Seq 8

Embedded system (ES)

(integrated into device for specific function

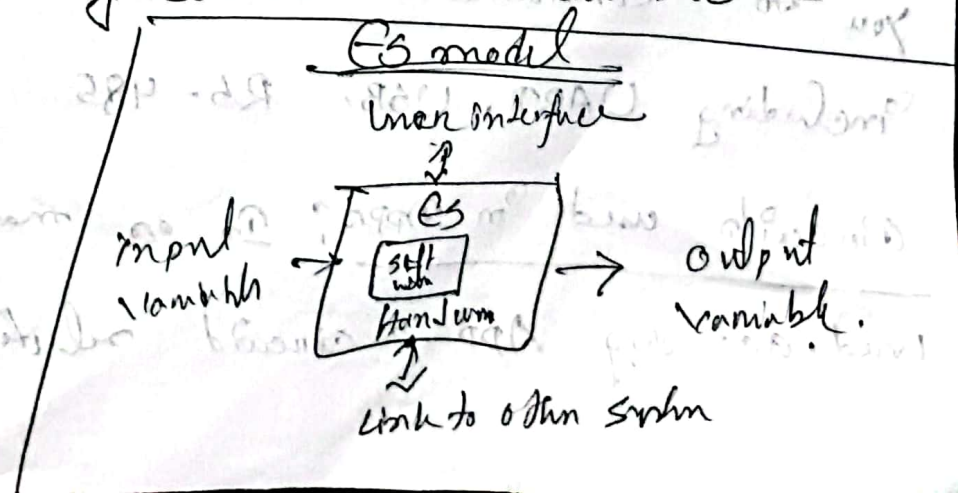
* Embedded system means something that is attached another thing.
* An embedded system can be thought of as a computer hardware system having software embedded in it.

- It has 2 components. hardware, application software (two flipped)

real time operating system (RTOS)
defines the way the system works
It sets the rules during execution of application program.

- Also referred firmware, for performing the specific function.
- Example of the industries where it is used, home application section, automobile section, agricultural, medical section

Two types ES.
- Hardware
- Software



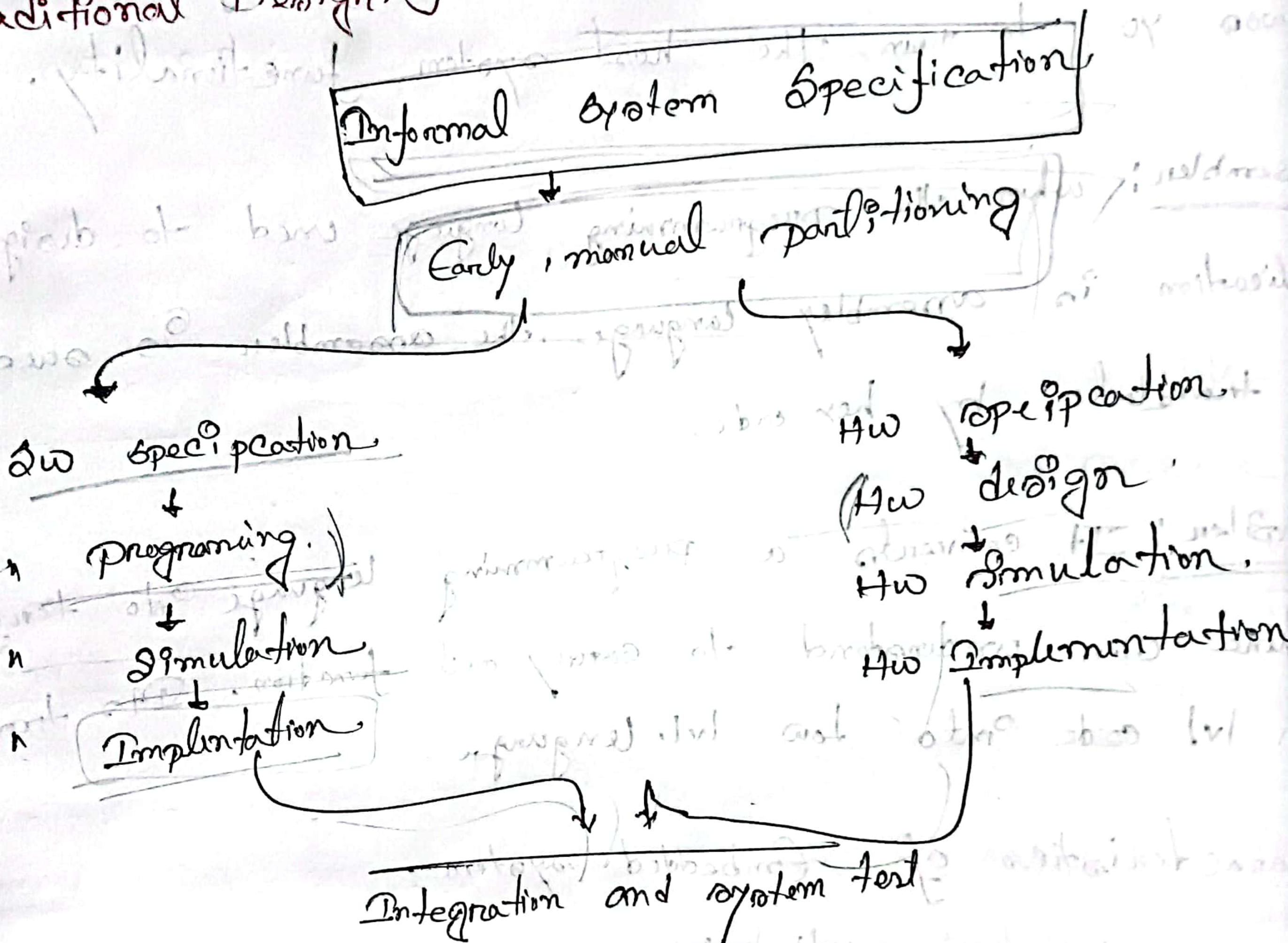
high lvl ~~code~~ onto low lvl. language.

