Humidity sensor :- It senses the percentage or concentration of water particles.
Relative Humidity (RH) %

Distance - IR pair can be used, ultra sonic system can be used.
TOA (time of Arrival)

Wireless Sensor Network :- Sensing and Actuating

19/11/2019 Abhishek Sir class :

IOT waala Part
Ubiquitous computing
Kevin Ashton father of IOT.
↳ He stated all the things are going to be connected on Internet.

People to device Ratio → used to check the network coverage.

1) Peer to Peer communication
2) Machine to Machine
3) IOT → kevin Ashton
4) Cisco → ~~Device to Human Ratio~~ human to device Ratio
   1998 ⇒ 1 : 1/8
   2002 ⇒ 1 : 1
   2005 → 1 : 4

Big Data ⟵ small data = generation
⇓
data which is holded.
small data + small data becomes big data

Components of IOT :

- Sensor / Actuator Hardware
- Application Program
- Communication
- Security

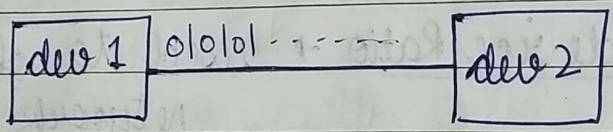
Any device having combination of this is a thing

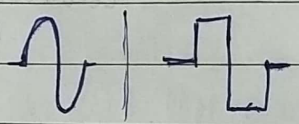
NAP3 Dragonfly dragon slayer

Any device having an Active Internet connection is called Internet of things.

- Restful API
- CoAP
- MQTT
- FTTP → for sms and short Message services

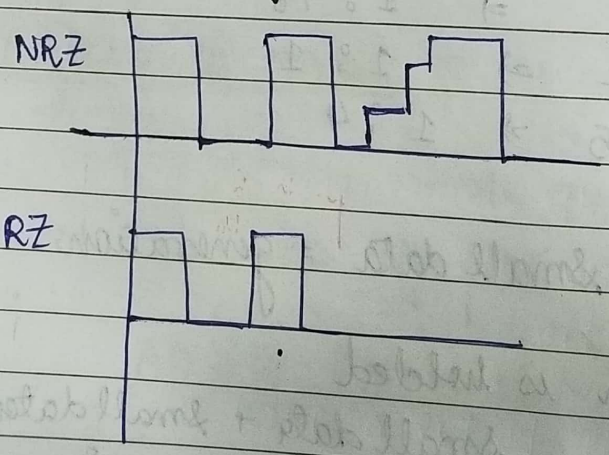
1° Wire Communication :-



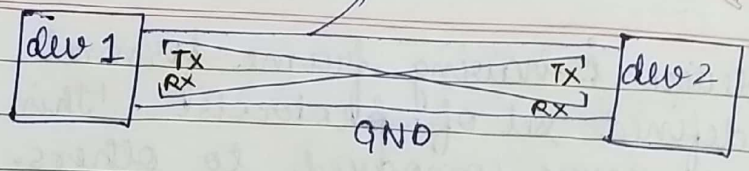


Morse code = first mode of communication

Line Coding :-



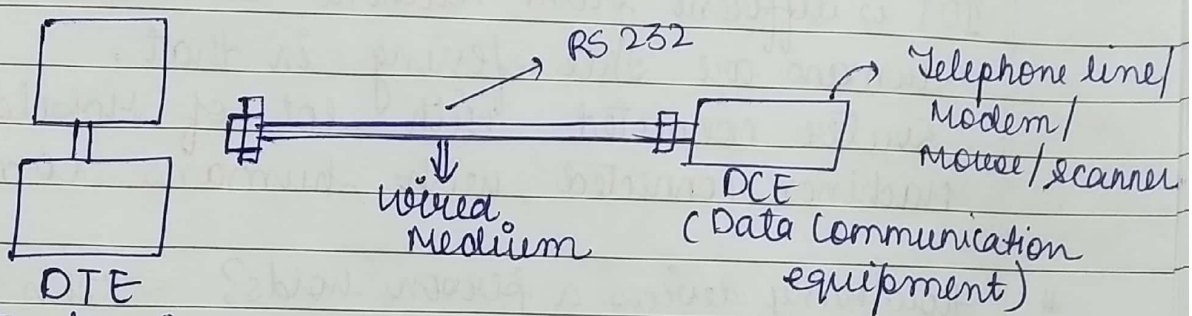
Null Modem connection, same clock



Tx, Rx of Both the devices are connected.

