Compression Between 8051 and Arduino

Feature	Feature8051 Microcontroller	Arduino
Architecture	Harvard Architecture	AVR (Harvard) / ARM (von Neumann)
Processor	8-bit	8-bit (AVR) / 32-bit (ARM)
Clock Speed	Typically up to 12 MHz	Varies by model (e.g., 16 MHz for Uno, 48 MHz for Due)
Memory	4 KB ROM, 128 Bytes RAM	Varies by model (e.g., 32 KB Flash, 2 KB SRAM for Uno, 256 KB Flash, 32 KB SRAM for Due)
EEPROM	Not typically available	Varies by model (e.g., 1 KB for Uno)
Programming Language	Assembly, C	Arduino (based on Wiring), C++
Development Environment	Keil, SDCC, etc.	Arduino IDE, PlatformIO
Power Supply Voltage	Typically 5V	Varies by model (e.g., 5V for Uno, 3.3V for Due)
I/O Pins	32 GPIO pins (varies by package)	Varies by model (e.g., 14 digital I/O, 6 analog for Uno, 54 digital I/O, 12 analog for Due)
Analog Inputs	Limited or not available	Available (e.g., 6 for Uno, 12 for Due)
PWM Outputs	Limited	Available (e.g., 6 for Uno, 12 for Due)
Serial Communication	UART, SPI, I2C	UART, SPI, I2C, CAN (Due)
USB Connectivity	Not built-in	Built-in USB port
Timers	Typically 2-3 timers	Varies by model (e.g., 3 timers for Uno)
Interrupts	2 external interrupts	Multiple external and internal interrupts (varies by model)
ADC	Not typically available	Not available on AVR models, available on ARM models (e.g., Due)

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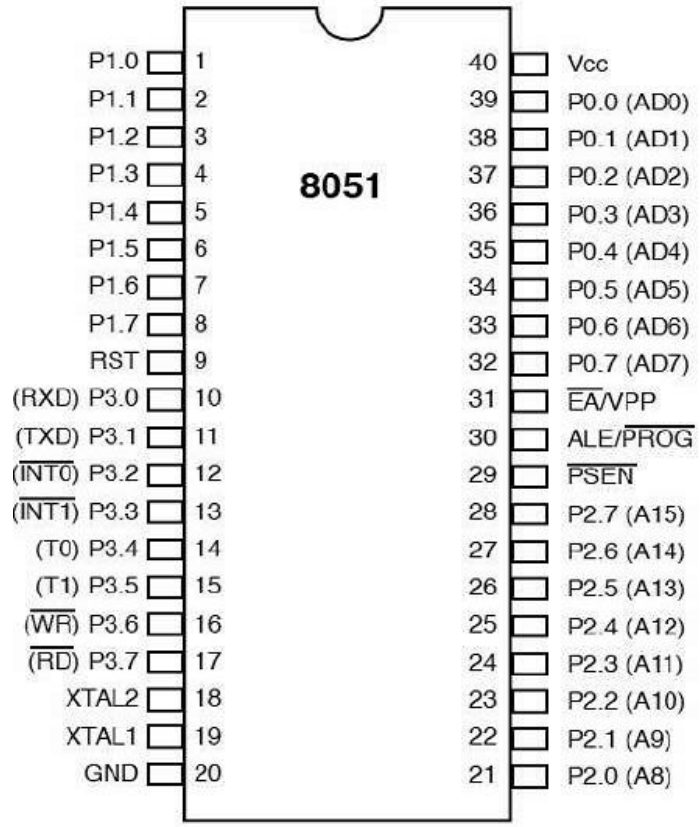
Wireless Communication	Not built-in	Available with shields (Wi-Fi, Bluetooth)
Real-Time Clock (RTC)	Not built-in	Available with shields
Libraries	Fewer libraries	Extensive libraries and frameworks
Community and Support	Smaller community, fewer resources	Large community, extensive support
Cost	Generally lower	Varies, often higher than 8051
Application Areas	Industrial control systems, legacy systems	Prototyping, hobby projects, education, IoT applications
Expansion Capabilities	Limited	Extensive via shields (e.g., Ethernet, Wi-Fi, motor control)
Debugging Tools	Hardware debuggers, limited software tools	Software serial monitor, hardware debuggers
Form Factor	Varies by manufacturer	Standardized form factors (e.g., Uno, Nano, Mega)

8051 PIN Diagram:



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Arduino PIN Diagram: