A decorative graphic on the left side of the slide, consisting of a light blue circuit board pattern with various lines and circular nodes.

THE ESP SERIES OF SYSTEMS ON A CHIP FOR PROTOTYPING IOT DEVICES

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WHAT YOU WILL HAVE TO SIT THROUGH WHILE SECRETLY CHECKING YOUR PHONE

- The ESP in context
- Details of the ESP32 and Lolin D32 Pro
- Pros and Cons of the D32 Pro for learning micros
- Demos and play time -- tell me what I have missed

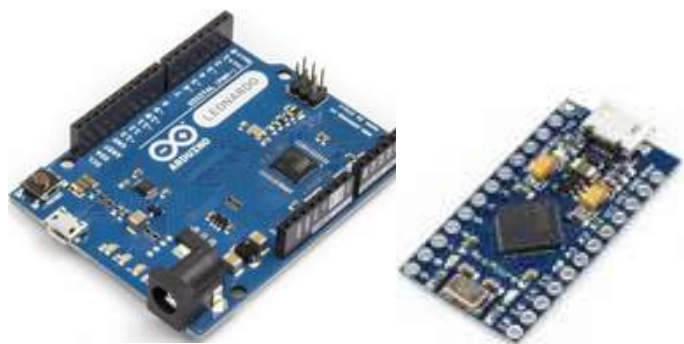
(If you're just too ADD for this, go to <http://robot50.net/workshops/esp32-workshop/> and start playing with the board)

THE ESP IN CONTEXT – MICRO PLATFORM ASPIRATIONS FOR INTRO TO RAPID PROTOTYPING COLLEGE CLASS

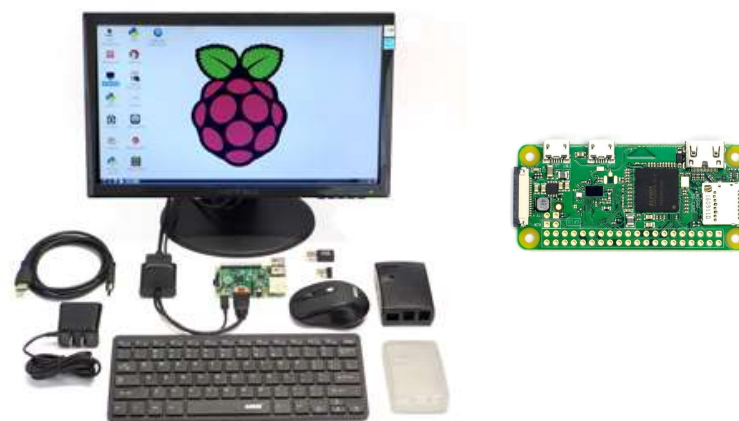
1. Suitable for complete beginnings to intermediate level complete prototypes
2. Flexibility in programming languages
3. Open-ish source-ish
4. Cheap
5. Well supported with tutorials, community, and cheap external sensors and accessories (in breadboardable form)
6. Rugged and easy to mount in 3D printed projects
7. Simple set up
8. Connected