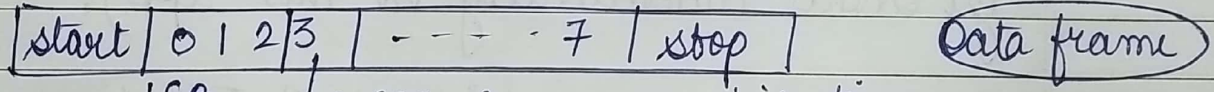
Standard Serial Communication Requirement :-

1) RS 232 / serial communication



1600 Baud Serial Rate

Here flow control Protocol is being applied.



Data frame

Data frame - The format in which we want to send the data. (frame format)

9 pins on db cable :-

1) carrier detect (CD)
2) Receive data (RxD)
3) Transmit data (TxD)
4) Data Terminal Ready (DTR) → for 100% success
5) Signal ground
6) Data set Ready
7) Request to send

control signals

8) Clear to send
9) Ring indicator
   - It tells How many packets are on queue.

- This device is having frame format along with pre defined set of protocols. This device is more secure compared to others.
- RS 232 is a protocol.

26/11/19 Abhishek sir's lecture

M2M V/S IOT

IOT is different from Machine to Machine Because Humans are also refering in that.
Router connected with lot of Mobiles.
Machines connected with humans comprises IOT

How Many devices a person holds? ⇒ This is what Cisco is trying to get Human to device Ratio

Nikon 35000 ⇒ Snap Bridge (By this app you do not need to get your SD card out all your images get saved automatically in this app).

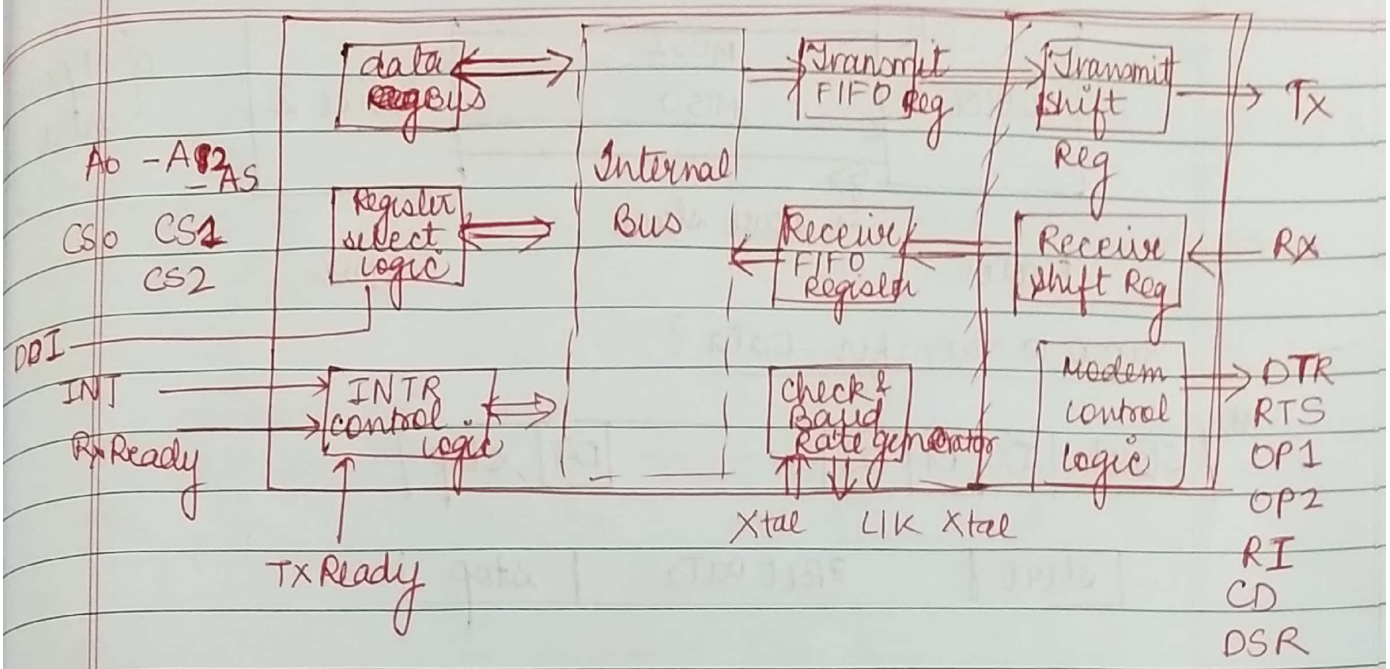
In IOT Human, Machine & Internet
↳ a very Imp feature in IOT communication
In M2M Machine, Internet

