Estimation of attitude via quaternion in an industrial robot

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Author(s): Benito, S.-Q.B.
Fac. de Ing., UASLP, San Luis Potosi, Mexico

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ABSTRACT
Traditionally, the automotive industry has been the largest employer of robots, but their control is inline and programmed to follow planning trajectories. In this case, in the motor’s department test of Volkswagen México a semi autonomous robot is developed to generally purpose. Some critical technical problems must be solved in a number of areas, including in dynamics and control. Generally, the attitude estimation and the measurement of the angular velocity are a requirement for the attitude control. As a result, the computational cost and the complexity of the control loop is relatively high. In the present paper, a techniques for attitude stabilization are proposed; the technique proposed is designed with attitude estimation and the prediction of the movement. With this approach, only the measurements of at least two non-collinear directional sensors are needed. Since the control laws are highly simple and a model-based observer for angular velocity reconstruction is not needed, the proposed new strategy is very suitable for embedded implementations. The global convergence of the estimation and prediction techniques are proved. Simulations with some robustness tests are performed.

INDEX TERMS

IEEE Terms
Acceleration , Estimation , Mathematical model , Quaternions , Service robots , Vectors

INSPEC
○ Controlled Indexing
  angular velocity measurement , attitude control , industrial robots , observers , path planning , sensors , stability , trajectory control

○ Non Controlled Indexing
  Volkswagen México , angular velocity measurement , angular velocity reconstruction , attitude control , attitude estimation , attitude stabilization , automotive industry , industrial robot , model-based observer , noncollinear directional sensor measurement , quaternion , semiautonomous robot , trajectory planning

Author Keywords
Estimation , Industrial Robot , Prediction of the movement , Quaternion