UART Interfacing on eYFi-Mega Board

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Parallel v/s Serial Interface

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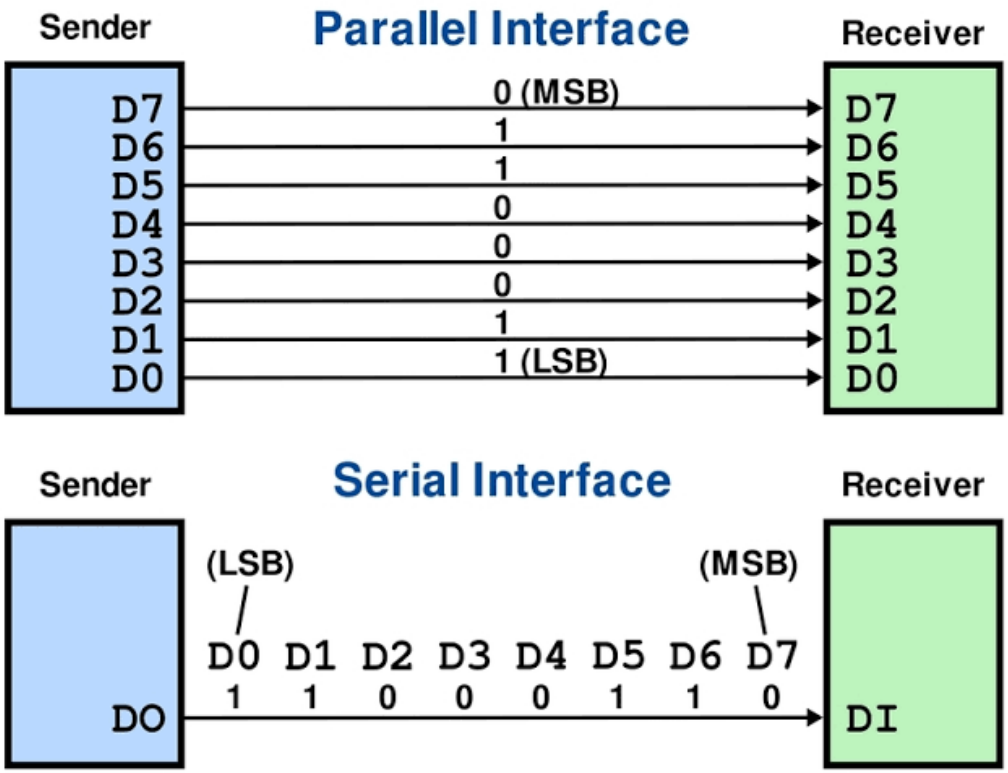

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Transmitter and Receiver must agree on the order in which the bits will be sent.

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How can this be ensured?

- Synchronous communication *OR*
- Asynchronous communication

Synchronous v/s Asynchronous

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Parameters	**Synchronous**	**Asynchronous**
Clock signal	Required	Not required
Overhead bits	Not required	Required
Data transmission speed	Fast	Slow
Data Tx/Rx	Blocks or frames	Bytes or character
Examples	I^2C, SPI	UART

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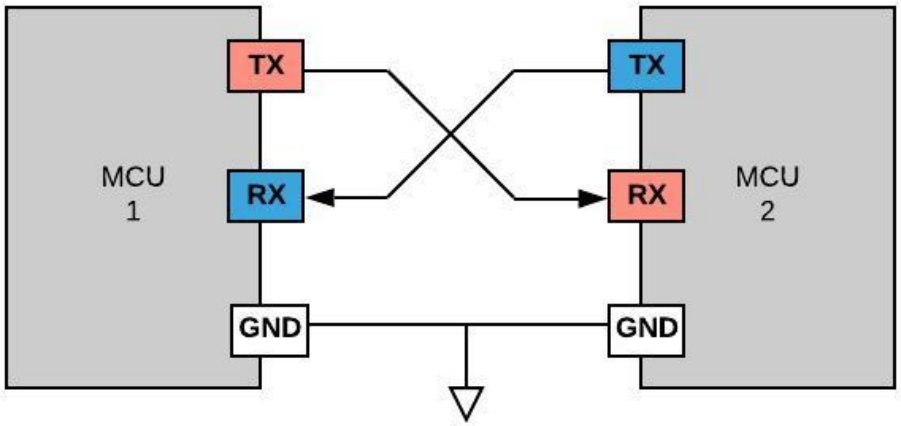

