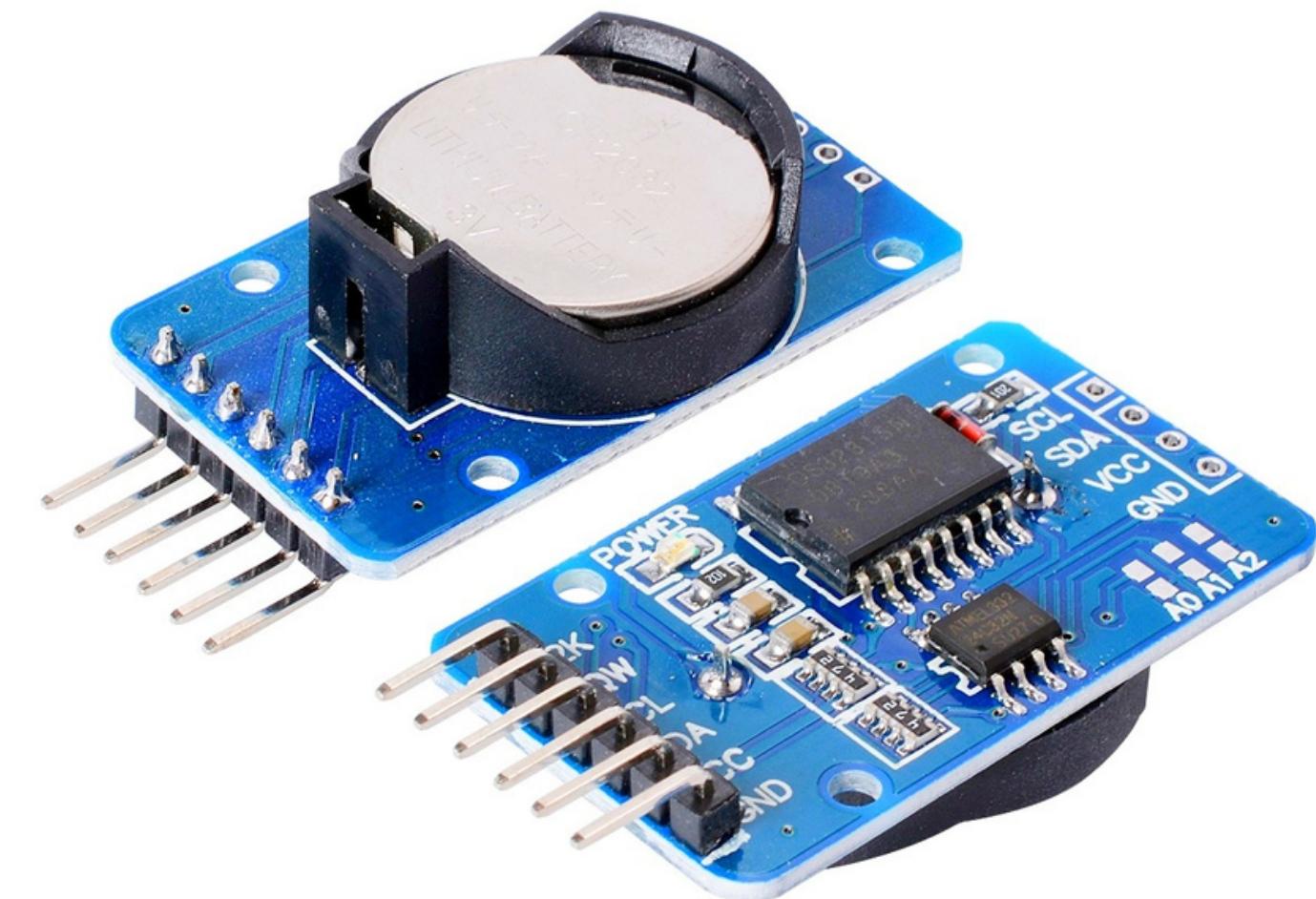
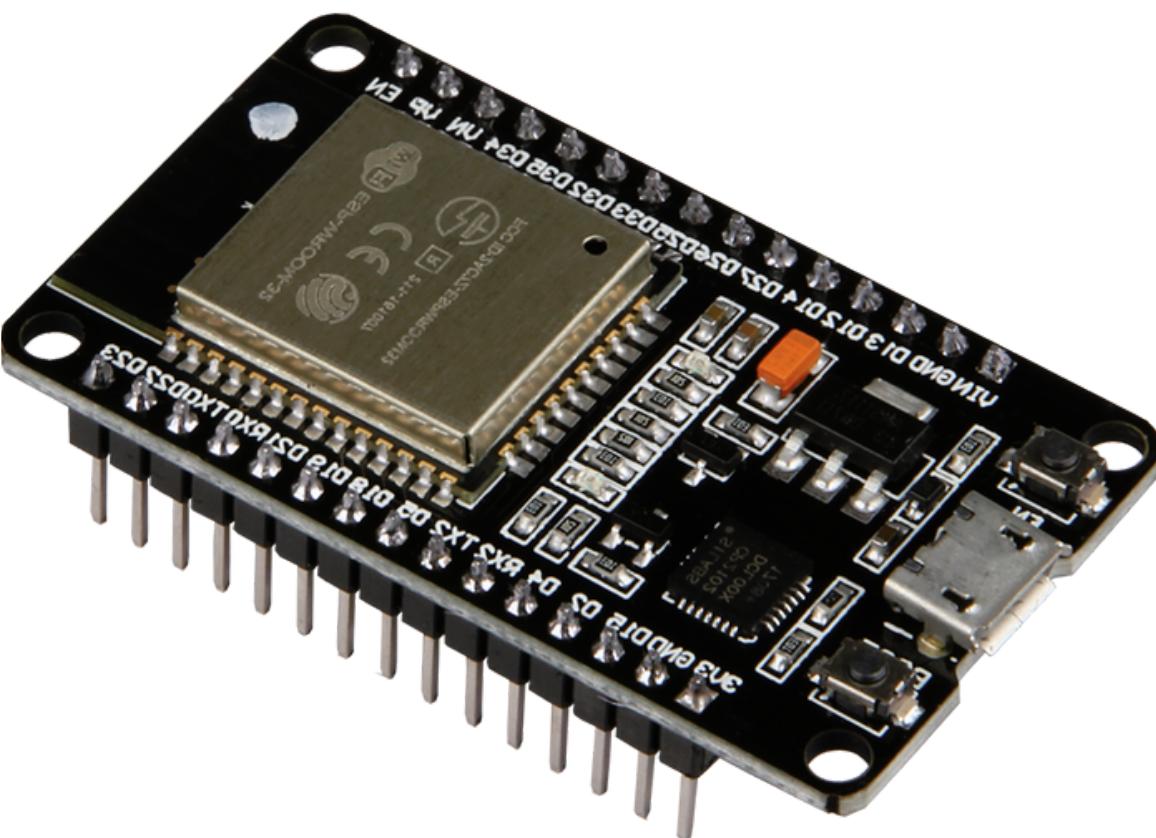
