

ABSTRACT

The development of technology in the industrial field is very rapid, this technology can help increase the effectiveness and number of goods produced by a factory. In making a technology in the industrial field, of course it is not random, it requires a long process, one of them is simulation. The design of the control system requires repeated testing, to minimize hardware damage the Hardware in The Loop (HIL) simulator is used.

In this study, the author uses hardware as a controller, Arduino UNO and software as a plant in MATLAB software, the plant that will be applied to the HIL simulator is a ball and beam control system. By using a State-Estimator, it can estimate variables that are not available in the ball and beam control system, so that it can support the results of the system response according to specified specifications.

The results of the study obtained a difference of steady state error in HIL and real plant of 0.443 cm, the difference in% overshoot of 13.62% and at settling time of 0.706 seconds. The cause of this difference can be caused by noise in the HIL simulator when sending control signals to the virtual plant and sending feedback back to Arduino UNO, noise at the position sensor at the real plant can also affect the response of the system at the real plant.

Key Word: *Hardware in The Loop, State-Estimator, Ball and Beam.*