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- Extra rules or mechanisms are needed to ensure reliable, error-free sending and receiving of data, which are:
  1. Data Packet
     - Synchronization Bits
     - Data Bits
     - Parity Bits
  2. Baud Rate

Data Packet

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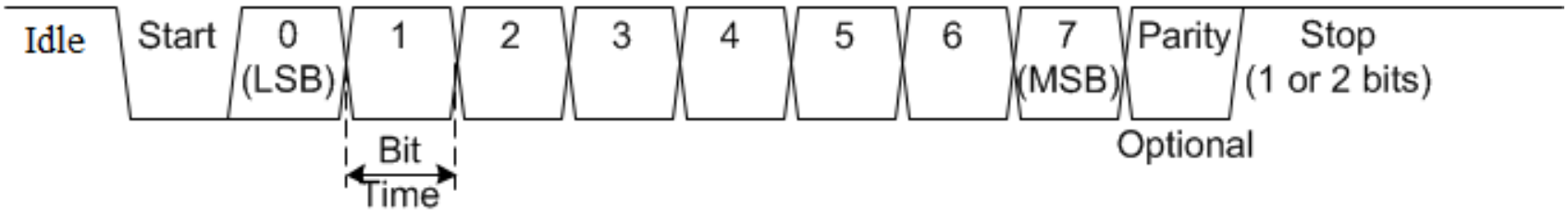
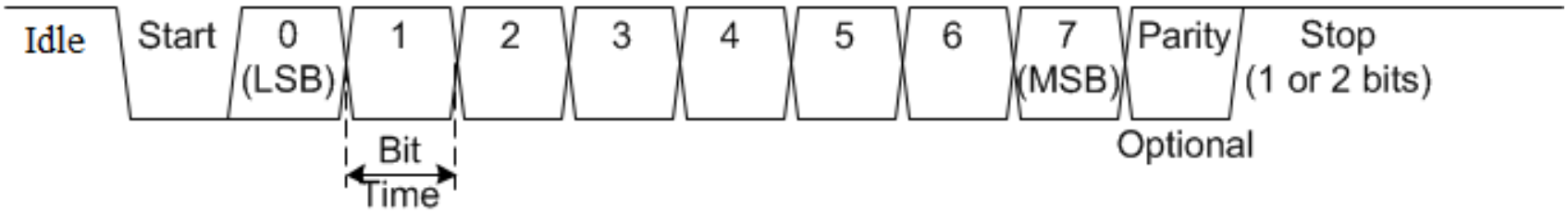

Idle
Start
0
(LSB)
1
2
3
4
5
6
7
(MSB)
Parity
Stop
(1 or 2 bits)
Optional
Bit
Time

Data Packet



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   - Start (1 bit) - transition on idle data line from 1 to 0.
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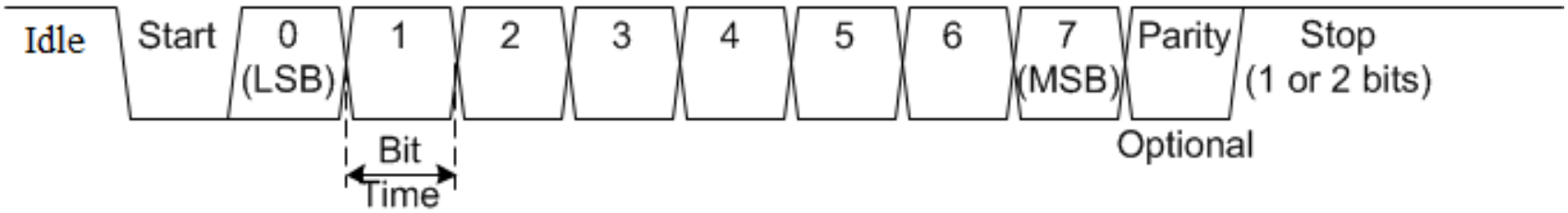