Characteristics of Embedded system

- Es must be reliable.
- It's can't crash.
- Software can't be updated in many Es. devices
- many device have critical performance & power design constraints.
- real time constraints occur in many application.
- SW used for flexibility, hardware used for performance

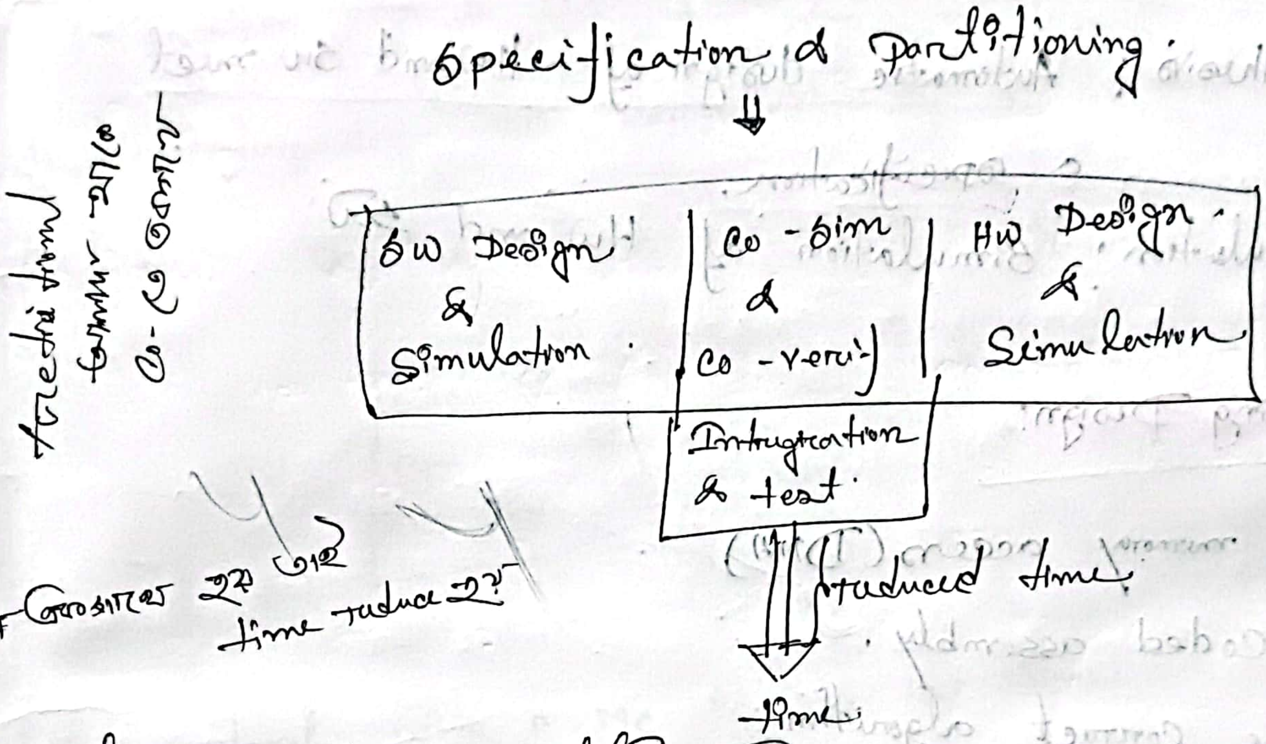
Hardware - software partitioning.