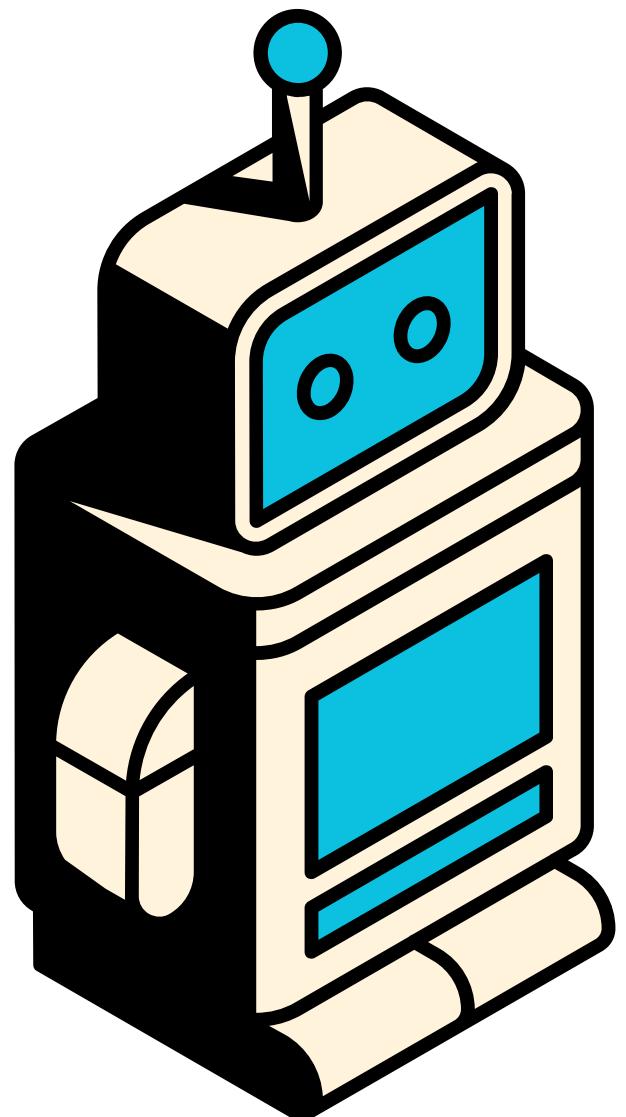
D Y PATIL  
INTERNATIONAL  
UNIVERSITY  
AKURDI PUNE

