**SPI Protocol**

1. Theory

SPI protocol is a communication protocol between one master and one slave or multiple slave.

Wiring: 4 wire

* SS/CS: chip select, this wire is set up with high, set it to low to choose which slave to communicate
* CLK: clock, this wire take a important role, in the slave, it only use for pin have attachInterrupt option
* MOSI: Master – Out – Slave – In,
* MISO: Master – In – Slave – Out

Data:

Data is in 8 bit, 16 bit or 32 bit, when we transfer, we use loop to transfer bit ont by one

Example: out data is uint8\_t datatype, it name is data\_example, it’s value is 49. We want to transfer data from master to slave.

In theory:

Master transfer data to slave through MOSI, and slave transfer data to master through MISO.

In master, we convert value “49” to binary, so it present in binary is 0x00110001. Then we transfer first bit, which is “0”, and then second bit “0”, then third bit “1”, and continue until last bit is “1”.

In slave, the slave have to determine “when” to take data. So CLK pin take an important role here. When we want to transfer bit “0” from master to slave, we set MOSI to low, and then pulse CLK pin, and because the CLK pin take a role as an attachInterrupt() of the slave, so the slave know that it time to take that bit, so it receive that bit data. The important here is the delay time, in the master we should provide suitable time so that the slave can take the bit data exactly.

Clock pulse:

Important: the time delay