- Traditional Design flow:



কোনটা SW, HW হিসাবে হবে তাও ম্যানুয়ালি হয়

- HW / SW Co-Design



একসাথে হয় তাই time reduce হয়?

(*) why Co-design useful?

=> reduced time to market

=> Achive better design

=> Timing, performance, safety, reliability, cost constraints.

=> It's also made possible by the advance in design methodologies and tools

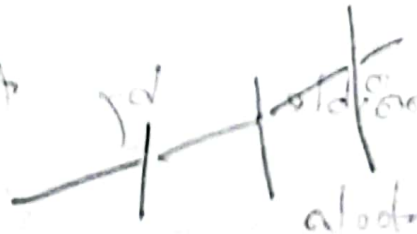
=> better solution can found.

=> The co-design Es involves.

- Co specification: relation between Hw and sw.
- Co-synthesis: Automatic design of Hw and sw meet a specification.
- Co Simulation: Simulation of Hw and sw.

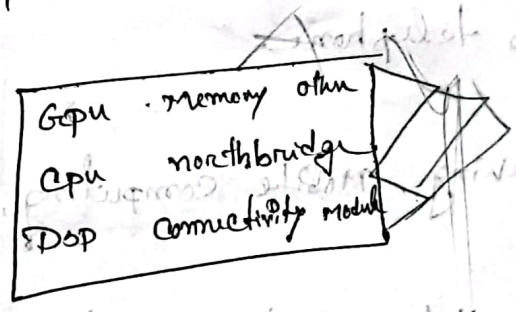
optimizing Design:

- Direct memory access (DMA)
- Hand coded assembly.
- Choose correct algorithm
- using standard template library (STL)
- use lookup tables.
- Avoid high frequency.
- Simplify your code



System - On chip (SOC)

- A system on a chip (SOC) is an Integrated Circuit (IC) that integrates all components of a computer or other electronic system into a single chip.



- The contrast with a MC on one of degree
- MC typically have under 100 kB of RAM and often run single-chip-system; whereas SOC is typically used with more powerful processor capable of running software such as the desktop version of Windows and Linux, which need external memory chips (flash, RAM) to be useful.

Application Domain > SoC where used?

In automobiles: used to make cruise control, Motor control. Core multimedia, robotics in an assembly line. e.g. Consumer electronics etc.

. Smart cards, banking & telephone

Tele communication: Networking, mobile computing, wireless communications, etc.

. They are in satellite and missiles.

Components of SoC:

. A microcontroller or microprocessor

. Memory blocks including ROM, RAM, flash memory

. Timing sources including oscillators.