# EMBEDDED SYSTEM DESIGN

## PRACTICAL - 5

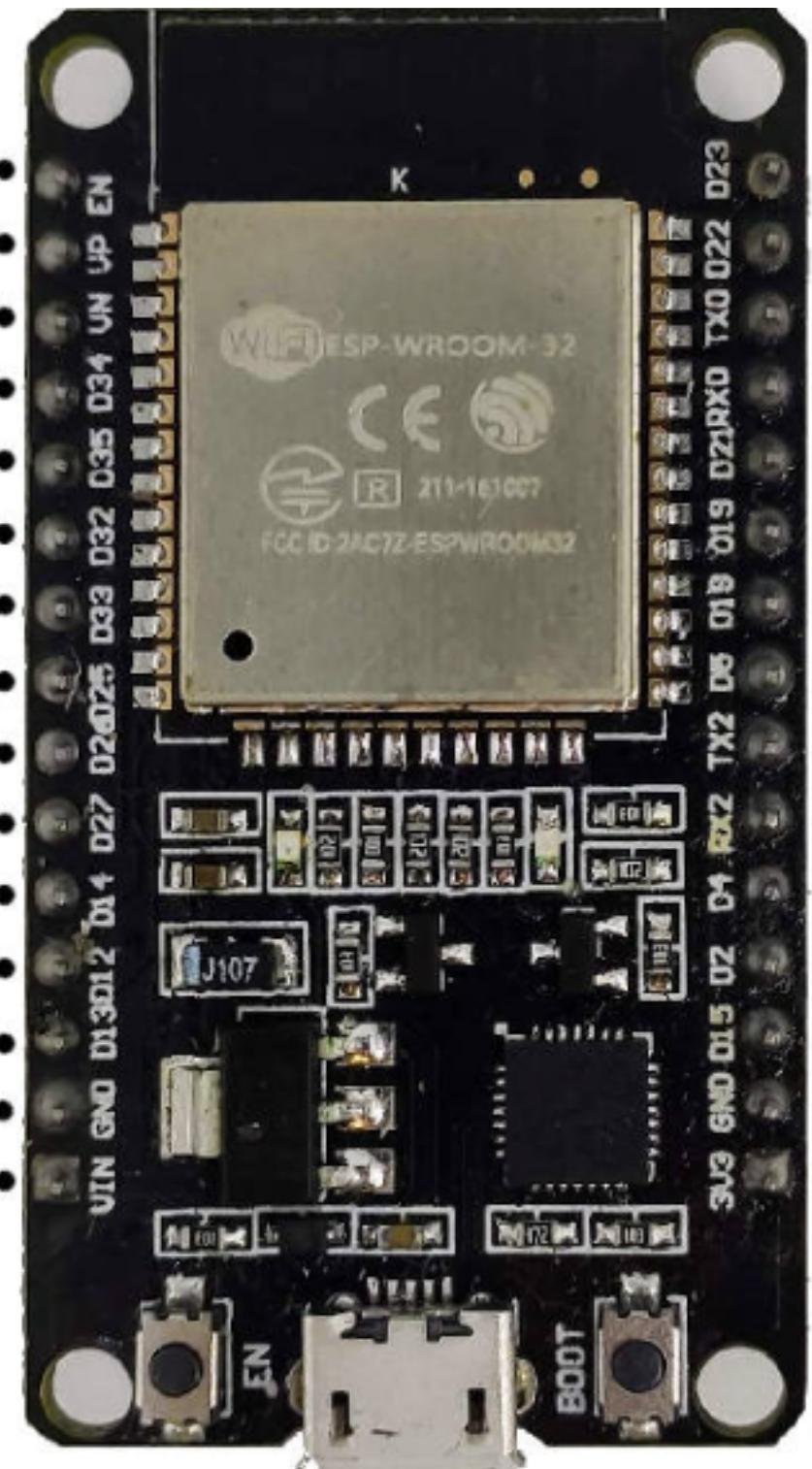
### INTERFACING RTC

By Divesh Jadhwanı



# ESP32 PINOUT

<b>Input only</b>	RTC GPIO0	SensVP	ADC1_0	GPIO36	5
<b>Input only</b>	RTC GPIO3	SensVN	ADC1_3	GPIO39	8
<b>Input only</b>	RTC GPIO4	ADC1_6	GPIO34	10	
<b>Input only</b>	RTC GPIO5	ADC1_7	GPIO35	11	
RTC GPIO9	Xtal32P	Touch9	ADC1_4	GPIO32	12
RTC GPIO8	Xtal32N	Touch8	ADC1_5	GPIO33	13
DAC 1	RTC GPIO6	ADC2_8	GPIO25	14	
DAC 2	RTC GPIO7	ADC2_9	GPIO26	15	
RTC GPIO17	Touch7	ADC2_7	GPIO27	16	
RTC GPIO16	Touch6	HSPI_CLK	ADC2_6	GPIO14	17
RTC GPIO15	Touch5	HSPI_Q	ADC2_5	GPIO12	18
RTC GPIO14	Touch4	HSPI_ID	ADC2_4	GPIO13	20
			GND		
			VIN		



