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A detailed kinematic analysis of a 6-articulated industrial robot

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Due to largely growing emphasis in academic research on industrial robots and their applications, it is often required by researchers to understand and examine the kinematic aspect of such robots. Obtaining both forward and inverse kinematic models of a given industrial robot could be a tedious and intricate task. Therefore, this paper presents a detailed kinematic analysis of a 6-axis industrial robot that commonly found in present-day industry and research laboratories. The proposed kinematic solutions have been validated against the simulation software provided by robot's supplier and an error analysis has been done to ensure the accuracy. There are models of robots which are well discussed in the field of robotic research and also within the domain of kinematic analysis. The Puma 560 by Unimation, also known as white rat of robotics is one of such robots which catalyzed robotic research for decades and well examined in textbooks and research articles. However, the eminence of such robots is gradually being replaced by modern 6-axis industrial robots. Perhaps due to its size, prize, availability or consideration of health and safety aspects, the Fanuc LR Mate 200iD is becoming increasingly popular in the industry as well as in the research laboratories. Alternatively, there are a limited number of research articles which examine the kinematics of present day industrial robots. Further, most of those articles barely discusses the results and lacks the scientific validation of proposed solutions. Therefore, the main focus of this article is to generate and validate the both forward and inverse kinematic models of a popular and modern industrial robot-the Fanuc LR Mate 200iD.

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