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 20

A STUDY OF LINEARIZATION TECHNIQUE USING A NONLINEAR THERMISTOR

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

20.1. INTRODUCTION

There are several linearization techniques of strongly nonlinear characteristic of thermistor has found its way in several applications. Some are using the different segments in passive method of linearization, conversion method of temperature into frequency or time intervals and some only used the computer methods for linearization. This work is using two methods of simulation; using Excel Simulation and PSpice Block Diagram simulation techniques to study the linearization technique of a measurement technique for astable system.

20.2. METHODOLOGY

Based on the derivation work on a thermistor's study that has been done in (Zvezditza & Toshko, 2009), the first and second derivatives of Eq. (1), Eq. (2) and Eq. (3) has been plotted in Fig. 20.1, Fig. 20.2 and Fig. 20.3. Then, guided by Fig. 12 in (Zvezditza & Toshko, 2009) and using the parameters given, a circuit was generated using PSpice simulation. An analysis was conducted using the PSpice simulation.

20.3. THEORETICAL BACKGROUND

At temperature, T = 25°, T = 273K+25° = 298K where

$$f = \frac{1.44}{(R_\tau + 2R_T)C_\tau} = \frac{1.44}{\left(R_\tau + 2R_\infty e^{B/T}\right)C_\tau} = \frac{1.44}{\left(R_\tau + 2R_{T2S}e^{B\left(1/T - 1/298\right)}\right)C_\tau} \quad (1)$$

Where value of B = q/k,

$$f' = \frac{2.88R_{T2S}Be^{B\left(1/T - 1/298\right)}}{C_\tau\left(T\left(R_\tau + 2R_{T2S}e^{B\left(1/T - 1/298\right)}\right)\right)^2} \quad (2)$$