36	GPIO23	V_SPI_D	MOSI
39	GPIO22	V_SPI_WP	SCL
41	GPIO1	TXD 0	CLK3
40	GPIO3	RXD 0	CLK2
42	GPIO21	VSPI_HD	SDA
38	GPIO19	V_SPI_Q	MISO
35	GPIO18	V_SPI_CLK	SCK
34	GPIO5	V_SPI_CS0	SS
27	GPIO17	TXD 2	
25	GPIO16	RXD 2	
24	GPIO4	ADC2_0	HSPI_HD
22	GPIO2	ADC2_2	HSPI_WP0
21	GPIO15	ADC2_3	HSPI_CS0
		GND	Touch3
		3.3v	RTC GPIO13

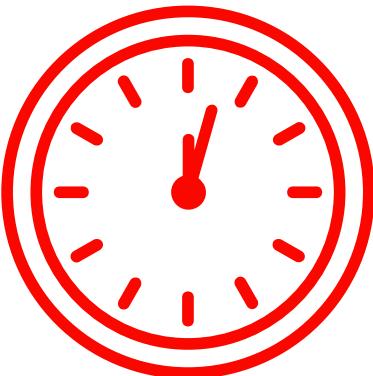
**240 MHZ (DUAL CORE  
PROCESS  
4MB FLASH MEMORY  
520 KB RAM**

# **ESP32 PINOUT**

- 34 PROGRAMMABLE GPIOS
- 18 12-BIT ADC CHANNELS
- 2 8-BIT DAC CHANNELS
- 16 PWM CHANNELS - INTENSITY
- 3 UART INTERFACES - ADD
- 3 SPI INTERFACES - MEMORY
- 2 I2C INTERFACES - SDA AND SCL
- 10 CAPACITIVE TOUCH SENSING GPIOS
- 16 RTC GPIOS - DATE AND TIME

# WHAT IS THE MEANING OF RTC IN A SYSTEM?

## RTC MODULE



### REAL-TIME CLOCK

A REAL-TIME CLOCK (RTC) IS AN INTEGRATED CIRCUIT THAT CONTAINS A TIMER THAT SUPPLIES THE TIME OF DAY (AND OFTEN, THE DATE).

A REAL TIME CLOCK, OR RTC, IS A DIGITAL CLOCK WITH A PRIMARY FUNCTION TO KEEP ACCURATE TRACK OF TIME EVEN WHEN A POWER SUPPLY IS TURNED OFF OR A DEVICE IS PLACED IN LOW POWER MODE

