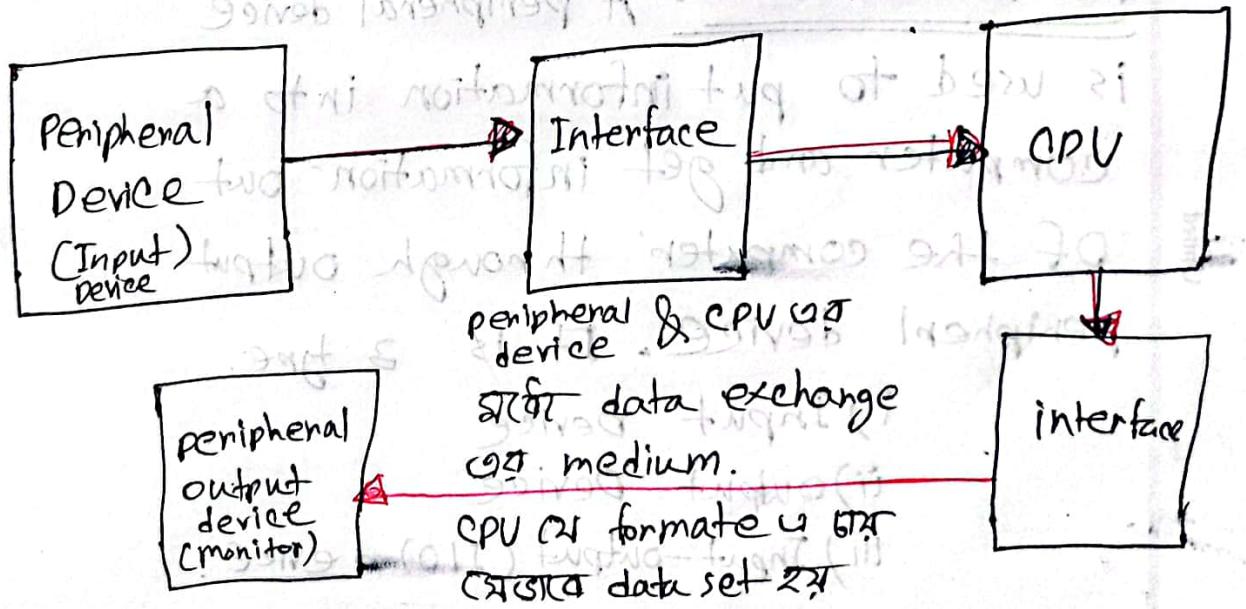


Computer Interfacing

computer interfacing: In computing, an interface is a shared boundary, across which two or more separate components of a computer system exchange information.

exchange between software, computer hardware, peripheral devices, humans and combination of these

touchscreen → send and receive data through interface
mouse, microphone may only provide an interface to send data to a given system. ATM, mouse → send data through interface



Interface গুরু কাঠা

- ① If device হতে এবং
device এ data থাকে
সেই বিষয়া formate দ্রু
থাকে কি এখনো হলে
formate করিব কৰা।
- ② If device এ data নাই
কে device free হাতে কি এখন
check করে। by থাকান
data hold করে নাই।

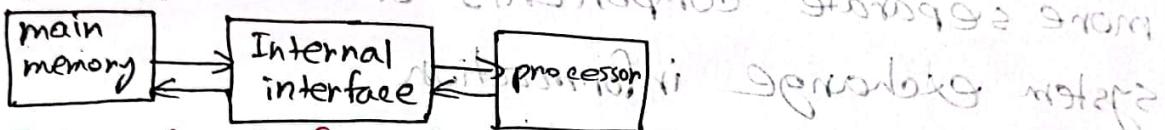
Sub.: Interface and its type

Interface

- ① External device এর মাজে interface রয়েছে (External interface)
- ② Internal device এর মাজে interface রয়েছে (Internal interface)

Internal interface

CPU এর মধ্যে যোগৈয়া data আপনা-আপনা হয় then internal interface
use করা হয় to distinguish storage store



Internal interface has no pins.

peripheral: A peripheral is a

device that connected to a

host computer externally.

Peripheral device: A peripheral device

is used to put information into a computer and get information out

of the computer through output peripheral device. It is 3 type.

- i) Input device
- ii) Output Device
- iii) Input-output (I/O) device

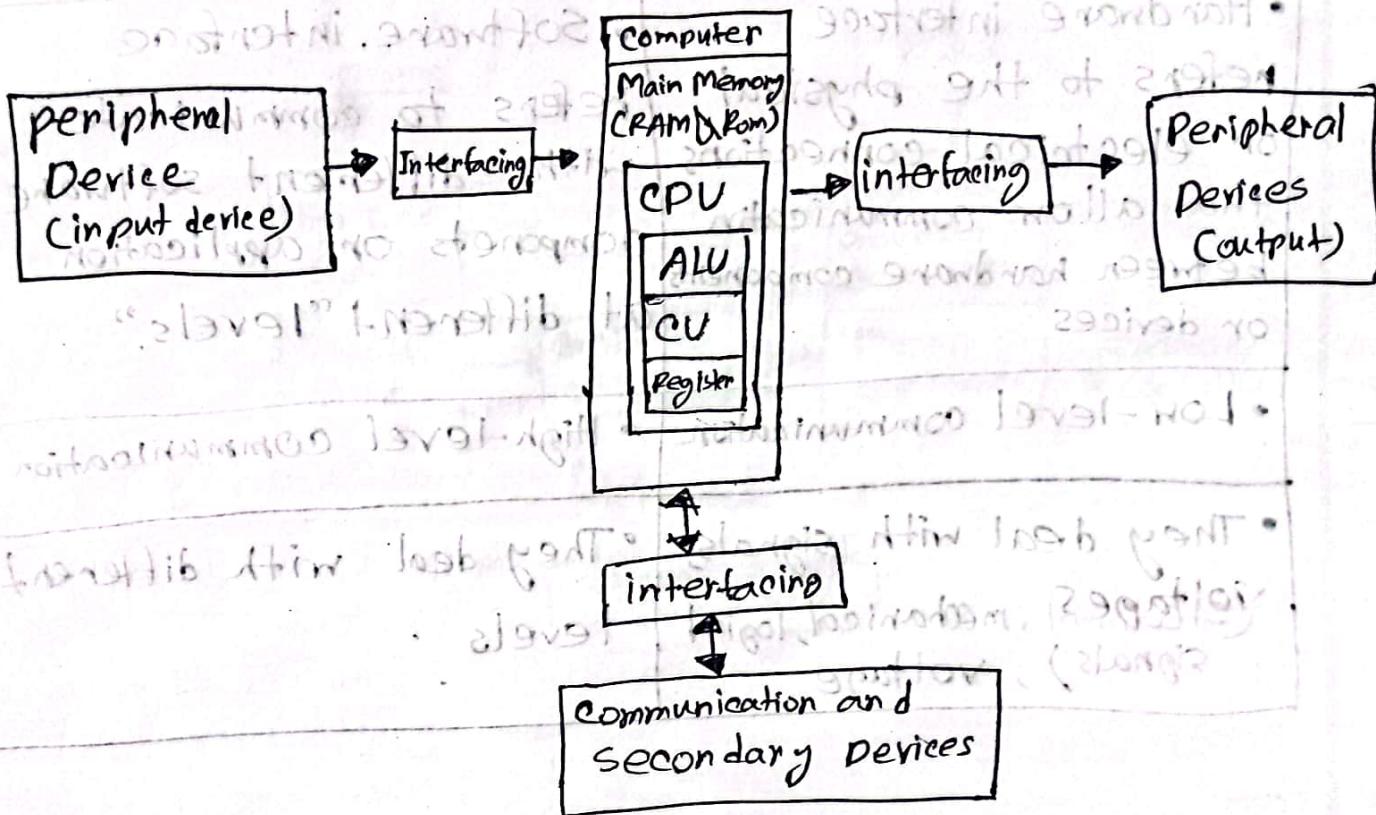
External Interface(I/Os)

External device and CPU ~~জো~~ মাঝে
I/O interface তারে external interface
বলে। Every processor chip has
pins which provide external
interface.

External input interfaces pins are
for sensing ON/OFF switches,
temperature sensor ... sensor.
(data নিয়ে sense করেছে)

External output interfaces: Pins
are for controlling ON/OFF switches,
increasing-decreasing values. Ex: speed
(data control করে)

Computing system architecture



ALU = Arithmetic logic unit

CU = Control unit.

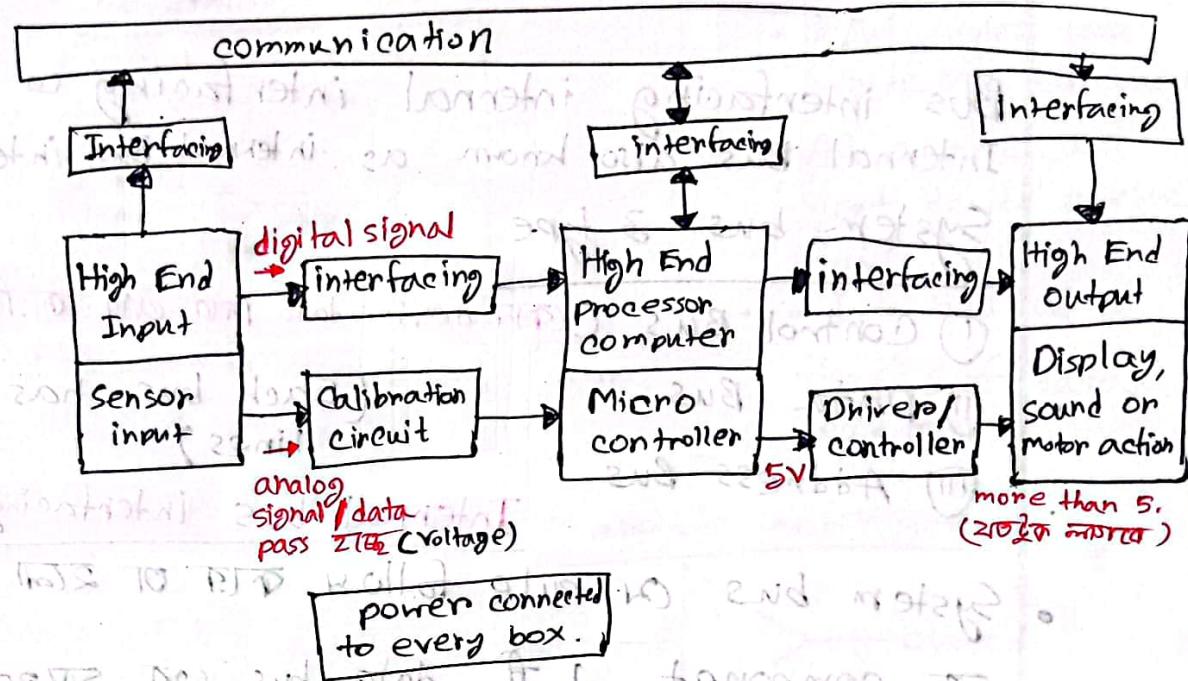
Interface and its type.

DATE: / /

Hardware interface and Software interface was given

Hardware interface	Software interface
<ul style="list-style-type: none">• Hardware interface refers to the physical or electrical connections that allow communication between hardware components or devices	<ul style="list-style-type: none">• Software interface refers to communicate with different software components or application at different "levels."
<ul style="list-style-type: none">• Low-level communication	<ul style="list-style-type: none">• High-level communication
<ul style="list-style-type: none">• They deal with signals (electrical, mechanical, logical signals), voltage	<ul style="list-style-type: none">• They deal with different levels

Hardware Interfacing Architecture



High End processor: at a time multiple task করতে পারে।
একজুড়ে High End input device (mouse, keyboard) করতে পারে।

High End input device এর signal দ্রুত তা digital।

(High End input device এর মতো নিয়ন্ত্রণ micro-controller থাকে।)
Output হয়ে High End output ফর্ম দেয় এবং মাত্রে নিয়ন্ত্রণ micro-controller এর।

