

Micno Final

Slide → Micro Controllers Note 1

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1. Write Differences Microprocessor Vs Micro Controller

Ans:

MicroProcessor	Micro Controller
a. A silicon chip representing a Central Processing unit (CPU).	a. A microcontroller is a highly integrated chip that contains a CPU, RAM, special & general purpose registers arrays.
b. It is a dependent unit. It requires the combination of other chips like timer, Program & data memory chips, interrupt controllers for functionality.	b. It is a self contained unit & it does not require external interrupt controller timer, UART etc, for its functioning.
c. Most of the time general purpose in design & operation.	c. Mostly application oriented.
d. Targeted for high end market where performance is important.	d. Targeted for embedded market where performance is not so critical.
e. Limited Power saving options compared to micro-controllers	e. Indu Includes lot of power saving features.

2. Write the Criteria for choosing a micro-Controller.

Ans:

- Speed: What is the highest speed that the micro-Controller supports.
- Power Consumption: Critical for battery Powered Products.
- The amount of ROM & RAM chip.
- The numbers of I/O Pins & Analog to Digital Conversion Support.
- Cost Per unit is a key issue.

3. Write the Criteria for choosing a micro-Processor

Ans:

- Logical Criteria
 - Instruction set functionality
 - Architecture, addressing mode
 - Execution Speed
 - Arithmetic & Logical Capabilities
 - Addressing capacity
- Physical Criteria
 - Power Consumption
 - size
 - Presence of on-chip peripherals
- Software tools & support.
- Cost Per unit
- Market availability

4. Write differences between Raspberry Pi & Arduino

Ans:

Raspberry Pi	Arduino
a. The Raspberry Pi is a microprocessor based single board computer.	a. The Arduino Uno is a micro-controller based Physical Computing Platform.
b. Runs a full-fledged Linux OS.	b. Runs a single program.
c. Doesn't support Analog I/O	c. Support for Analogue I/O
d. 1.2 GHz Processor with 16GB of RAM	d. 16 MHz Processor with 2KB of RAM.

5. Which things you should follow to choose right kind of board

Ans:

- Investigate the goal of the project.
- Find the feature of the board, if it fulfils the goals.
- Consider Price, CPU Processing speed, RAM, Network Capability, Power consumption.

6. Write Advantages & Dis-advantages of Arduino

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Ans:

Advantages

- Small
- Portable
- No Computer required
- Programmable Logic
- Vast range of applications
- Cheap

Disadvantages

- Limited by ADC
- Limited Processing Powers
- No data storage

7. Write Advantages & Dis-advantages of Raspberry-Pi

Ans:

Advantages

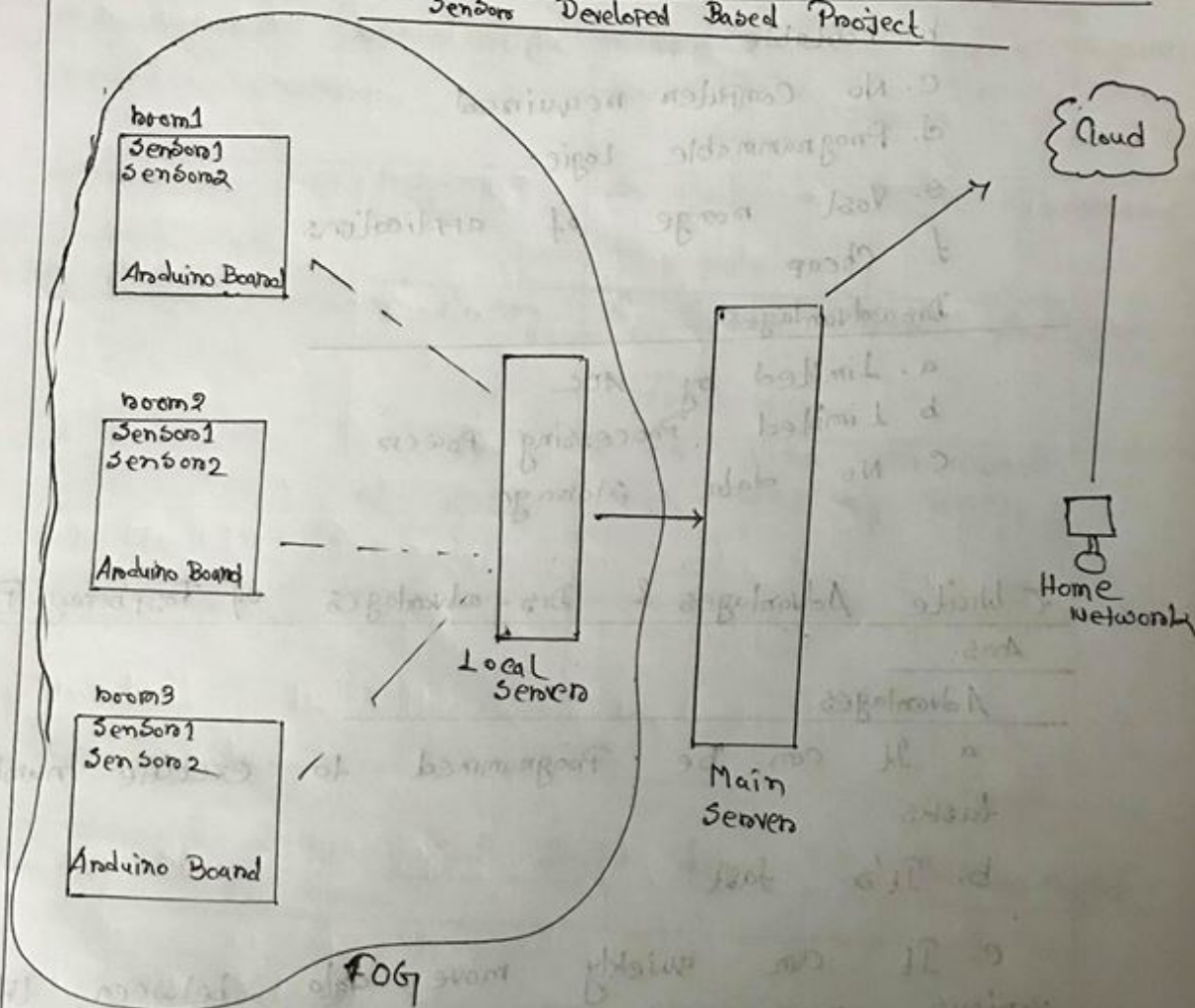
- It can be programmed to execute number of tasks.
- It's fast.
- It can quickly move data between the various memory locations.