THE ESP IN CONTEXT – A RANGE OF POSSIBILITIES

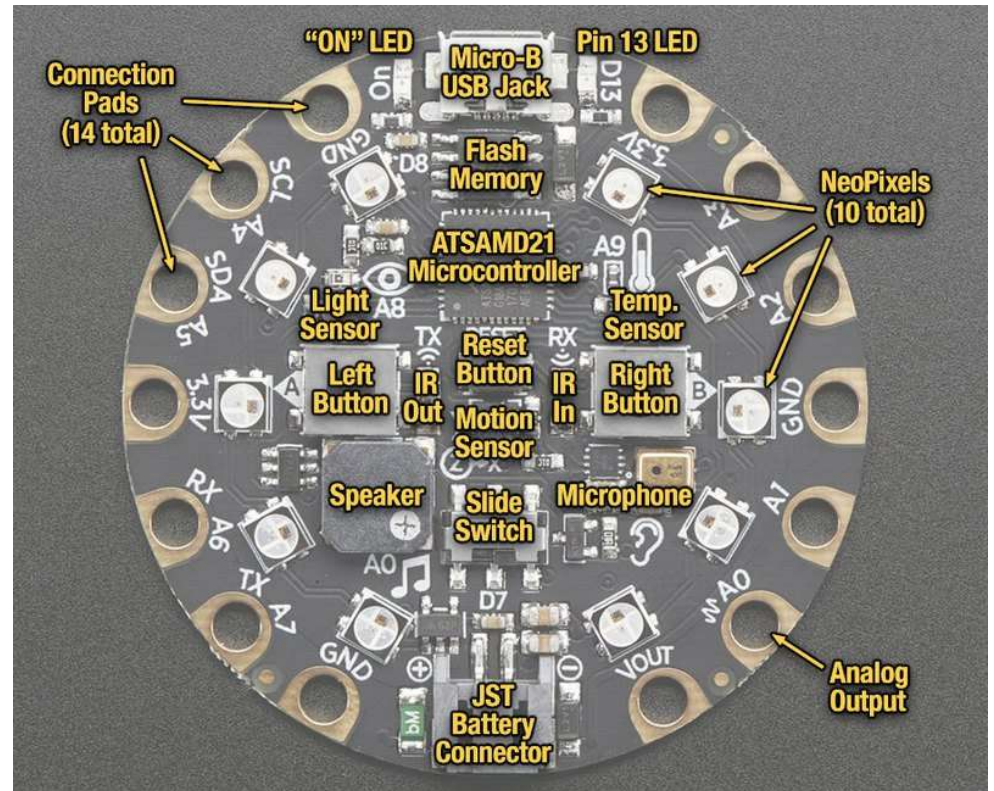
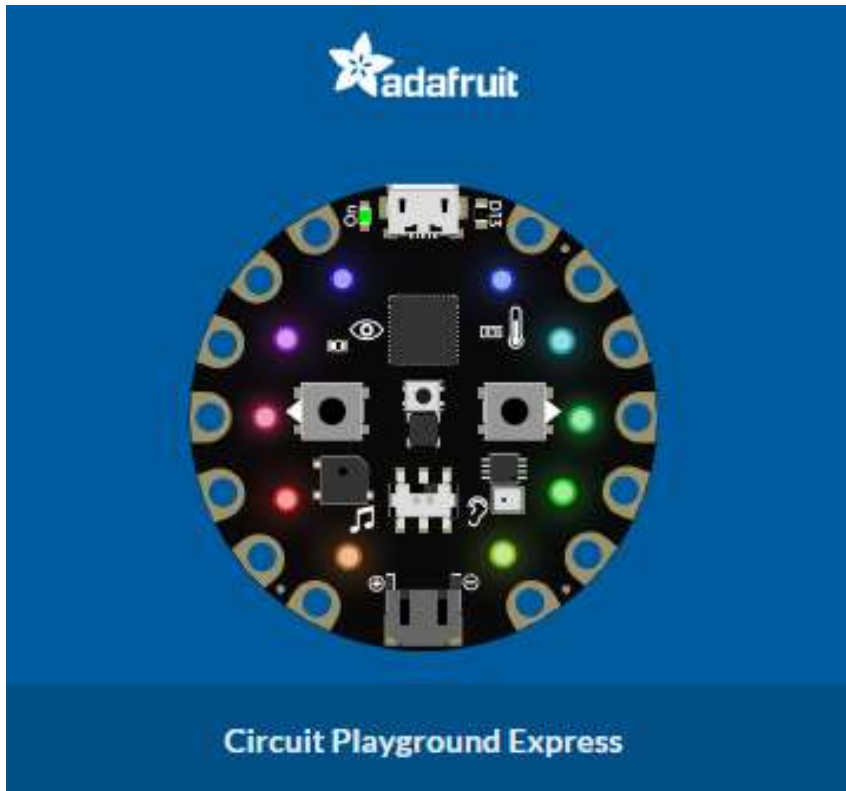
Arduino



