

PROGRAMMING AND APPLICATIONS OF ROBOT.

Robot Programming Languages:- (RPL):

→ A specialized computer language is used to instruct a robot to perform tasks such as movement, sensing, decision-making and interaction with its environment.

→ It allows engineers to define,

1) What the robot should do?

2) How it should do it?

→ It is mainly used to control robots, interact with hardware.

1) Versatile/Variable Assembly Language (VAL):

→ A low-level language where each instruction corresponds directly to a CPU instruction.

→ VAL provides precise control over actuators, motors and sensors.

→ Purpose:-

→ VAL Gives control of hardware such as,

* Registers - A small, high speed storage located inside CPU/Microcontroller.

*Memory - It stores data temporarily / permanently.

*Input/output ports - For sensor reading and Actuator Control.

→ VAL is not portable. Because Every processor family has its own instructions/commands.

→ Why VAL?

→ It lets engineers describe a robot's motions and tasks in a way that is easier to write and maintain than raw machine code, while still giving precise control.

→ Supports Variables, loops, and Conditional statements for flexible automation.

→ Easier to learn and Allows fine control of robot joints and movement paths.

→ Applications:-

→ Automotive Assembly.

→ Material handling and packaging.

→ Welding, painting and machine tending.

Program [Add two Numbers] :-

`section .text`

`global _start;`

`_start:`

`mov rax, 5; put 5 into 64-bit register rax.`

`add rax, 7; add 7 to rax (now rax=12).`

`mov rdi, rax; exit code=rax`

`mov rax, 60; syscall number for exit.`

Output [On simulation] :-

12

Program Explanation :-

* `section .text` → declares section where executable instructions live.

* `global _start` → Execution begin.

* `_start` → program's entry point.

* `rax` → Accumulator Register.
→ Used for arithmetic operations.

* `rdi` → Designation Index.

→ It holds 1st argument passed to a function.

* `mov rdi, rax` → Copy the result (12) to register RDI.

→ LINUX which is a free, open-source operating systems uses RDI for exit code argument.