Instituto Politécnico, Nova Friburgo
August 30th- September 3rd, 2004
Paper CRE04 - AC05

Simulation of a Workstation Based on Cartesian Parallel Structure

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The industrial robots have been constructed, from an anthropomorphic architecture, similar to the human arm, from the initial idea that the robot would be a mechanical system capable to realize the same tasks that the man and having similar ability. However, after researches and practical applications, the dream of construct a robotic machine similar to the man and with the same ability would not be an easy task. It can be enumerated diverse elements that justify this difficulty as those relative to the command of the robot that controls angles (rotation joints) for a linear trajectory and problems related to its inertia. One alternative to solve, partially, these problems is to use parallel architectures. The parallel cartesian structure consists of a robotic structure with 6 degrees-of-freedom, where the axis of the actuated joints are placed two-by-two, according to three axis of the Cartesian referential. One end of the forearms are connected at center of each face of a virtual cube that constitutes the mobile platform. It have advantages as: the actuators are mounted in the fixed base and no component of mechanical transmission (pulleys, gears, cable) are in movement, reducing the inertia problem; its construction is modular, allowing a reduction of the manufacturing cost and, for one same base it can be used different compositions of arms and forearms, getting a variety of workspace. The workstation is constituted by a table to support the element "to be read" and/or to be worked, and a parallel cartesian structure that the carries the tool of machining or reading. The table has two coupled motions, to commanded by the cartesian structure: one of up-and-down and another of rotation. Thus, the system has 8 degrees-of-freedom to realizate the operations of reading and machining, with a high flexibility (2 d.o.f. of table and 6 d.o.f. of the cartesian structure) [1,2]. The equations of the kinematics model of the Parallel Cartesian Structure are highly non linear. Then it is impracticable use them to simulate movements and to determine its workspace [3]. Using a graphical software it has been possible to simulate the motion of the cartesian structure, and verifying the elements collision determine the motion limits of the joints. From the graphical simulation of the motion it has been possible to obtain the workspace of the Parallel Cartesian Station.

REFERENCES

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