Abstract

Flexible and programmable automation are increasingly demanded by industry as they offer reduced set up times and the ability to manufacture parts in small batches. These systems invariably use robots for handling and other manufacturing tasks to attain the desired output. Simulation of robot systems which is getting very popular, especially with the lowering cost of computers, can be used for layout evaluation, feasibility studies, presentations with animation and off-line programming [1]. The off-line programming capability of such systems can be enhanced if the programmes generated have the accuracy needed, so that modifications to the programmes - however minimal are not required. But this is not the case at present due to various reasons such as, modelling and manufacturing inaccuracies. This results in the robot space and control space not exactly mapped. Improvements to this mapping can be made at high costs, which could make such systems not so affordable. Thus if a mapping of the robot space can be improved by other means, in an affordable manner, then it will be of immense use to the users of such systems in the flexible automation area. Normally, an external sensor system is used to aid the calibration process. Robot calibration can be defined as a process by which the accuracy of a robot manipulator is enhanced to high orders of
This paper presents the work done with a system called GRASP, which is a 3D modelling and simulation system with textual programming and off-line programme generation capability. The issues of simulation and calibration are discussed and case studies presented to support the necessity for calibration.

References


Index Terms

Computer Science

Robotics
Key words

Kinematic parameters
Measurement "noise"

Nonlinear least squares
Nonlinear parameter identification
Robot calibration
Six degrees of freedom