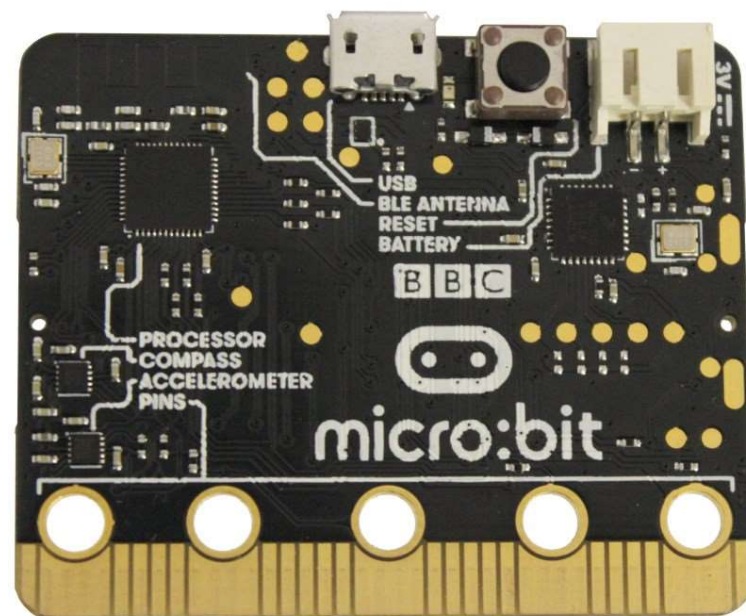
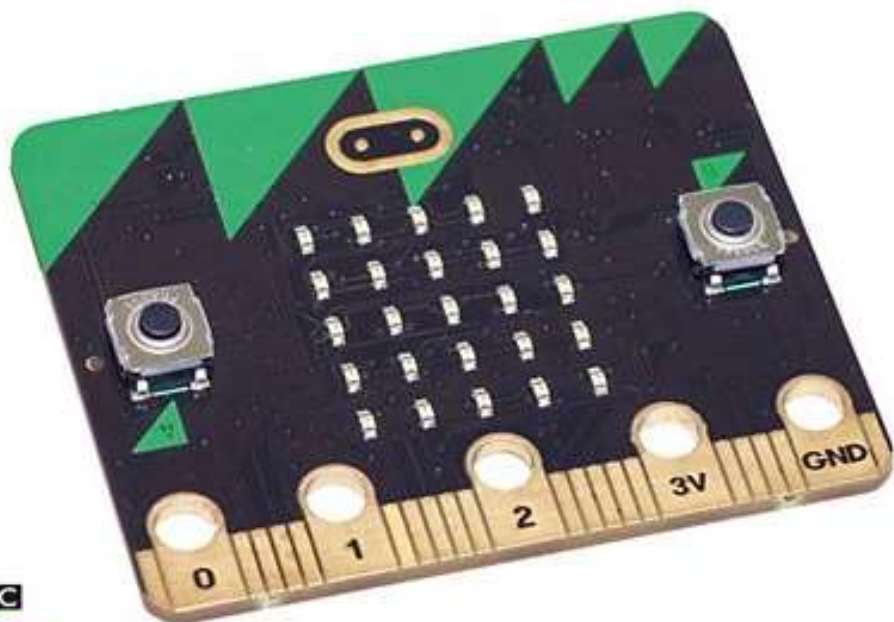
Raspberry Pi



