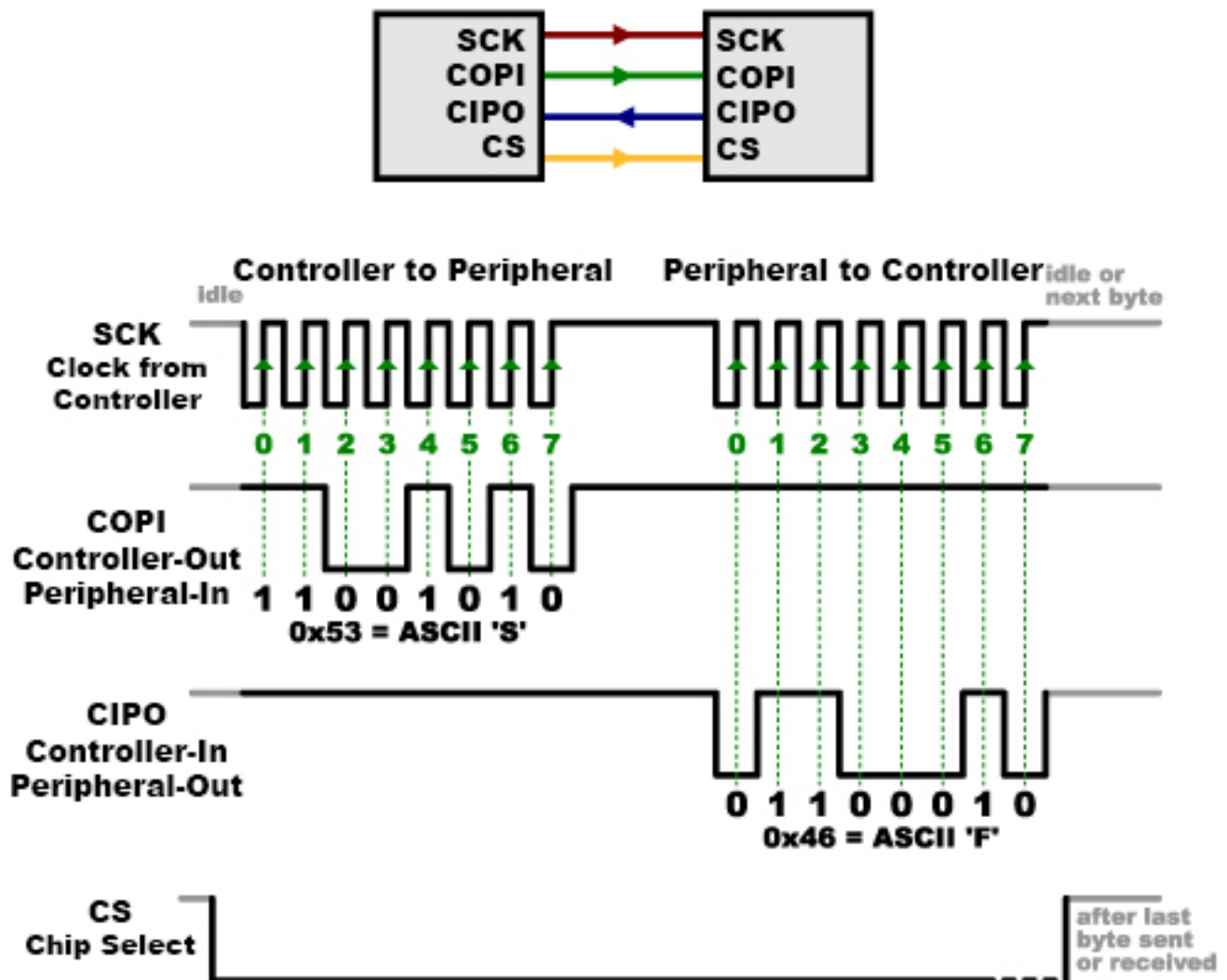


Bit Banging

Getting Data from A to B

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Introduction

A lot of people don't realize that digital data is only valid when read with exact timing. They assume data is royal and does its own thing. Bit banging is a vernacular way of describing this process but lacks any real information so here's the skinny. Bit banging is transmitting digital data across an interface by means of software control versus hardware switches or direct means. There are many serial and parallel interfaces that fall into this description like UARTs and various bus specifications. This is the abstract view, but it's important to realize the physical conditions to accomplish this task as well. When processor speed increased, various protocols to accomplish data transmission serially to overcome massive wiring requirements of parallel interfaces became desirable. The idea of bit-banging became commonplace but the actual signal conditions must be addressed as well.

Data contained within a PCB or digital circuit benefits from minimum influences from parasitic capacitance, inductance, and debilitating resistive leaks to ground so the typical square-wave data pulse goes unscathed. Once out into the world, data begins to suffer leading and trailing-edge decay, noise adheres to all edges, and the signal level begins to droop. The first rule of bit-banging is to sample data pulses as close to the center as possible to avoid the rough edges. This implies two things: a clock signal (or strobe) and a clock rate that is basically twice the frequency of the data. So the clocking its self has to be hearty. You have to manage the shape of the data pulses. Spikes can damage IC innards and signal levels below the ability of the receiving circuit to discern a "1" from a "0" does you no good. This implies you are aware of the IC family specs and understand noise elimination techniques.

So bit-banging is a basic phenomenon in electrical engineering that is here to stay and touches on many technologies and protocol descriptions. How these individual use-cases are constructed is fertile ground for hobbyists in which to build projects. Over the years, I have had a few websites attempting to present such projects to the public. The latest rendition can be found at WolfDenElectronics.com. I welcome your comments and project descriptions.

Maybe we can both work on some use-cases to advance the understanding of bit-banging.