SOSCO

MECHATRONIC SOLUTION

Novel Structure

The TRBB_HILS is a Hardware In the Loop Simulation system for student to understand how to design and implement a real-time embedded control algorithm rapidly. In this experimental setup the position of a metal ball is stabilized on a beam by speed control of a two brushless motors located at the two ends of the beam. These two motor which run two propellers will control the thrust of the set of the motor and propeller and finally control the angle of the beam in order to stabilized the ball on the beam depends on the desired position of the ball which is set physically by the operator.

The novel structure of the TRBB_HILS is totally different and more challenging compare to the available ball and beams in the market. Because of the proposed structure more challenging and advanced nonlinear control algorithm might be used to control the position of the ball.

A set of linear and rotary pots are used to measure the position of the ball on the beam and the angle of the beam as well. The TRBB is also equipped with another beam and ball as the mechanism to set the desired static position of the ball and also the desired trajectory of the ball on the beam.

The robustness of the control algorithm will be verified disturbing the position of the ball. In the HILS structure MATLAB and Simulink are used as the simulation environment in order to simulate some parts of the hardware and control the system by changing the control parameter online. LABVIEW is also used as the GUI to monitor the system. AB_HILS and LABVIEW HMI works well with Hardware In the Loop Simulation.

TRBB_HILS

Twin Rotor
Ball & Beam

Hardware In the
Loop Simulation

Topics Covered :

- Hardware-In-the-Loop-Simulation
- System Modeling & Identification
- State Space analysis
- Real-Time Embedded Control
- Virtual Instrument
- PID control
- LEAD & LAG Control
- NN and Fuzzy Control
- Adaptive Control
- Non-Linear Control
- Labview & Matlab GUI
- Teleoperation
- Disturbance effect
- Frequency Response
- Step Response

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