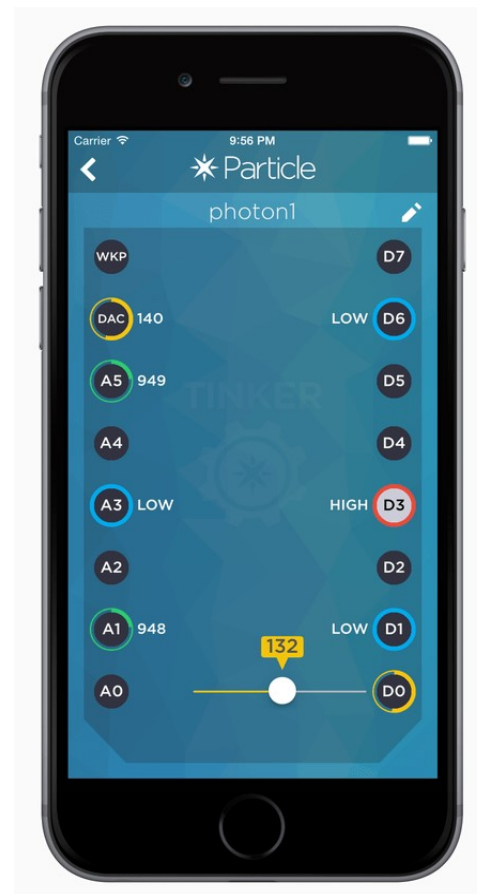
THE ESP IN CONTEXT – A RANGE OF POSSIBILITIES



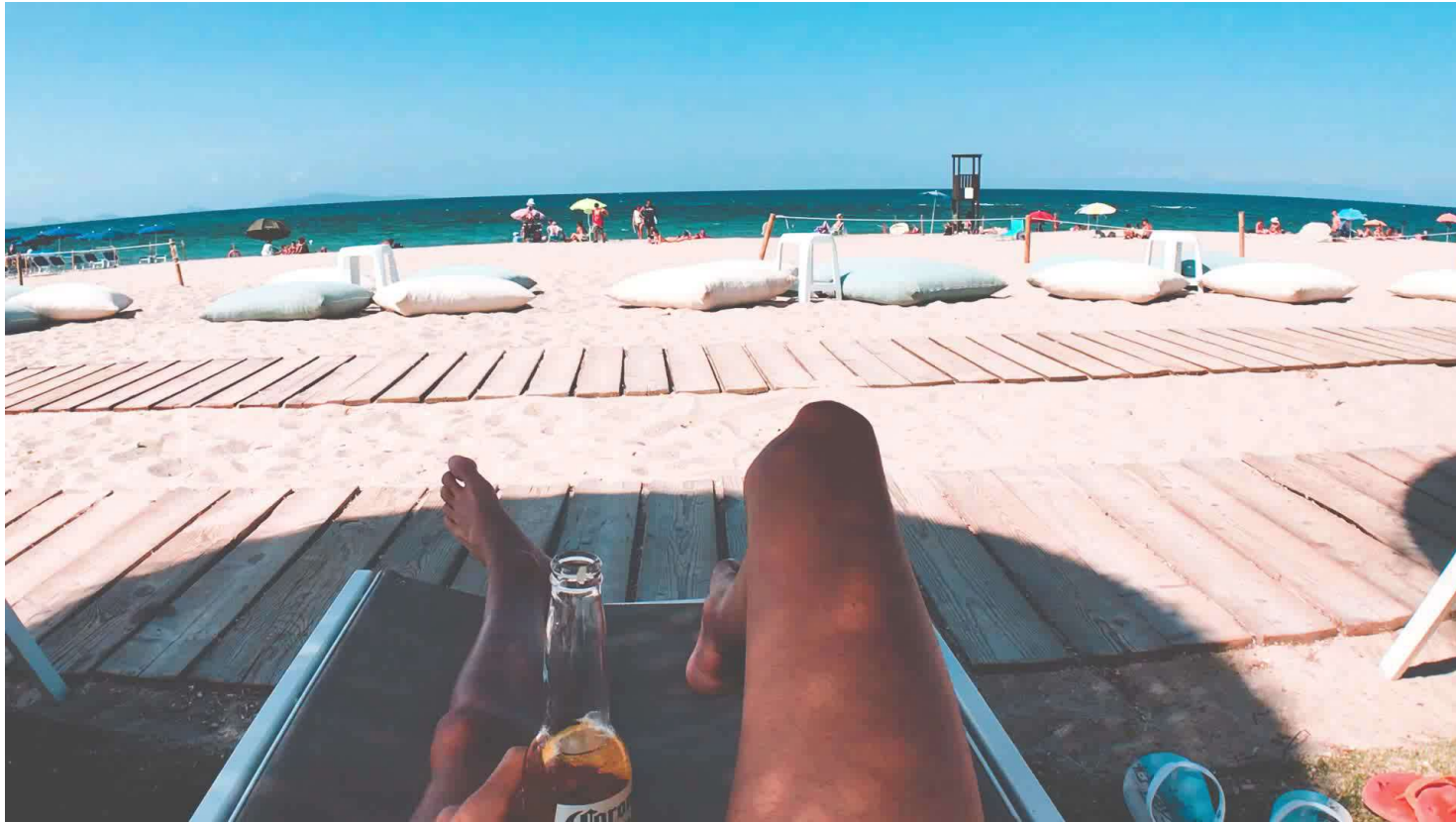
THE ESP IN CONTEXT – A RANGE OF POSSIBILITIES



THE ESP IN CONTEXT – A RANGE OF POSSIBILITIES



THE ESP32



...but first a relaxing interlude...

THE ESP32

Processors: CPU: Xtensa dual-core (or single-core) 32-bit LX6 microprocessor, operating at 160 or 240 MHz and performing at up to 600 DMIPS

Wireless connectivity: Wi-Fi: 802.11 b/g/n Bluetooth: v4.2 BR/EDR and BLE

Peripheral interfaces: 12-bit SAR ADC up to 18 channels
2 × 8-bit DACs

10 × touch sensors (capacitive sensing GPIOs)

4 × SPI

2 × I²S interfaces

2 × I²C interfaces

3 × UART

SD/SDIO/CE-ATA/MMC/eMMC host controller

SDIO/SPI slave controller

Ethernet MAC interface with dedicated DMA and IEEE 1588

Precision Time Protocol support

CAN bus 2.0

Infrared remote controller (TX/RX, up to 8 channels)