Disadvantages

- It has a limitation on size of data.
- Most of them does not support floating point operations.
- Heating Physically
- It should contact with the other external devices.

e. The microprocessor is does not have any internal Peripheral like ROM, RAM & others I/O devices.

Sensors Developed Based Project



- ⇒ Raw Data $\xrightarrow{\text{Process}}$ Average
- ⇒ Sensor \rightarrow Arduino Board.
- ⇒ Main Servers \leftarrow প্রয়োজনীয় data রাখা হয়.
- ⇒ Raspberry Pi হতে ADC-মাপা হয়।
- ⇒ Arduino Board \leftarrow I2C Protocol দেওয়া থাকে।

- ⇒ Micro-Controller is energy efficient → Clock Speed was.
- ⇒ Raspberry Pi has 40 pin headers.
- ⇒ Ultrasonic Sensor → is Digital Sensor.

Slide → Communications Protocol 1.

8. Define Protocols.

Ans:

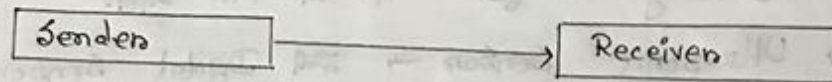
A set of rules & guidelines for communicating data.

9. Write differences between Serial Communication vs Parallel Communication

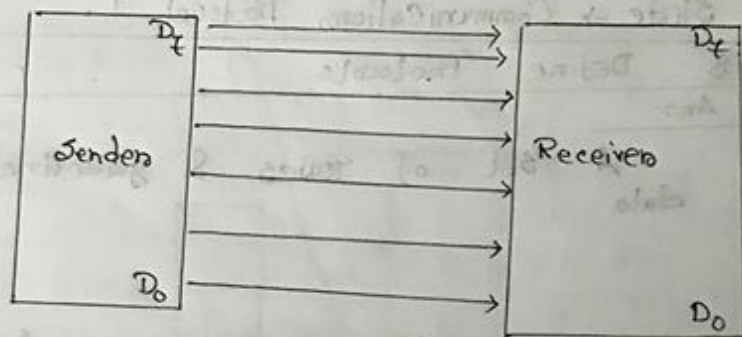
Ans:

Serial	Parallel
a. Data flow in bi-direction, bit by bit.	a. Multiple lines are used to send data. Example 8 bits or 1 byte at a time.
b. Economical Cost	b. Expensive Cost
c. Speed is slower	c. It's faster.
d. Used for long distance communication. Example: Computer to Computer	d. Used for short distance communication. Example: Computer to Printer.
e. Less number of cables	e. High number of cables

* Serial Communication



* Parallel Communication



* Parallel Communication - G- data rate \uparrow \Rightarrow \uparrow \Rightarrow \uparrow

10. Write the Major factors Limiting Parallel Communication.

Ans.

a. Speed: Clock skew Phenomenon reduces the speed of every link to the slowest of all of the links.

b. Cable Length: Crosstalk Phenomenon creates interface between the Parallel lines & the effect only magnifies with the length of the Communication link. This limits the length of the Communication Cable that can be used.

11. Define Clock Skew

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Ans:

The spatial variation in arrival time of a clock transition on an integrated circuit.