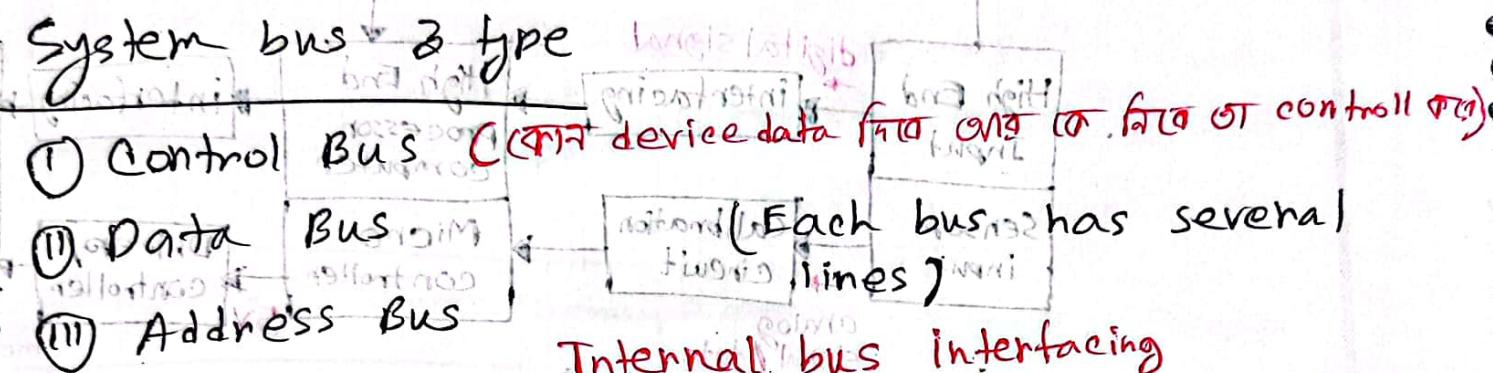
Micro controller: always specific কিছি task করে। Input device
ফর্মে sensor use করে এর environment হতে raw data আসে।

sensor input হতে micro controller এর analog data pass 2V
করে data/signal 2V voltage. calibration circuit voltage (2V
করে data/signal 2V voltage. calibration circuit voltage (2V
modify করে micro-controller এর ডেবালুট করে data (0-1) পাঠায়।

calibration circuit data করে 0/1 bit দেয় and microcontroller করে
Micro-controller highest 5V দিচ্ছে driver (এ), এর মাধ্যমে micro-controller করে 5V
display / motor করাতে হবে। amount of power need for display / sound ... output
or driver supply করে। output device হলো low end. এতে কোন অন্যান্য controller থাকে না।

Bus Interfacing (Oral slide)

Bus interfacing internal interfacing to use ইস্ট।
Internal Bus also known as internal Bus interfacing (IBI)



Internal bus interfacing

System bus or rule follow করে তা ইস্ট Tri-state logic.

মোট component 1 tf data bus এবং মাঝে

connected থাকে।

internal (input device can be CPU's transmitter).

at a time multiple input device data bus ও data supply করতে পারবে না, 1 tf data data bus ও traverse করে পারবে না।

∴ At a time 1 tf input device(transmitter) enable

থাকে / at a time 1 tf device data bus (or data দিতে পারে।

CPU এবং মাঝে অন্য device এবং internal connection

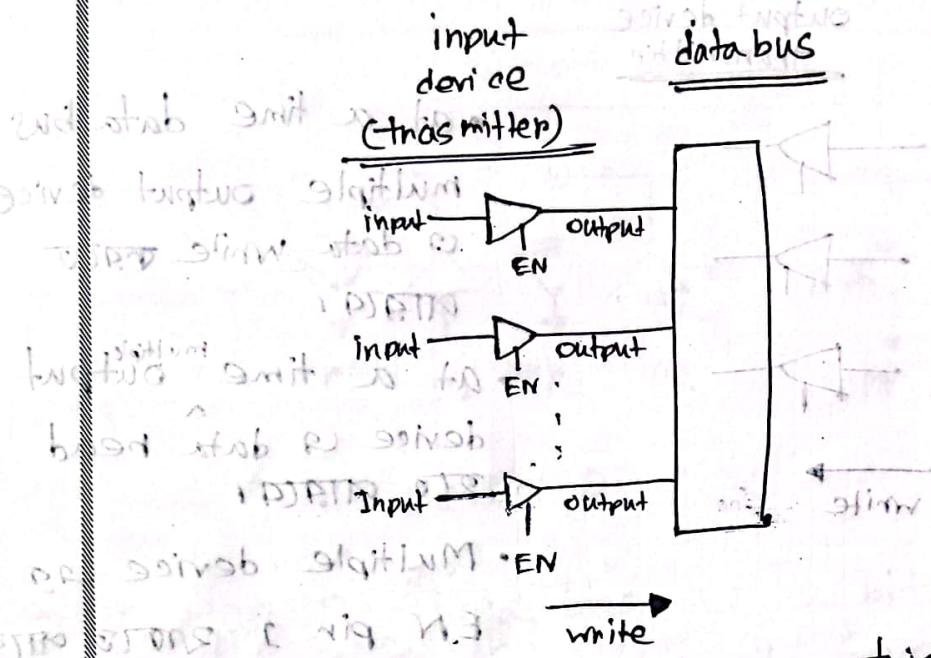
গুরুত্ব করবি। Internal bus interfacing এর মাধ্যমে