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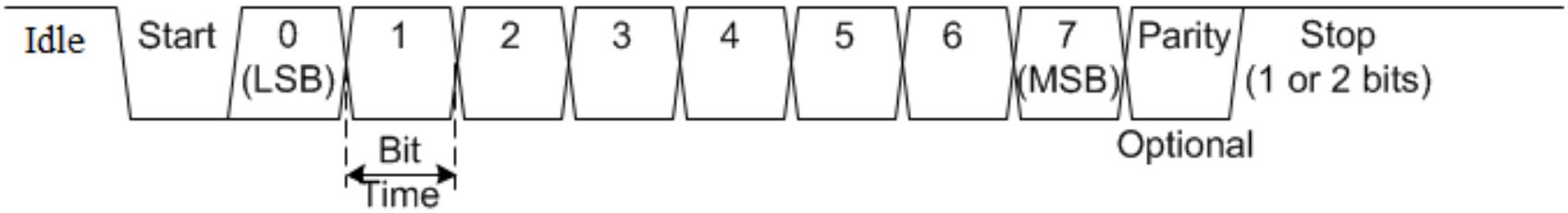

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   - Endianness of data bits
3. Parity Bits
   - Low-level and simple form of error checking.
   - It can be odd or even.

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- These baud rates are achieved in micro-controller by dividing the clock frequency.

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  2. **8** ⇒ Number of data bits in a frame
  3. **N** ⇒ No Parity bits
  4. **1** ⇒ 1 Stop bit
  5. "**H**" ⇒ ASCII value = **0b01001000**
  6. "**i**" ⇒ ASCII value = **0b01101001**
  7. **Endianness** ⇒ Little-endian, by default

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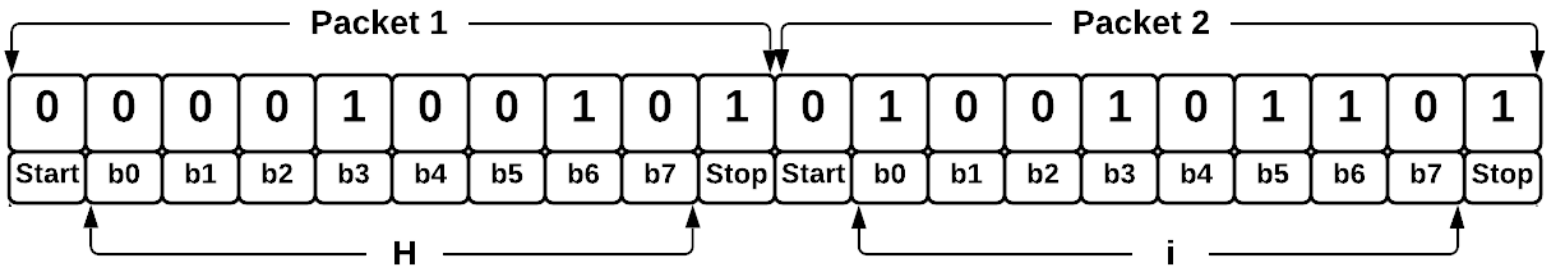

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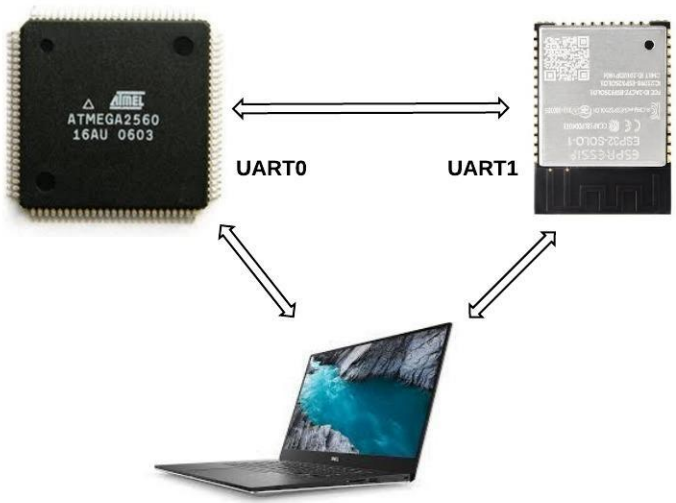

- Connection between ATmega2560 and PC
  1. TX0 → USB
  2. RX0 → USB
- Connection between ATmega2560 and ESP32
  1. ATmega2560:TX0 → ESP32:RX1
  2. ATmega2560:RX0 → ESP32:TX1

