An Interface Integrated Circuit of the Inductive Proximity Sensor

by

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Dedication

This thesis is dedicated to my parents, Hon-Fai Yau and Lih Liu,

and my sister, Hsia-Jing, Yau.

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Abstract

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This work describes the design and simulation results for the CMOS interface integrated circuit of a two-coil eddy current proximity sensor. The multisensory perception of this sensor provides information on both the proximity and the conductivity of the conductive plate target. These two parameters are reflected in the interface circuit by the phase shift between the signals in the primary and secondary coils and the operating frequency at which the minimum phase shift occurs. The interface circuit includes the driving circuits of a sinusoidal VCO and a transconductance amplifier for the purpose of periodic excitation of the primary coil, a phase detector circuit to extract the output signal in the secondary coil, and a feedback loop to control the operation frequency. The integrated circuit is simulated by using the 0.8 μm CMOS model of the standard silicon process provided by the MOSIS service. Numerical results of the accuracy and resolution of the circuit are presented as well.

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