Input device & Data bus

Sub.: _____

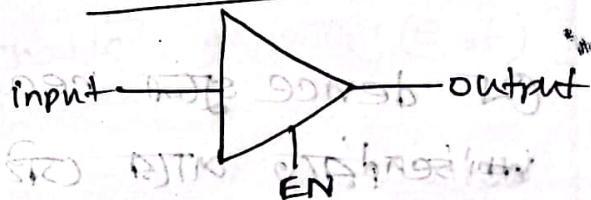
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Bus conflict at ସମ୍ପର୍କ ସମ୍ବନ୍ଧରେ
1 I/O pins is 2ମୟ ଏତାମେ.



- Only one I/O is used as output.
- input device data write or data bus
- At a time 1 I/O input device enable 2ମୟ
- data bus at a time 2 ମୟ data read ହେଲେ

tristate buffer gate



enable	input	Output
0	X	Z
1	0	0
1	1	1

Enable pin 0/1 କେବେ OT
control କରେ control bus.

Data bus & Output device.

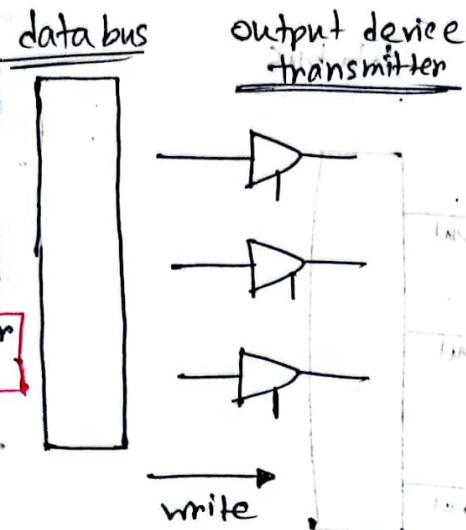
Sub.: _____

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(bus conflict হলে কী)

If one I/O is used
as output and
multiple I/O are
used as input
causes No Bus Error



at a time data bus

multiple output device

data write করা
করা যাবে।

at a time multiple
output device করা
করা যাবে।

Multiple device করা

EN pin করা যাবে

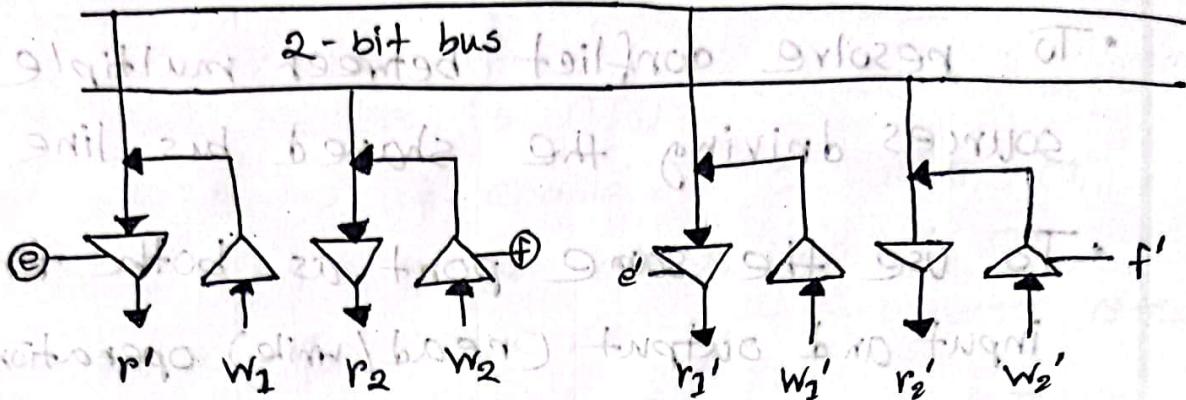
~~Output device state - read - write (data receive, data send)~~

both করতে পারে যেই device একটি 2 pin enable
pin থাকে। read এর জন্য 1 pin, write এর
জন্য 1 pin।