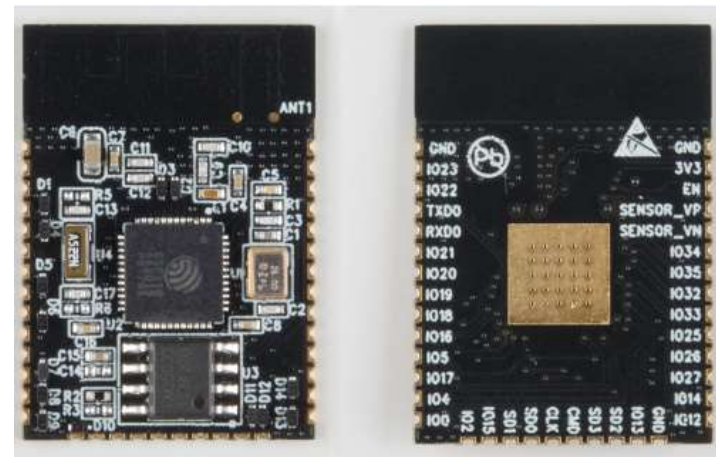
Motor PWM, LED PWM (up to 16 channels)

Hall effect sensor

Ultra low power analog pre-amplifier

Security: IEEE 802.11 standard security features all supported, including WPA, WPA/WPA2 and WAPI, Secure boot, Flash encryption, 1024-bit OTP, up to 768-bit for customers, Cryptographic hardware acceleration: AES, SHA-2, RSA, elliptic curve cryptography (ECC), random number generator (RNG)

Power management: Internal low-dropout regulator, Individual power domain for RTC, 5µA deep sleep current
Wake up from GPIO interrupt, timer, ADC measurements, capacitive touch sensor interrupt



THE ESP32 – WEMOS/LOLIN D32 PRO

Espressif official ESP32-WROVER module

16MB Flash, 8MB PSRAM or 4MB Flash, 4MB PSRAM

Clock Speed(Max) 240Mhz @ 68 mA, 5 uA in deep sleep mode

WIFI & Bluetooth

Lithium battery interface, 500mA Max charging current

Battery Connector: PH-2 2.0mm

LOLIN I2C port

LOLIN TFT port

TF (Micro SD) Card slot, supports SPI mode.

Board Power Supply (USB) 5V

Supported Batteries Lipo Battery 3.7V

Operating Voltage 3.3V

Digital I/O Pins 21 (total)

12 bit ADC Analog Input Pins 6 (total)

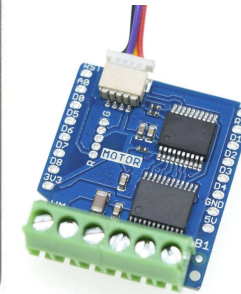
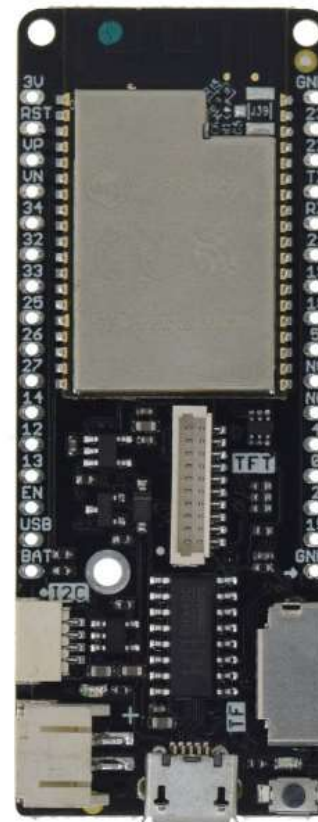
Analog Output Pins (DAC) 2

PWM Pins 2

All of the IO pins run at 3.3V, up to 40ma











USB 5V available @ .68a

Length 65mm Width 25.4mm Weight 7.5g



DOES THE D32 PRO MEET ASPIRATIONS?

1. Suitable for complete beginnings to intermediate level complete prototypes

-  Flexibility in programming languages: Arduino, Micro-Python, C (Espressif IDF)
-  Open-ish source-ish: good Espressif docs, Arduino port plus commodity sensors
-  Cheap: \$9.80 (Pro with 16MB), \$6.50 (D32 with 4MB), \$6.70 TFT & cable
-  Well supported with  tutorials,  community, and cheap external  sensors and accessories (in breadboardable form)
-  Rugged and easy to mount in 3D printed projects: 2x2mm, 1x2.5mm holes, small and rectangular, silk screened both sides, flat bottom, but no damn on/off switch
-  Simple set up: possibly drivers and several libraries to install in Arduino IDE
-  Connected: wifi & Bluetooth, BLE HID on iOS!

D32 PRO / ESP8266 PLAYTIME

- To get started: <http://robot50.net/workshops/esp32-workshop/>
- Quirks & things that need work:
 - Cannot use SD card with TFT attached using normal libraries
 - More complete HID examples
 - Simplified network logons
 - No damn on/off switch