UART Header on eYFi-Mega Board

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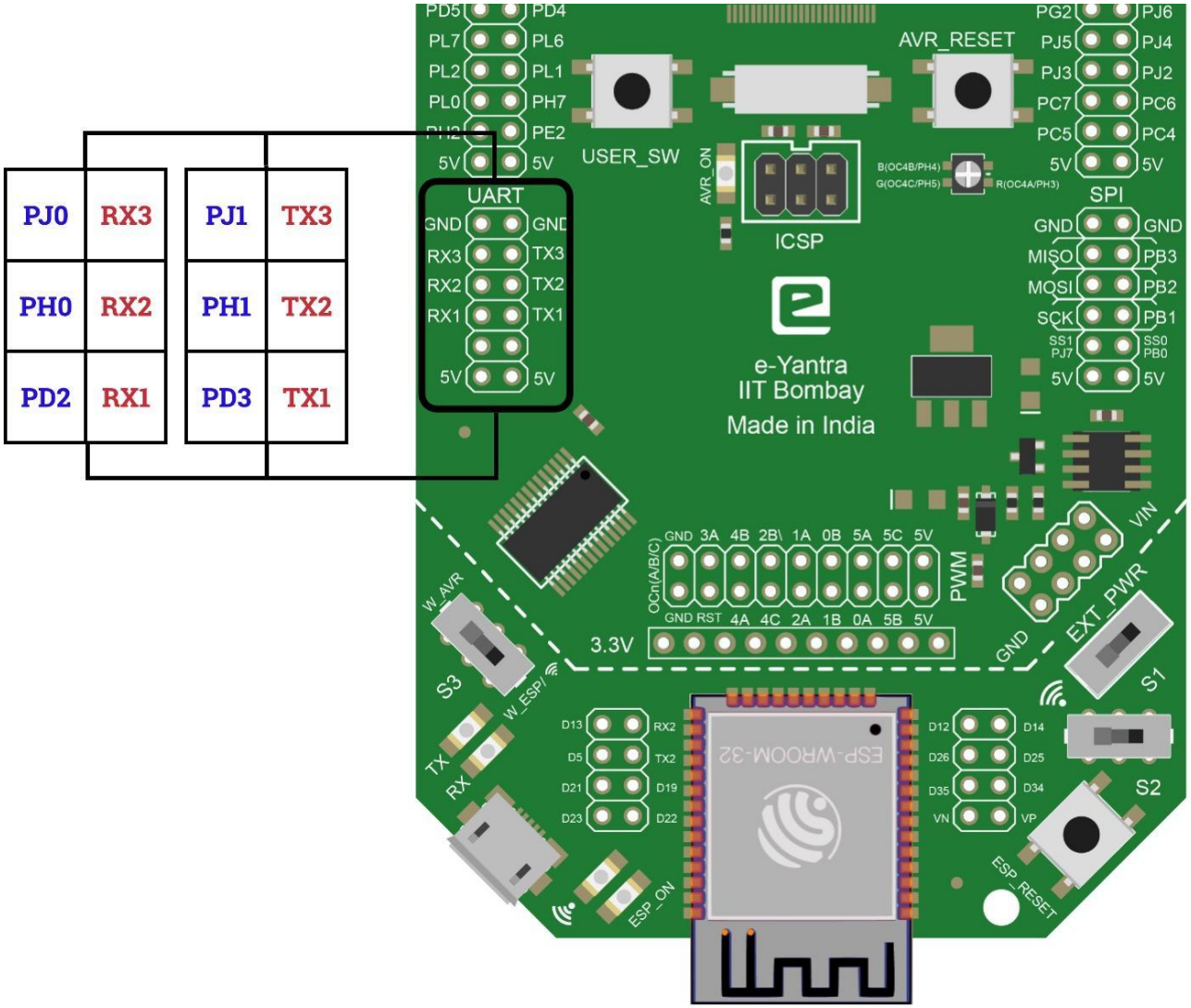

Problem Statement

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- Write a program to read character from UART and do the following according to the character received:

Character	Action
'F'	Decrement freq by 100 ms
'S'	Increment freq by 100 ms

Thank You!

Post your queries on: helpdesk@e-yantra.org