UART → universal Asynchronous Receiver / Transmitter

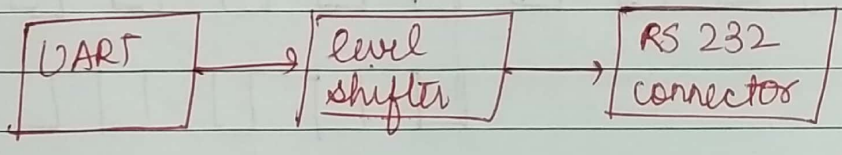
→ Programming chip which converts parallel data Received from CPU to serial format and send it to RS 232 level shifter also vice versa.

In UART we have a lot of level shifters.

UART chip



Part of flow control Protocol

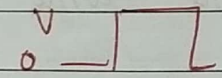


With RS232 we can cover 19.2 meters
With UART we can cover 100 m using RS232

Serial communication

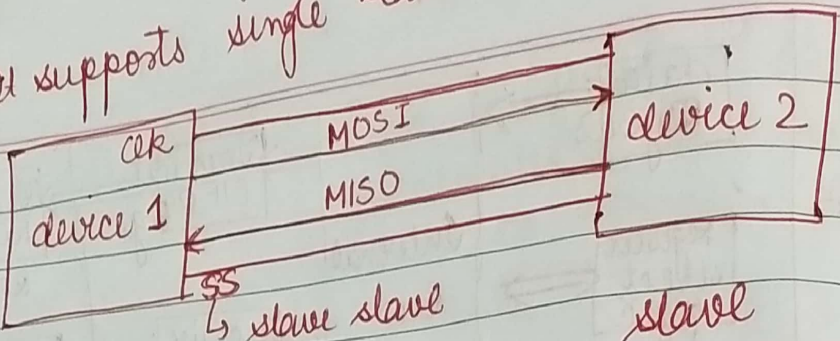
SPI (Serial peripheral Interface) :-

Till now we learnt

1)  → using RZ, NRZ transfer Bits
RS 232
2) Two lines for Data Transfer, One for flow control
3) Using UART → creating Buffers.

Problem with RS232 and UART is Number of pins are too Much, It's too Much too handle that Much no. of pins.

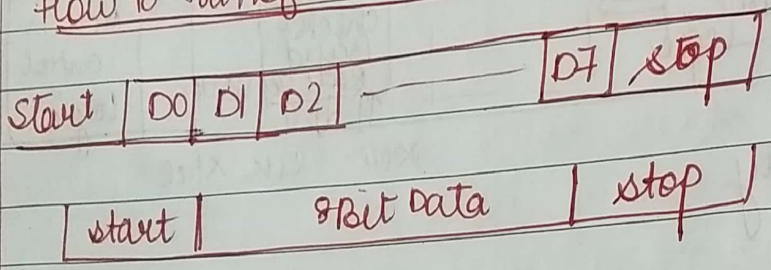
It supports single Master Multi slave.