ESP 32 DEEP SLEEP



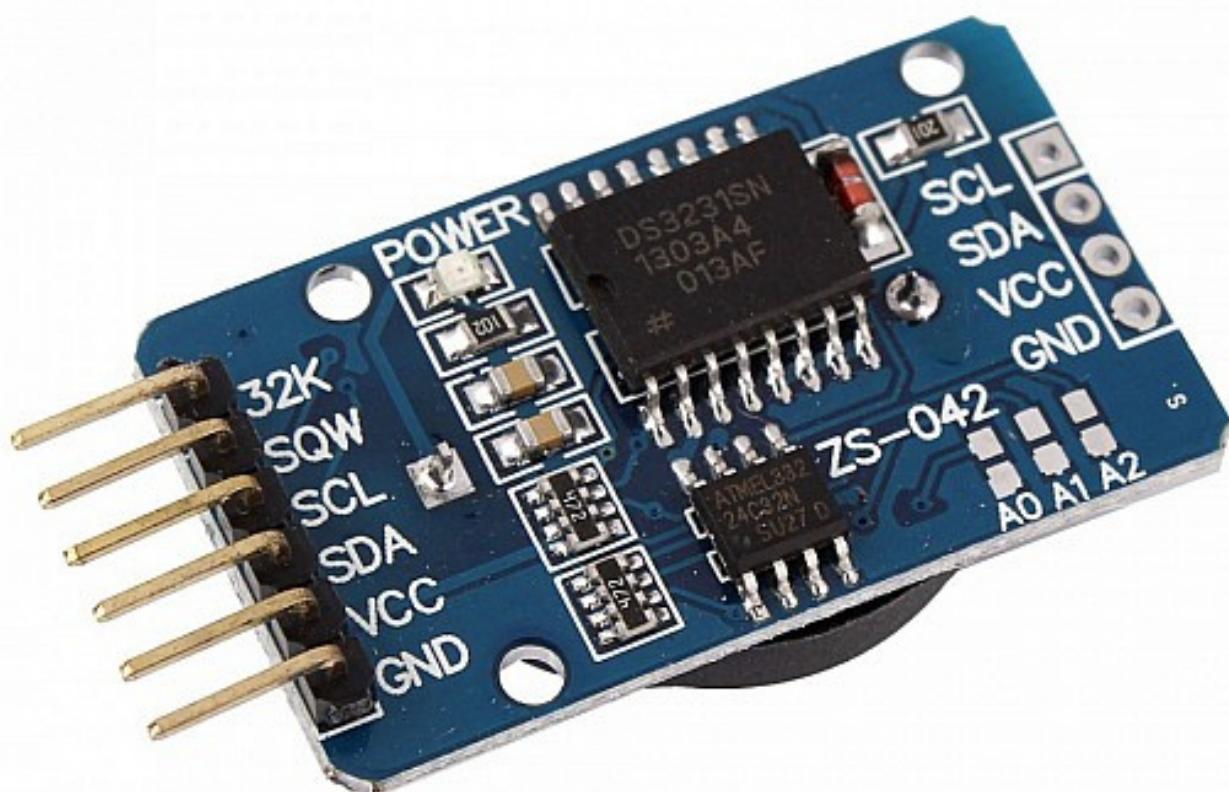
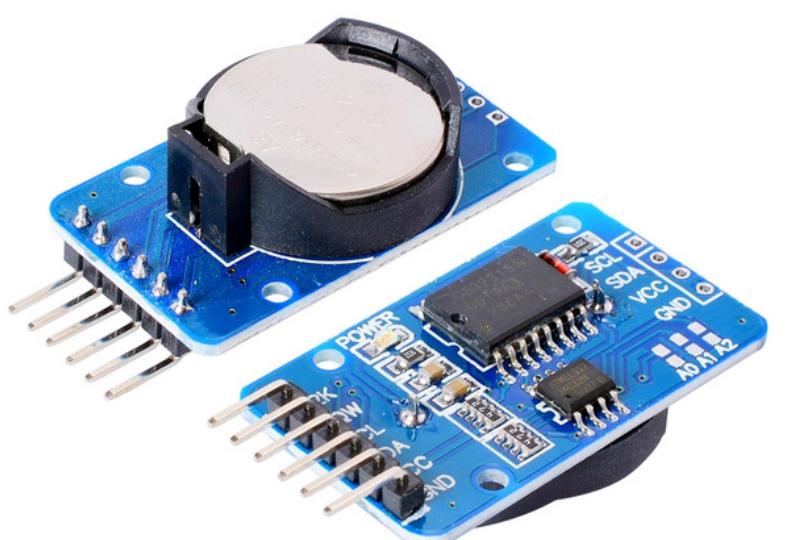
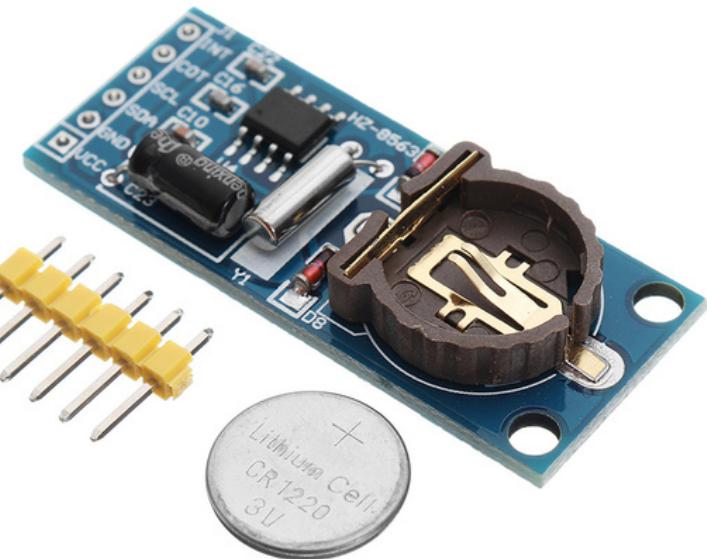
