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A Comparison of Arduino, Raspberry Pi and ESP8266 Boards

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A Comparison of Arduino, Raspberry Pi and ESP8266 Boards

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1. Arduino

Arduino is an 8-bit microcontroller development board with a USB programming interface to connect to a computer and additional connection sockets to external electronics like sensors, motors speakers, diodes etc [1]. It has got both input and output pins, the input pins can be either be digital (0 – 13) or analogue (A0 – A5), while the output pins are only digital (0 – 13) [2]. Arduino board design is open source and it also has an open source integrated development environment which has a cross-compiler, a debugger and a serial monitor to control the inputs and outputs. Arduino can either be powered through the USB connection from the computer, from a 9V battery, or from a power supply [3] .

2. Raspberry Pi

Raspberry Pi is a computer-based development board which runs on a Linux distribution referred to as Raspbian Linux. It can work and be connected like any computer to a mouse, keyboard, and screen perform computing functions. Raspberry Pi B+ board has 32-bit processor, four USB ports, HDMI port, Ethernet port, Audio port, CSI camera connector, and micro SD card slot [2]. It also has 40 general-purpose input/output. Raspberry Pi comes in different models, Model 2 lacks an embedded Wi-Fi but a Wi-Fi adapter can be used via the USB port to get internet connectivity. New models of Raspberry Pi 3 have integrated Wi-Fi module in its board making it easier to configure internet connectivity [4].

3. ESP8266 - Node MCU

This is an open source development board with a firmware that runs on ESP8266 module. The ESP-8266 module is a wireless programmable microcontroller board. The ESP8266 WiFi board is a SOC with integrated TCP/IP protocol stack that can give any secondary microcontroller access to a WiFi network [5]. The ESP8266 board is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor and therefore this is more suitable to be used as a sensing node that is capable to sense the data from various wirelessly connected IoT sensor nodes and send data to the central server like [5].

4. A comparison of Arduino, Raspberry Pi and ESP8266 Node MCU

	Arduino	Raspberry Pi	ESP8266 Node MCU
Developer	Arduino	Raspberry Pi Foundation	ESP8266 open source community
Type	Single board microcontroller	Mini computer	Single board microcontroller
Operating System	None	Linux	XTOS
CPU	Atmel, ARM, Intel	ARM Cortex	LXT106
Clock Speed	16 MHz	1.2GHz	26 MHz – 52 MHz
Memory	32KB	1-4GB	Upto 128MB
Storage	1KB	MicroSDHC Slot	4MB
Power	USB, Battery, Power Supply	USB, Power Supply	USB
Operating Voltage	5V	5V	3.3V
I/O Connectivity	SPI I2C UART GPIO	SPI DSI UART SDIOCSI GPIO	UART, GPIO

Table 1: A comparison of development boards

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