

# Communication Protocols

We have 2 - Serial & Parallel

In Parallel we send every bit through its own wire. If we want to send for eg 16 bits we would need 16 wires + ground wire. The time delay is non-existent. But complexity and wastage is immense. So we don't usually use them if we can afford the time delay. eg PCI, IEEE-488

In Series we send 1 bit at a time to define we have started a bit stream or stopped it we use start bits & stop bits and also we use a clock signal to know the bitrate of the signal.

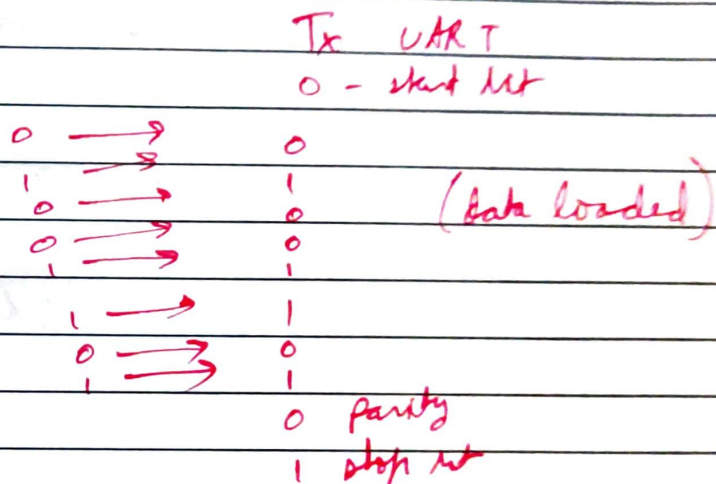
eg SATA, USB, UART, I2C, SPI

	Serial	Parallel
Speed	Slow	Fast
bits	1	n
bits/clock	1	n
Cost	Low	high
length	long	short
high freq	More efficient	Low efficient.

Because of low cost, upgradability, operation length, are optimal for operation while using microcontrollers, we use Serial Communication in these applications.

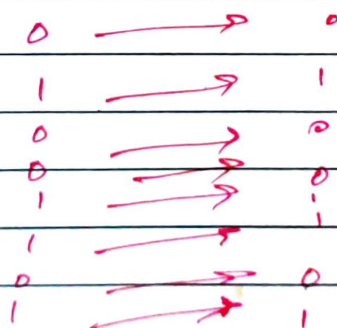
## ① UART

### 1) DATA BUS



2) Tx ~~0~~ 0101100100 Rx

### 3) Rx UART DATA BUS



+ve

- use 2 wires
- no clock
- Has parity bit

Disadvantages

- Length of bits depends upon data bus lanes
- has 1 Tx for 1 Rx



## 2) I2C

- 1) The data frame is loaded
- 2) Master sends address bits
- 3) Slave ~~sends~~ makes SDA low for one bit (ACK bit)
- 4) Master sends the bits (data frame)
- 5) Slave sends SDA low for one bit (ACK bit)
- 6) To terminate the transmission SCL is high and ~~SCL~~ then SDA is turned high.

+ve

- Multiple slaves & Masters
- Uses 2 wires only

-ve

- Rovers
- size limited to 8 bits