- ① ~~Output device Tri-state কী?~~
- enable pin এর 2 pin (ON, OFF)
- enable pin OFF (0) থাকে
তখন আরেক tri-state মডেল
বাব। এমন্তর output wire
high impedance থাকে,
device কর্তৃপক্ষ deactivate
করাকে। এমন্তর device কর্তৃপক্ষ data
read করতে পারে, write করতে
- থাকে না।

data send → write

data receive ← read



Device D and Device D'.

- Q. Device D data bus & 2 bit data ~~write~~ (write) and ~~read~~ data Device D' read (receive) কর।
 Device \Rightarrow 2ff করে enable pin $w_{1,2}'(e,f)$ & (e',f') .
 e, e' \rightarrow read enable pin
 f, f' \rightarrow write enable pin

For Device D write; and, Device D'. r_1'

$$e=0, f=1; \quad e'=1, f'=0$$

- Q. If D' is writing to D then what happen?

$$e'=0, f'=1 \therefore e=1, f=0$$

Advantage of Tri state Bus

- To resolve conflict between multiple sources driving the shared bus line.
- To use the same port as both for input and output (read/write) operation.
- It higher the bus fanout (20 for device connected 20 for fanout)

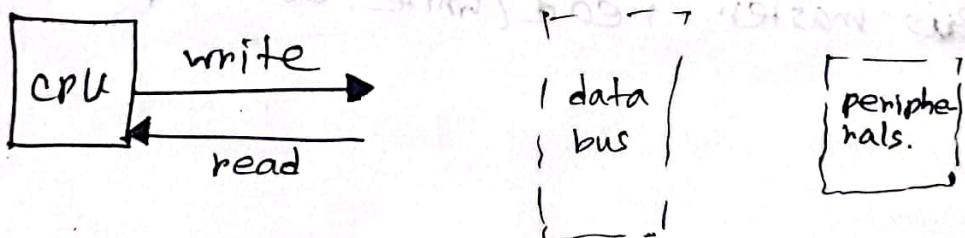
External Bus Interfacing (EBI)

- An external bus is also known as external bus interface (EBI).
- An external bus is a type of data that enables external devices and components to connect with a computer.
- It enables connecting devices carrying data and other control information, But it is only restricted to be used external to the computer system.
- Slower than Internal bus.
- External bus can be both serial / parallel.
- Example of External Bus: Universal Serial Bus (USB), PCI, IEEE 1394

Bus Master:

(Internal interface
of information)

- Usually Bus master is CPU
- কখন কোন Device এর enable pin 1 রয়েছে, CT
data read / write করে, at a time 1 AF
input device এর enable pin 0 CT 1 ২০৮৫ এর
ensure করার কাজ হলো Bus Master (CT)
- (The device that determines who will speak
and who will listen is called the bus master)
- A READ means data is going into the bus master.
(Read করে CPU read করে। স্টির data CPU এ কাছে আসতে
receive করে CPU.)
- A write means, data is going out from the
Bus master. (write করে CPU write করে। outgoing arrow)



প্র রেড/ওয়াটে কো ও কো
read = receive data
write = send data.

Sub.: _____

3 type of Bus.

SAT SUN MON TUE WED THU FRI

DATE: / /

Address line: (Unidirectional) always

The bus master uses them

to designate which device CPU
wants to communicate with.

