Communication Protocols In Embedded Systems

- Communication Protocols are set of rules that allow two or more communication systems to communicate data via any physical medium.
- Communication protocols are broadly classified into two types:
  - ✧ Inter System Protocol
  - ✧ Intra System Protocol

Inter System Communication Protocols

- ✧ Inter system protocols establish communication between two devices like communication between computer and microcontroller kit.
- ✧ Types of inter System communication protocols
  1. USB communication protocols
  2. UART communication protocols
  3. USART communication protocols

1.USB communication protocols:

USB protocol is a serial communication two-wired protocol.The data cable signal lines are labeled as D+ and D-.This protocol is used to send and receive the data serially to host and peripherals.

2. UART communication protocol:

UART stands for a universal asynchronous transmitter and receiver.UART protocols is a serial communication with two wired protocols.The data cable signal lines are labeled as Rx and Tx.
The UART takes bytes of data and sends the individual bits in a sequential manner.It is a half duplex protocol.

3. USART communication protocol:

USART stands for a universal synchronous and asynchronous transmitter and receiver. It is a serial communication of a two-wired protocol.This protocol is used to transmitting and receiving the data byte to byte along with the clock pulses.It is a full duplex protocol.

Intra System Protocol:

- ✧ The Intra system protocol is used to communicate the two devices within the system.
- ✧ Types of Intra System protocols:
  1. I2C protocol
  2. SPI protocol
  3. CAN protocol

1. **I2C protocol:**

I2C stands for the inter-integrated circuit and it requires two wires connecting all peripherals to the microcontroller. Its has two wires SDA(serial data line) and SCL(serial clock line) to carry information between devices and these are bidirectional.It is a master to slave protocol.The transmitter sends 8-bit data, the receiver replies one bit of acknowledgement.

2. **SPI Protocol:**

SPI stands for the serial peripheral interface.It requires four wires MOSI, MISO, SS ans SCLK.It is a full-duplex communication protocol.

3. **CAN protocol:**

CAN stands for control area network.It is also a serial communication protocol.It requires two wires CAN high and CAN low.It is based on message-oriented transmission protocol.