NIELIT, Gorakhpur

Course Name: A-level (1st Sem.) **Subject: IoT**

Topic: Wired and Wireless communication **Date: 22.05.2020**

IOT consists of Things, Sensors and Actuators, Communication protocols, Cloud etc..
There are two types of Communication Protocols:

- Wireless Communication
- Wired Communication

The wired communication is divided into two categories:
Internal Communication:

- I2C
- SPI

External Communication

- Ethernet
- RS-232
- RS-485
- UART
- USART
- USB

Internal Communication
1) I2C :
I2C stands for “Inter-integrated circuit” bus.It was developed for television by Philips Semiconductor, 1980 . In I2C devices processors, EEPROMs, sensors, real-time clocks are used as a control interface and I2C devices can also have separate data interface (digital TV tuners, video decoders, audio processors …).There are 3 types of I2C depending on speed : Slow (under 100 Kbps) ,Fast (400 Kbps) ,High-speed (3.4 Mbps).

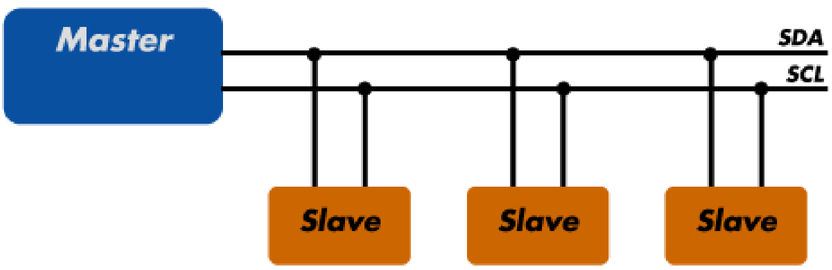


Image contain two wire lines i.e Serial Data(SDA) and Serial Clock(SCL).Several slave devices can be connected to a master device using I2C.

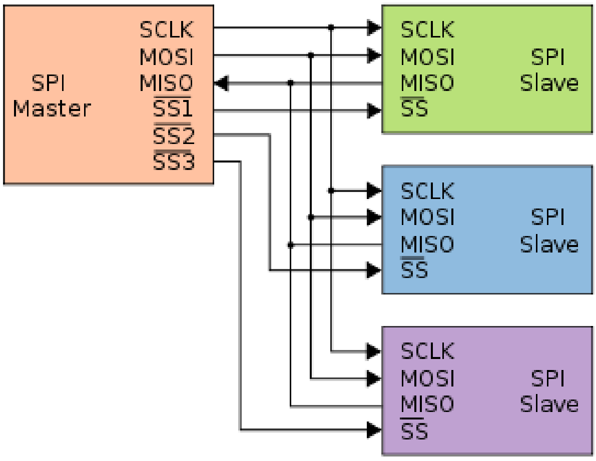
Advantages :

- Useful for devices that communicate occasionally
- multiple device can be connected
- Interconnection without additional wires.

Disadvantages :

- Hardware and especially software implementation more complicated than the SPI Half-duplex.
- Not scalable for large number of devices.

2) SPI :
The Serial Peripheral Interface bus (SPI) is a synchronous serial communication interface specification used for short distance communication, primarily in embedded systems. The interface was developed by Motorola in the late 1980s. Typical applications include Secure Digital cards and liquid crystal displays.



- As it can be seen in the image above that slave devices have 4 connections i.e SCLK(Serial Clock) ,MOSI(Master Output Slave Input) ,MISO(Master Input Slave Output) ,SS(Slave Select).First 3 pins share same line from controller but SS pin controls which slave device is active.

Advantages:
- It's faster than asynchronous serial
- The receive hardware can be a simple shift register
- It supports multiple slaves

Disadvantages :
- It requires more signal lines (wires) than other communications methods
- The communications must be well-defined in advance.
- The master must control all communications (slaves can't talk directly to each other)
- It usually requires separate SS lines to each slave, which can be problematic if numerous slaves are needed.

I2C	SPI
Speed limit varies from 100kbps, 400kbps, 1mbps, 3.4mbps depending on i2c version.	More than 1mbps, 10mbps till 100mbps can be achieved.
Half duplex synchronous protocol	Full Duplex synchronous protocol
Support Multi master configuration	Multi master configuration is not possible
Acknowledgement at each transfer	No Acknowledgement
Require Two Pins only SDA, SCL	Require separate MISO, MOSI, CLK & CS signal for each slave.
Addition of new device on the bus is easy	Addition of new device on the bus is not much easy a I2C
More Overhead (due to acknowledgement, start, stop)	Less Overhead
Noise sensitivity is high	Less noise sensitivity