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APPLICATION FOR POSITION AND LOAD REFERENCE GENERATION OF A SIMULATED MECHATRONIC CHAIN

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ABSTRACT

The paper presents the position and load reference generation for a motor stand simulating a mechatronic chain, in this case a three degree of freedom robot leg. The task is accomplished using three PLC controlled motors in position as the robot joint actuators coupled with three controlled in torque, simulating the load at each simulation time-step. The paper briefly discusses the mathematical model and presents the visual interface used in the simulation, which is then to be further integrated into a virtual environment robot control application.

Keywords: VIPRO platform, robot simulation, graphical user interface, reference generation.

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1. INTRODUCTION

The walking robots' ability to adapt to uneven terrain makes them very useful in today's

intelligent applications, from rescue operations and autonomous firefighting to elderly and disabled care. Walking locomotion ensures leg adaptation to the available environment, avoidance of unsuitable step positions and robot movement adapted to the terrain configuration

The walking robot is physically composed of a body containing the elements capable of executing the allocated tasks and the robot legs, generally with three degrees of freedom, which ensure locomotion. The legs are either in a support phase – the phase in which the leg is in contact with the ground, the body is either stationary or moving along the walking route, or in the walking phase – in which the leg is off the ground, executing motion in relation to the robot body with the aim of contacting the ground in a new position. The legs are RRR kinematic chains with active couples.

2. RESULTS AND DISCUSSION

Enter your results in this section; summarize the collected data and the analysis performed on those data relevant to the discourse that is to follow. After presenting the results, you are in a position to evaluate and interpret their implications, especially with respect to your original hypotheses [4].

3. EXPERIMENTAL

Motion with an elementary step corresponds to a walking cycle and transports the characteristic point M of the robot, usually chosen as the centre of mass or the geometric centre or on a vertical axis passing through it. Point M is the origin of a referential attached to the robot. The trajectory of point M is given in relation to a referential attached to a fixed point in the workspace.

4. CONCLUSION

The paper presents the design and strategies for modelling a robotic kinematic chain using coupled actuators driven from PLCs on a testing stand. This entails the calculation of dynamic resistive loads within the proposed virtual environment, which are duplicated in coupled actuators controlled in torque. Once this model is fully operational, it can be used to safely test

any type of control and motion strategies on a virtual robot system, while maintaining a solid base in concrete hardware implementation.

As can be seen from the described process of carrying out the modelling and mathematical simulations, the end-result is well parameterized and can be scaled to a wide variety of robotic applications, as well as various environment and kinematic chain situations.

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