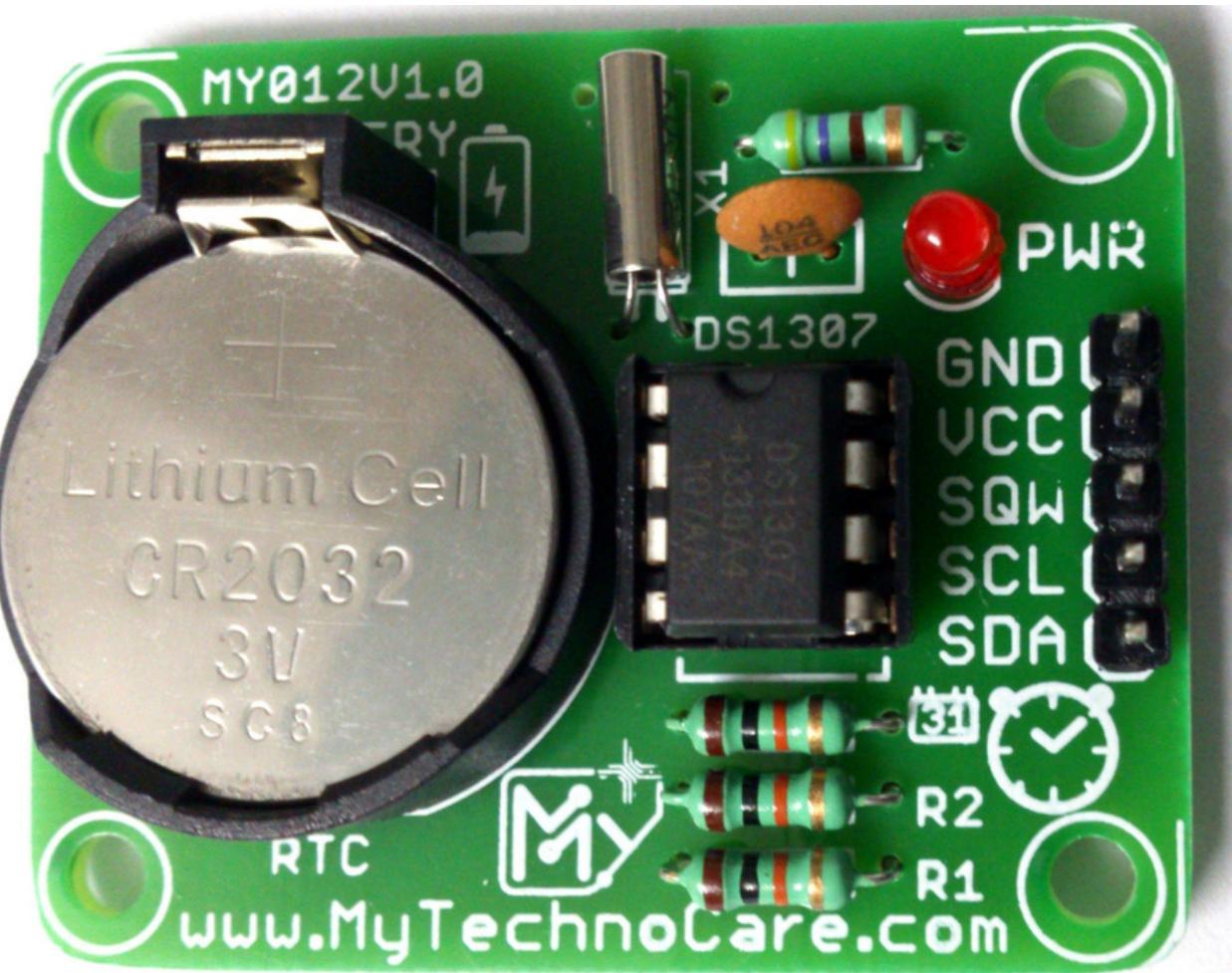
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# Sleep Modes

