

Lookup Table Reduction and Its Error Analysis of Hall Sensor-Based Rotation Angle Measurement

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Abstract : Hall sensor is widely used to measure rotation angle. When the Hall voltage is measured for linear displacement, it is converted to angular displacement using arctangent function, which requires a large lookup table. In this paper, a lookup table reduction technique is presented for angle measurement. When the input of the lookup table is small within a certain threshold, the change of the outputs with respect to the change of the inputs is relatively small. Thus, several inputs can share same output, which significantly reduce the lookup table size. Its error analysis was also performed, and the threshold was determined so as to maintain the error less than 1°. When the Hall voltage has 11-bit resolution, the lookup table size is reduced from 1,024 samples to 279 samples.

Keywords : hall sensor, angle measurement, lookup table, arctangent

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