Adjustable Mechanism for Walking Robots with Minimum Number of Actuators

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Received December 23, 2010; revised July 6, 2011; accepted July 11, 2011; published electronically July 12, 2011

Abstract: Recent literature on walking robots deals predominantly with multi-degrees-of-freedom leg mechanisms and machines capable of adopting several gaits. This paper explores the other end of the spectrum suggesting mechanisms derived from a four bar coupler curve for a one degree of freedom walking robot. Simulation of the walk indicates that body of the robot is able to move with low variation in velocity. The best strategy for changing the gait to enable the robot to walk over obstacles and the effect of change in length of different links are explored to open up the possibility of a two degree of freedom walking robot with the capability of changing its gait, suitable as a low cost unit for several applications. Such rugged units would permit the use of an IC engine as the primary source of power and could be of utility in installations where electronics may not be functional. In simple walking machines the foot of a leg is usually required to trace a D shaped curve with respect to the chassis. In this paper we begin with a Hoecken mechanism capable of tracing such a curve. The foot is required to move parallel to itself and the same could be achieved using a six or eight link mechanism. A few such devices have been synthesized in this paper and their motion properties compared. The study also covers the possibility of providing adjustments to vary the step length and height of the foot's movement.

Key words: walking robot, degree of freedom, coupler curve, gait

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