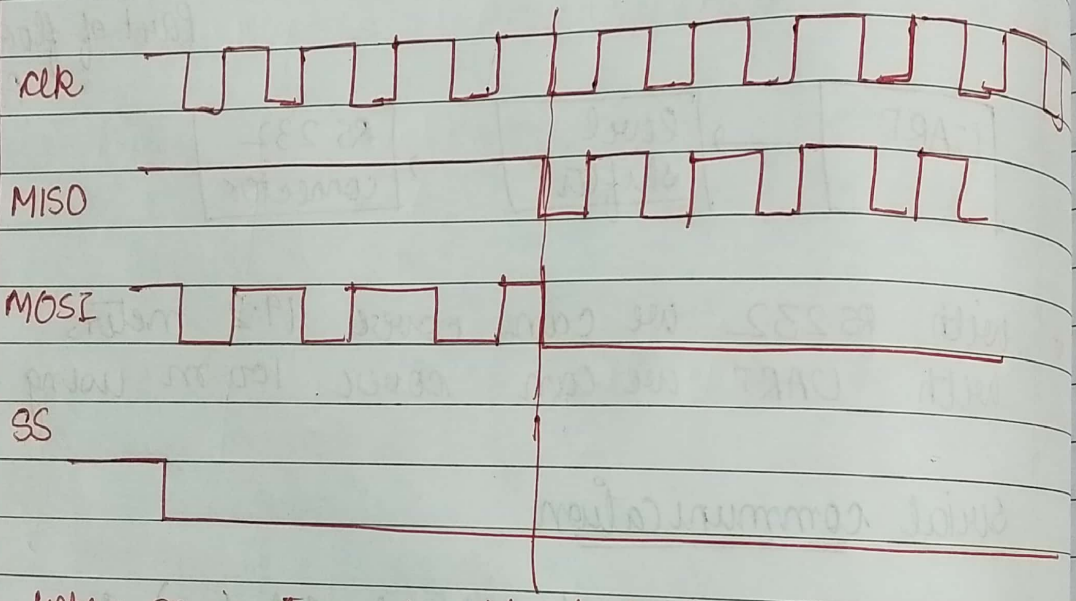


↳ slave slave slave

Master

How to transfer Data ?





When SS is turned off data transfer gets stop.

At a time either MISO works or MOSI works. Both don't work at the same time.

Whoever sends the clock first owns the system. The one who owns the clock (generate it) is the Bus Master.