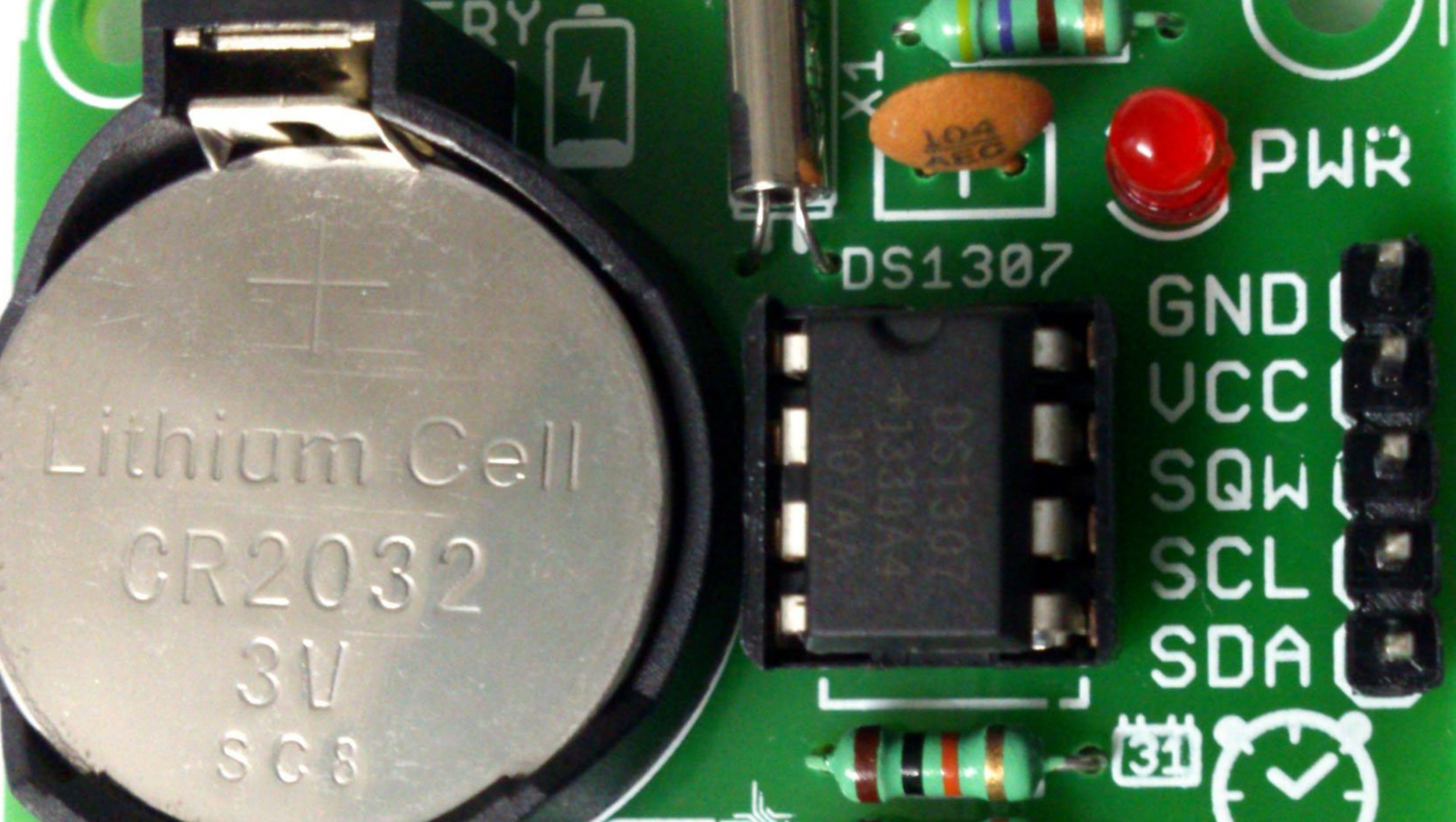
In Light-sleep mode, the digital peripherals, most of the RAM, and CPUs are clock-gated and their supply voltage is reduced. Upon exit from Light-sleep, the digital peripherals, RAM, and CPUs resume operation and their internal states are preserved.

