Introduction

Thursday, 30 June 2022 8:38 am

2 Design Techniques in Robotics

1. **Mechatronics System Design** is a mechanical design intended to integrate mechanical systems and its embedded control systems.

Courses Include:
- Mechanics
- Circuits
- Robotics 1
- Robotics 2
- Control System Engineering
- Advance PLC, SCADA and HMI

2.Robotics Design is the creation of a plan or convention for the construction of a robot or a robotic system (focuses on architectural blueprints, engineering drawing, operation process, circuit diagrams).

Courses Include:
- Electromechanical System
- PLC programming
- Microprocessor and Microcontrollers
- CAD subjects
- Sensors Technology

Microprocessor (uP)

1. are the brain of microcomputers
2. single chip on the motherboard

capable of processing data

> It controls all components in the computer (I O, storage, hardware, software)

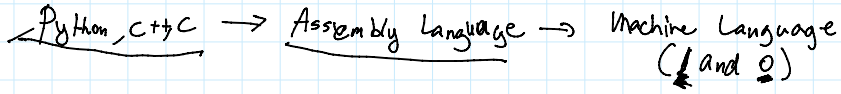
> It also execute sequence of instructions

> Only understands Machine language (1 and 0)

Other languages understand by humans:

A. High Intelligent languages (Python, C++,C)

B. Assembly Language



uP Parts

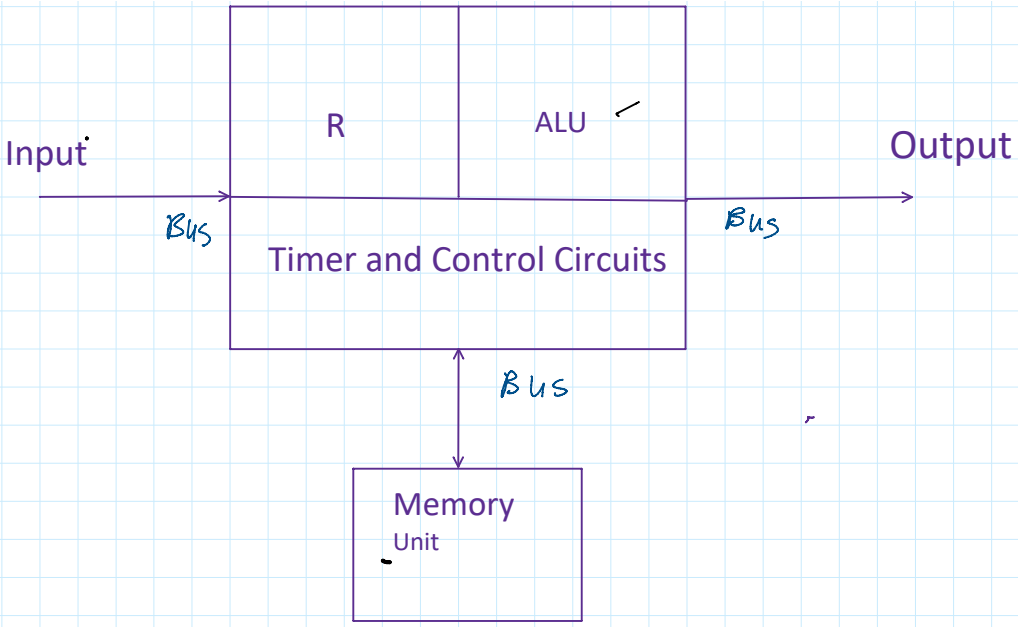
1. Register. Temporary storage Location for performing instructions.
2. ALU -Arithmetic Logic Unit -perform computations
3. Timing & Control CKts . Keeps all other-parts of system. like (memory, I/O) working together in right time sequence.

Microprocessor is connected with:

Input : gives input data to microprocessor

Output: Used to provide calculations from ALU

Memory: Used to store data



Evolution of Microprocessor
1st Generation (1939-1954) - Vacuum Tubes
2nd Generation (1954-1959) - Transistors
3rd Generation (1959-1971) - IC
4th Generation (1971 -present) - microprocessors

* 4 Bit Microprocessor → perform 4 – bit data at a time
  Intel 4004, Intel 4040

* 8 Bit Microprocessor
  8008, 8080, 8085, Motorola 6800 (M6800)

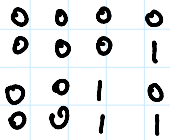
* 16 Bit Microprocessor
  8086, 8088, Zilog Z800, 80186, 80286

* 32 Bit Microprocessor
  Intel 80386, 80387, 80486
  Intel Pentium, Intel Pentium PRO
  Intel Pentium II, III, IV

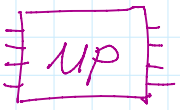
Intel Dual Core

* 64 Bit Microprocessor
Intel Core 2, I7, I5, I3

Clock speed
- speed of microprocessor executes instruction
- Measured MHz or GHz
  # 1MHz = 1 million cycles per second
  # 1GHz = 1billion cycles pet second
  Cycle means electric signal Cycle
- currently 3 GHz



Ex. 4 Bits



Word size
- no. of bits that can be processed by a processor in a single instruction determines the RAM that can be accessed and total number of pins.
- 32-bit and 64-bit architecture currently

Instruction
- term for commands given to the microprocessor to perform an operation
- This does the ff:
  * Data Transfer
  * Arithmetic Operations
  * Logical Operations
  * control Flow
  *Input/output machine control

memory

RAM - Random Access Memory - volatile memory that. gets erased when power is switched off.

ROM - Read Only Memory - non-volatile memory whose data remains intact even after power is switched off.