

Comparison Between SPI, I²C, and UART

Metrics

Speed : A measure of the number of bits¹ transferred per-second (bps). Don't let high numbers fool you... some protocols have heavy overhead which means that there *can* be a significant difference between gross, raw, and net figures; protocol overhead grows proportionately with the amount of data that needs to be sent. Consider sending a temperature measurement between two microcontrollers once per-second vs sending a real-time video stream between two Internet-connected devices.

Difficulty : A factor / product of hooking up the physical wires, writing code, pin counts, and managing actual communications. Expect a tradeoff of speed and device support with variance in difficulty.

Devices : Not an exact figure... more of a general feel for the number of devices you can expect to see that support the specified protocol out-of-the-box. Don't get too caught up on this metric... there are a plethora² of ICs out there that can act as a bridge between protocols.

Pins : A hard limit? ...not when you have sweet expander³ ICs available. Just keep in mind that complex designs *can* make managing your pins more difficult. Having 1-2 extra pins is always nice.

Results

	Speed	Difficulty	Devices	Pins
SPI ⁴	☆☆☆	☆☆	☆☆☆	4/3
I ² C ⁵	☆☆	☆☆☆	☆☆	1
Serial ⁶ / UART ⁷	☆	☆	☆	2

(rating system : more stars = better for all metrics)

¹ http://en.wikipedia.org/wiki/Bits_per_second

² <http://www.maxim-ic.com/datasheet/index.mvp/id/2052>

³ <http://www.ti.com/product/pcf8575>

⁴ Serial Peripheral Interface : <http://www.youtube.com/watch?v=1nO2SSExEnQ>

⁵ Inter-Integrated Circuit : <http://www.youtube.com/watch?v=GJX0BRUagCg>

⁶ Serial (Transistor Transistor Logic - TTL) : <http://www.youtube.com/watch?v=g0pSfyXOXj8>

⁷ Universal Asynchronous Receiver Transmitter : http://www.societyofrobots.com/microcontroller_uart.shtml