In Deep-sleep mode, the CPUs, most of the RAM, and all digital peripherals that are clocked from APB\_CLK are powered off. The only parts of the chip that remain powered on are:

- RTC controller
- ULP coprocessor
- RTC FAST memory
- RTC SLOW memory



**BATTERY - MAINTAINS ACCURATE  
TIMEKEEPING WHEN THE MAIN POWER TO  
THE DEVICE IS INTERRUPTED.**



Lithium Cell  
CR2032  
3V  
SC3

DS1307

PWR

GND

UCC

SQW

SCL

SDA

**IN THE CONTEXT OF THE ESP32, YOU CAN USE THE SQW SIGNAL TO WAKE UP THE ESP32 FROM A DEEP SLEEP MODE AT SPECIFIC INTERVALS, ALLOWING THE DEVICE TO PERIODICALLY EXECUTE TASKS WHILE CONSERVING POWER.**



Industrial Robots



GPS Receivers



Digital Cameras

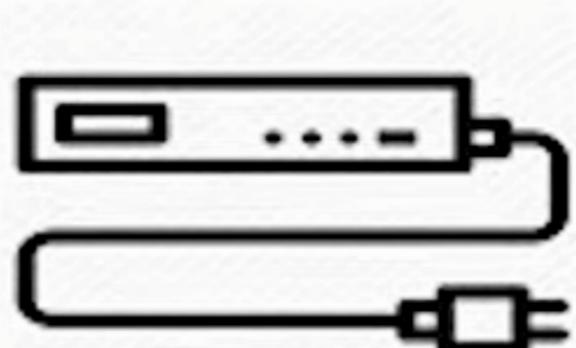


DVD Players



Wireless Routers

# Embedded Systems



Set top Boxes



Gaming Consoles



Photocopiers

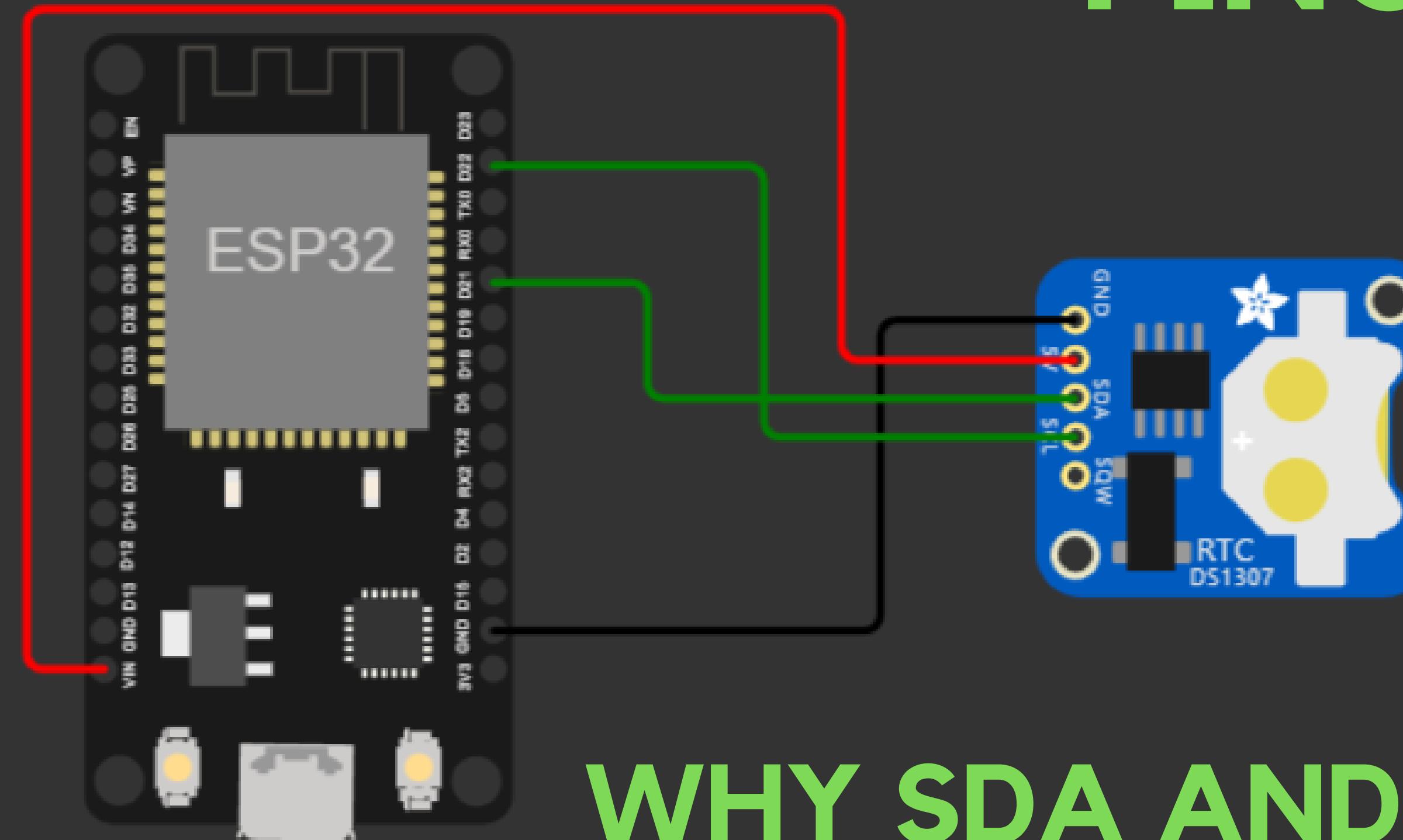


MP3 Players



Microwave Ovens

# PINOUT



**WHY SDA AND SCL ON PARTICULAR PINS?**

```
from machine import I2C, Pin
from time import sleep
from ds1307 import DS1307

# address = addr=0x68

i2c_rtc = I2C(0, scl=Pin(22), sda=Pin(21), freq=400000)
rtc = DS1307(i2c_rtc)

while True:
    (Y, M, D, day, hr, m, s, p1) = rtc.datetime()
    print("Current Date and Time: {}-{}-{} {}:{}:{}{}".format(Y, M, D, hr, m, s))
    sleep(1)
```



**GAME  
ON**

**GAME  
ON**

## **TASKs**

**Alarm clock , use buzzer**

**Relay , stopwatch etc**

**LCD display Time , a clock**

# THANK YOU

dypiu.ac.in