INTERFACING ELECTRONIC FOR MEASUREMENT, SIGNAL PROCESSING AND WIRELESS COMMUNICATION

Edited by

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IIUM PRESS

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Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011

Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

Sheroz Khan, AHM Zahirul Alam & Anis Nurashikin Nordin: Interfacing Electronic for Measurement, Signal Processing and Wireless Communication.

ISBN: 978-967-418-171-0

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed By:
IIUM PRINTING SDN.BHD.
No. 1, Jalan Industri Batu Caves 1/3
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Batu Caves Centre Point
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CONTENTS

Chapter 14

DESIGN OF CAPACITIVE MEASURING SYSTEM FOR HIGH FREQUENCY BAND TRANSDUCER

NURUL ARFAH BINTI CHE MUSTAPHA, AHM ZAHIRUL ALAM, SHEROZ KHAN

Capacitance-to-voltage conversion (CVC) is a simple and attractive method for accurately measuring very low value capacitance variations over a wide range of capacitance changes, leading to almost linear relationship between the capacitance variations and the resulting voltage fluctuations obtained. Another added advantage of this technique lies in its simple implementation in MOS technology (Krummenacher, 1985). Also, this technique bypasses the usage of the conventional analog-to-digital converter, as the signal obtained is already digital, thus reducing the hardware cost by saving an important stage in the whole process (Chiang, Wang, & Huang, 2008). The resulting output signal is digital which can be easily transmitted, received and processed even by systems including wireless sensor networks. To meet such expectations, the 0.13 μm CMOS technology transducer is used.

14.1. CVC BLOCK DIAGRAM

Converter circuit used in this design uses a basic inverting principle as shown in Fig. 14.1 where capacitance C_f is the feedback circuit, and both capacitance C_r and C_x are at the inverting input of the Op-amp.

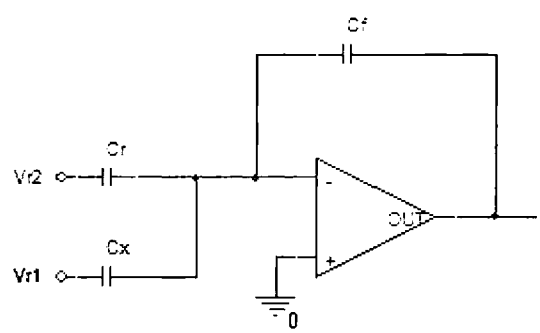

Fig. 14.1: Schematic of a Basic CVC (Sedra & Smith, 2004)