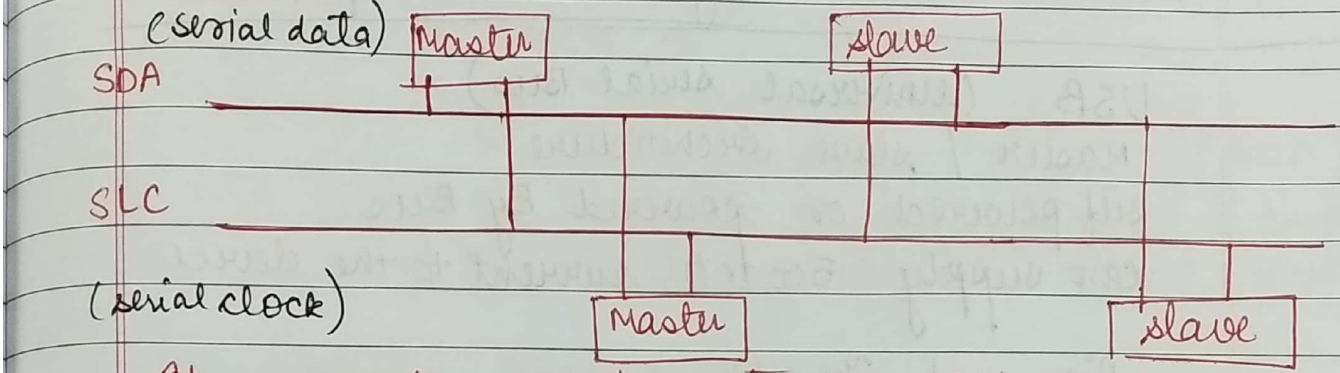
I2C Integerated Interconnected circuit

- Still 4 are too much pins so need device

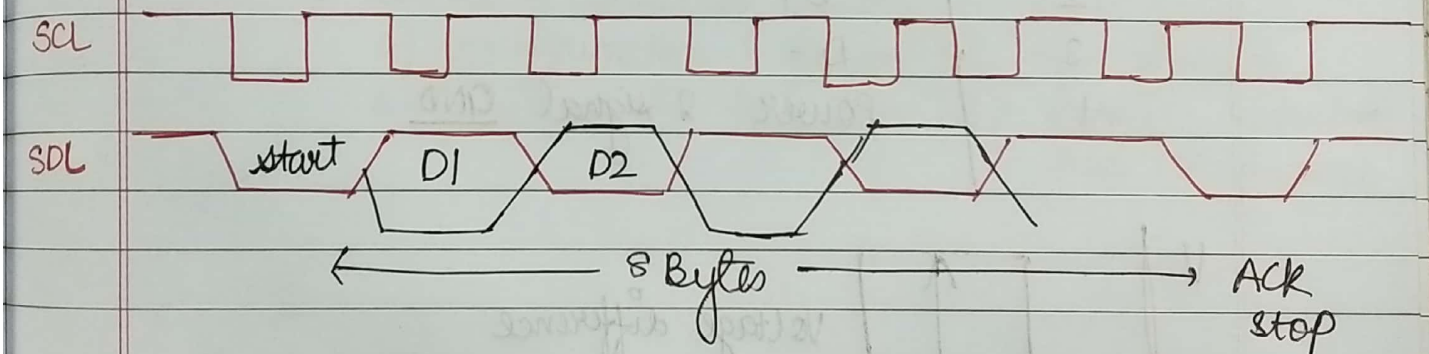
- It's a low cost solution
- easy to implement
- speed = 100 to 400 kbps

If I can manage to do the whole process in 2 pins we will go with that solution.

2 wires

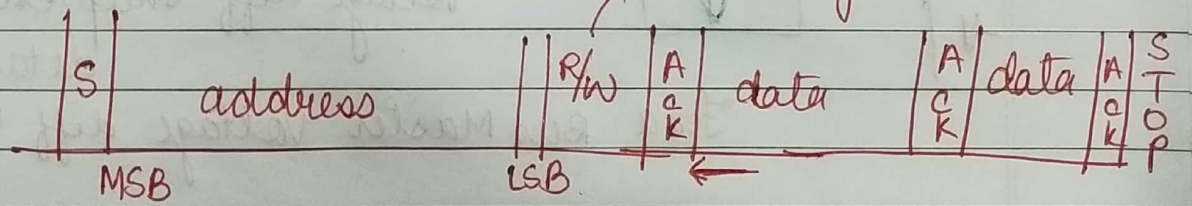


It supports Multi Master Multi slave.

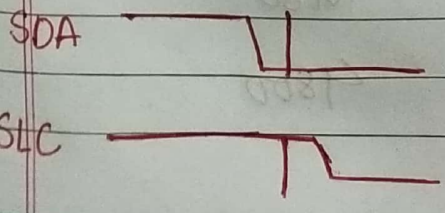


Frame format:-

Master says Read/write



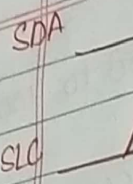
How do we decide who is going to be Bus Master?



Master 1st pulls SDA (data line) low and next pull SCL (clock) low

start situation

Stop situation { Master 1st Releases the SCL and then SDA }

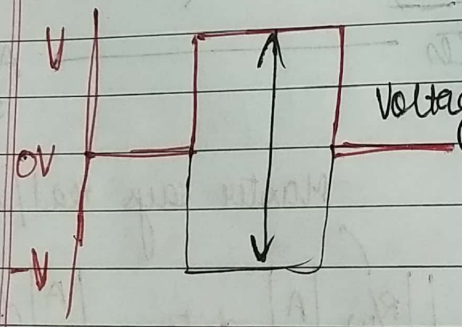


How we handle this situation in multi Master?
The device which has higher priority will have this critical thing comes into picture.

USB (Universal Serial Bus)

Master / slave Architecture
self powered or powered by Bus
can supply 500 mA current to the device

Pin	Function
1	+5V
2	D+
3	D-
4	Power & signal GND



Voltage diff Interpretates signal details

For a Bus Master Voltage diff Matters a lot.

Version	Transfer Rate (Mbps)
USB 1.1	1.5 & 12
USB 2.0 (H-S 2001)	480
USB 3.0 (Superspeed 2008)	4800

USB 3.1 2014 9600

OTG | Mini | Micro

↳ They don't have Intelligence, Can't be used to send or Receive Data

OTG (on the Go)

↓

With OTG we can connect more programmable devices

It Makes devices to communicate with each other

It enables the device to be USB host

↳ some protocols which work are

1. Attach detection Protocol (ADP)
2. Session Request Protocol (SRP)
3. Host Negotiation Protocol (HNP)

Communication Protocol :-

- comm. B/w host & device are in form of packets
- when device is connected, host obtains
  a) Configuration & properties of device
  b) Unique ID to identify device network and Hardware