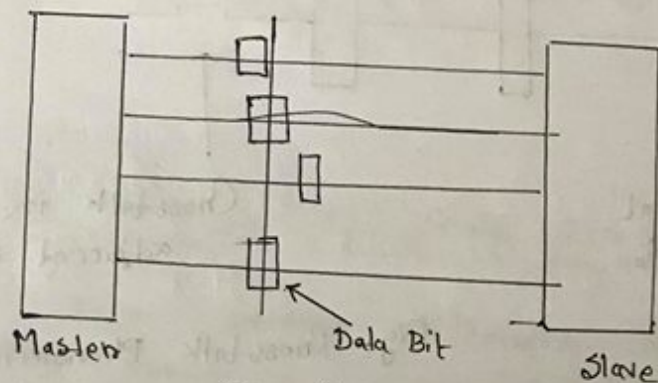


Fig: Clock Skew

⇒ Sender থেকে- Receiver -এ distance যত বেশি-
তত bit এর অসঙ্গতি- তত বেশি স্বাক্ষর হবে, প্রবো সমস্যা-
wait -করতে হবে,

Short Distance → Not Fact
Long Distance → Fact

12. Write the factors of Clock Skew

Ans:

- Temperature
- Resistance
- Path Length.

13. Define Cross Talk.

Ans:

A signal transmitted on one circuit or channel of a transmission system creates an undesired effect in another circuit or channel.

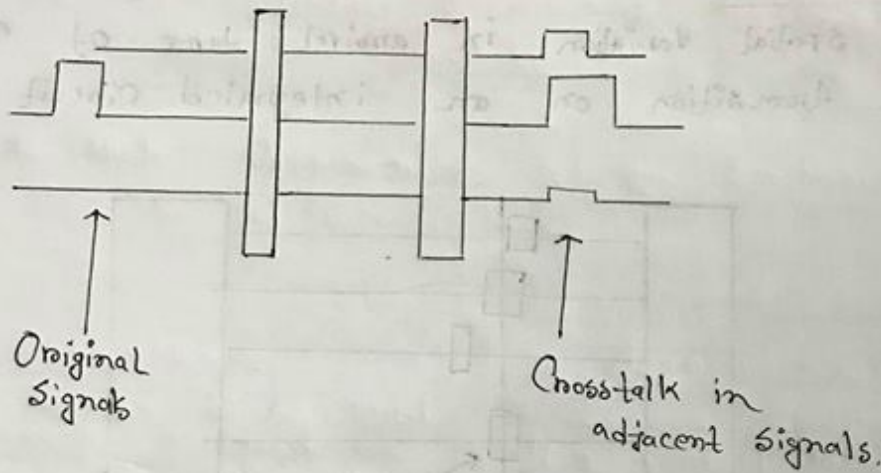


Fig: Crosstalk Phenomenon.

Q4. Why Cross Talk occurs.

Ans.

Cross talk occurs when the signal on one wire in a Parallel bundle imprints itself on an adjacent wire.

- ⇒ Serial Communication - Clock skew and Crosstalk are.
- ⇒ Serial Communication - Clock skew and Crosstalk are.
- ⇒ Short Distance + High Data Speed → Parallel
- ⇒ Long Distance + Low Data Speed → Serial
- ⇒ VGA Cable is used for PC and Projector
- ⇒ Short Distance - Real Time - High Speed
- ⇒ data transfer - Parallel Communication
- ⇒ USB to Pen drive is used for PC to data transfer - Serial

→ 8086 GA AX, BX GA data transfer

MOV AX, BX

ant Parallel

16 bit data bus.

* Distance between AX ↔ BX ⇒ Nano-Meter.

15. Write the advantages of Serial over Parallel.

Ans:

- Clock skew between different channels is not an issue.
- A serial Connection requires fewer interconnecting cables. & hence occupies less space. The extra space allows for better isolation of the channels from its surroundings.
- Crosstalk is not much significant issue, because there are fewer conductors in proximity.

⇒ Inducting Coupling - GA સર્જિત Cross talk solve
 વધારા રજા, આ સર્જિત - ભાગ Plastic GA shield
 - સર્જિત વધારા રજા, - રજા Current jump વધારા GA,

* UART → Universal Asynchronous Receiver Transmitter.
 * USART → Universal Synchronous Asynchronous Receiver Transmitter

16. Write differences between Synchronous & Asynchronous Communication

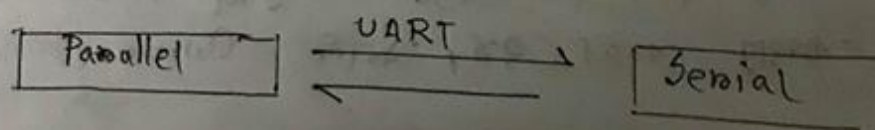
Ans.

Synchronous	Asynchronous
a. Sender blocks until message received.	a. Sender continues execution after sending message
b. Sender & Receiver must be active at the same time	b. Message may be queued if receiver not active

17. Write note on UART.

Ans

One kind of Computer hardware that converts Parallel data into Serial data & vice versa



* UART - Micro-Controller - Feature

18. Write the differences between UART vs USART

Ans. →

UART	USART
a. Supports lower data rate	a. Supports higher data rate
b. Receiver need to know baudrate of the transmitter before initiation of reception.	b. Receiver need not be required to know the baudrate of the transmitter
c. Simple Protocol	c. Complex Protocol.
d. Uses start bit, stop bit, Parity bit.	d. Uses LIN, SPI, I2C

⇒ USART character framing Problem হয় বলে,
⇒