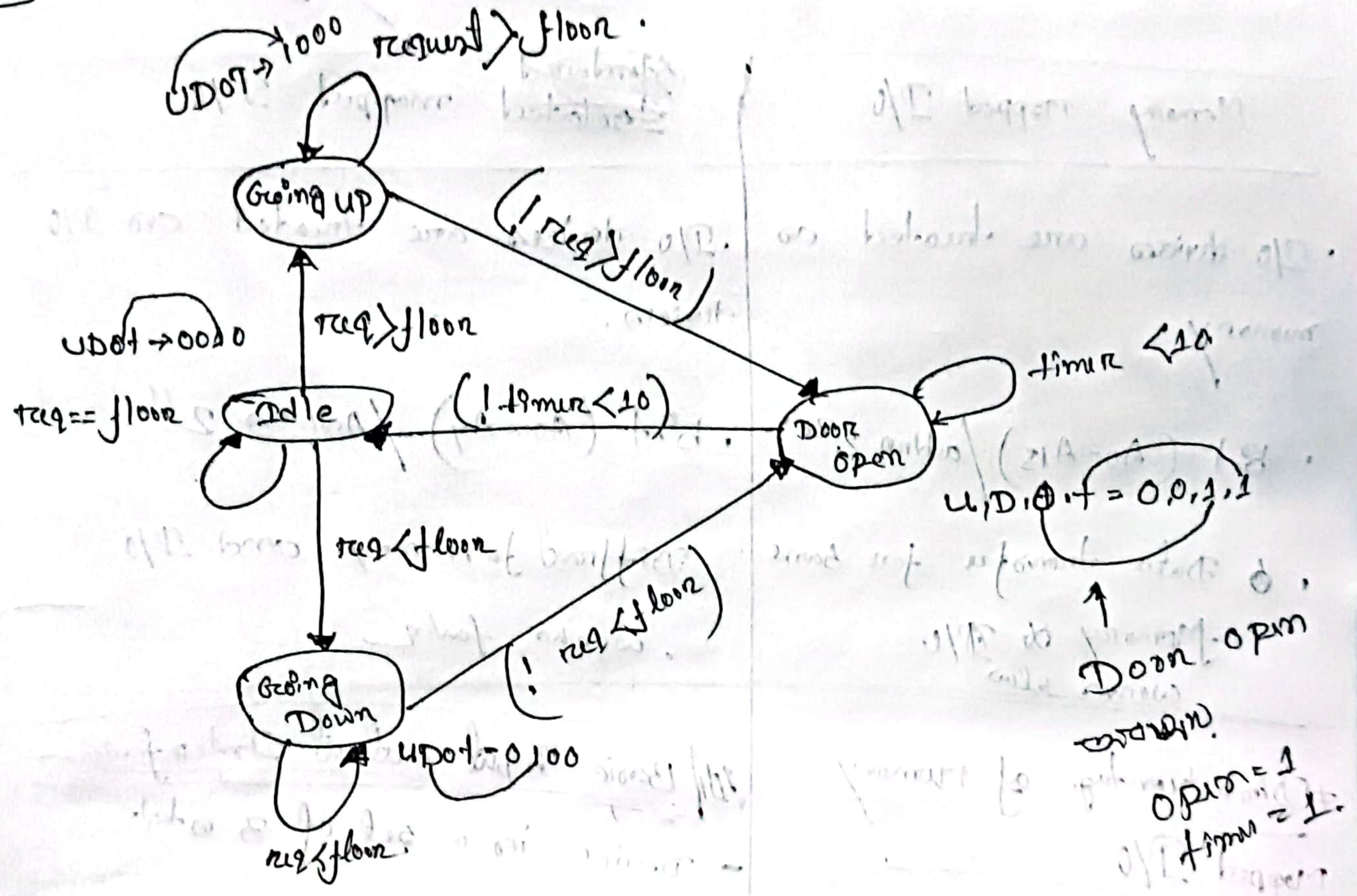
. External interface such as USB, Ethernet.

. Voltage regulators

• ES for Elevator System with finite state Machine (Digram)

Qu: Draw the finite state diagram for an elevator?

Ans



U = up
D = Down
T = timer start
O = open

এখানে request যদি floor থেকে বড় হয় উপরে উঠবে যতক্ষণ না তাহা req সমান হয়.

Idle আগে থাকবে, যখন floor আর req সমান then Idle mode: যখন req থেকে floor বড় তখন নিচে নেমে যাবে. যদি req থেকে floor বড় না হয় তখন (! req < floor) then Door open হবে 10s জন্য 10 সেকেন্ড শেষ হলে Idle mod যাবে Still same req যদি floor থেকে বড় না হয় Door open.