CPU (bus master) কর্তৃ মাস্টার

যোগাযোগ করতে DBT ও বুকার জন্যে

address line use হয়।

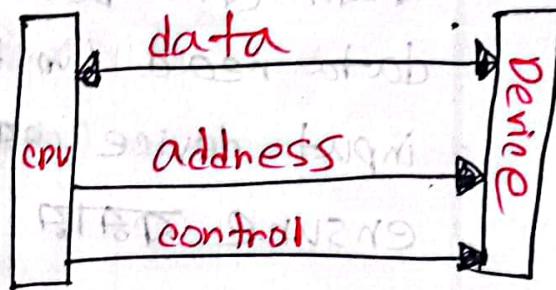


Figure: The Bus

Control lines: (Unidirectional) mostly

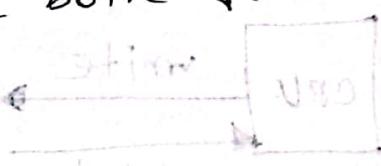
Device প্রয়োগ করে ০ or 1

যোগাযোগ ও control কর্তৃ কর্তৃ
control lines ফর্ম।

Data line: (bidirectional) always

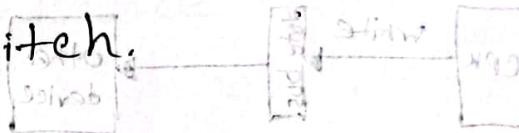
data transfer হয় তাই data line কর্তৃ হয়।

Bus master read/write both করতে পারে।



Causes of Bus Error

- ① If multiple devices using the bus as output.
- ② Wait states are not maintained properly.
There will be no synchronization in bus line and it will occur bus error.
- ③ If an I/O device cause the bus pin / enable pin stuck at 1 or 0.
- ④ Caused by glitch.



(if end of stat) back to the D000 slave stat v00
for 8500 bus stat 0100 and 1000 slave stat v00
end stat 0000 the 00 is bus stat 1000
first 0000 slave stat 1000 bus stat 0000

• (idle in state 0000)

• not in memory protection 0000

• I/O to write and read protection

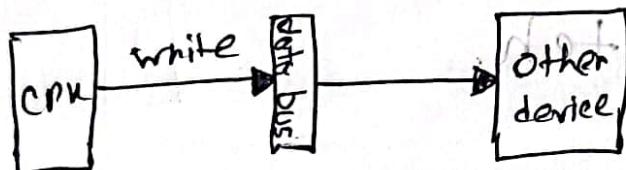
• illegal bus burst mode A

• illegal bus burst mode B

• illegal bus burst mode C

Wait state: CPU is much faster than memory chips - peripheral (clock speed different)

Wait state is a time out period during which a CPU or bus lies ~~idle~~ sit idle during some clock cycle so that the memory chips can catch up.)



CPU data write clock occurs fast. (data bus a)
other device data bus clock data read clock slowly.
So, full read at 23/21 occurs data bus
a data occurs in data bus. CPU wait
clock (wait state a 21).
So, wait state properly maintain clock
occurs when Bus error occurs.

Glitch: A short-lived fault in a system.

(Suppose device pblm a 21 clock enable
pin on 23/21, a 21 Bus error 21.)

Serial and parallel interface

↳ External interface এর জিমিলাতি.

External interface: একটা অস্থা 1 ft device এর
নেক বলে device externally connect করি হোন
Or way to data communication করে থাকি
Or external interface control করে থাকে।

Every processor chip has pins which
provide external interface.

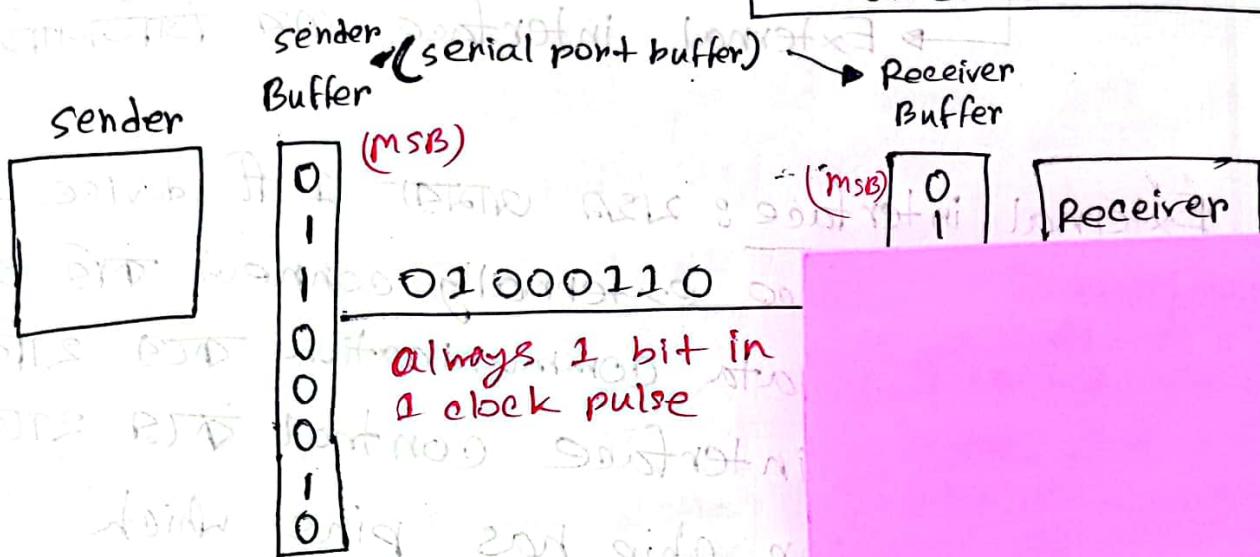
External device ওস্থা wire ফিল্ট করি।
wire connected 2110 ports।

port: A port is a physical docking point which
connect the external device and the computer.
It can be programmatic docking point (data
transfer করে internet গুরীচা)

- serial communication এম, serial port ফিল্ট করি।
- parallel communication এল parallel port ফিল্ট
device করে connect করি।

Serial Transmission

when data is sent 1 bit in 1 clock cycle over 1 channel.



always 1 bit in
1 clock pulse

- If data is 8 bits, first 1 bit pass to sender buffer
- store 7 bits
- each clock pulse, 1 bit will pass to receiver buffer
- MSB bit pass হওয়ার পথে
- 1 bit reaching end কোথায় থাকবে
- sender 0 to 1 bit send করা শুরু করবে
- bit reaching receiver buffer
- synchronized to receiver buffer এ একটি bit receive

Buffer a full data load হওয়ার পথ যে

receiver CPU C to data output

advantage

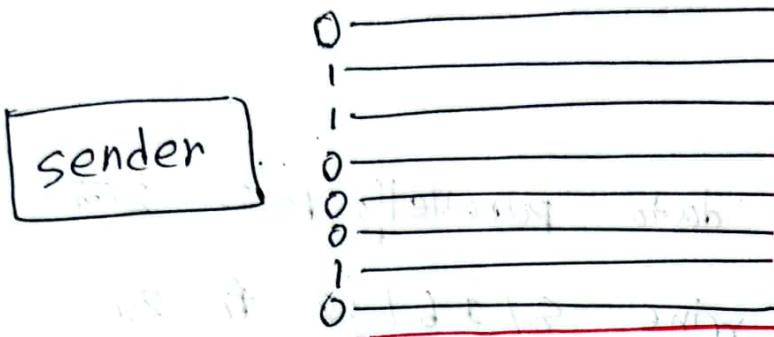
- ① data synchronization ensure
- ② ছুল data গ্রহণ করে বেশ noise কর

Serial transmission used:

- for long-distance data transfer (costly)
- when data is small
- connection between computer & modem using (RS-232 cable). also
25 wire out, data wire 2
control wire 23

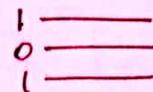
Sub: _____

Parallel Transmission



Crosstalk:

One channel creates an undesired effect in another channel called crosstalk.



0 এবং 1 র কাছের বাটো চালনা করে দ্বিতীয় চালনা করে পাস করে। দাটা এবং ইন্ফলুেন্স করে পরিবর্তন করে।

synchronization line

- sender & receiver একই কালো বাটো করে। buffer থাকে না।
data communication
- sender & receiver এবং মধ্যে বি.ফি. বাটো থাকে।
1 ক্লক পাসে 6 বাটো বি.ফি. বাটো করে। (16 বাটো থাকলে, 1 ক্লক-পাসে 16 বাটো বি.ফি.)
- When data is sent over multiple data bits over multiple channels at a same time called parallel transmission.
- synchronization wire থাকে যেখানে sender এবং receiver এবং ক্লক পাসের সময় সমান। minimum synchronization থাকে যেটি ensures করে। তাও হলু করে চালনা করে।

disadvantage

• data error হতে পারে। (check করা কাজ) নাই করে full data পেয়েছি নাকি?

• data delay ঘোষণাতে ফাল্টি data receive হতে পারে।

• data bit (থেকেন্ট) পরিবর্তন হতে পারে।

• cost করা কাজ। noise করা

used

• External RAM we করেন parallel port এ লাগাই device করা।
parallel Transmission করা।

* • A large amount of data want to send

• Data needs to be send quickly (video streaming, printer)