DEVELOPMENT OF A SIMULATED MEASURING OBJECT FOR THE EVALUATION OF DIFFERENT SENSORS

By

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1-1301-028

BACHELOR'S DEGREE
in

MECHANICAL ENGINEERING – MECHATRONICS CONCENTRATION
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY

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August 2017

Revision after the Thesis Defense on 26th July

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

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ABSTRACT

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Position measurement by using sensors is crucial for many applications especially in industrial and safety-related fields. Therefore, a well-calibrated sensor is essential in all measuring systems. Currently, a laboratory exercise for students taking subject "Messwerterfassung und Umformung" in FH Südwestfalen Soest is not optimized for the purpose. This thesis work is an effort to develop and optimize the laboratory equipment for exercising with different types of position sensors and their comparison. A new position measuring system that consists of an electronic control box, a mechanical positioning system, electronic position sensors, and PC with LabVIEW will be designed and developed. Interconnection between the control box and LabVIEW will be developed using serial connection via USB. The control box is utilizing STM32F429I-DISC1 32-bitARM microcontroller to controls the stepper motor driver of the mechanical positioning system and communicate with LabVIEW on the PC. CooCox IDE is used as the development environment of the control box. Three type of sensors can be exercised and evaluated using the newly developed system, namely position sensors based on linear potentiometer, magnetostrictive, and LVDT. All the measurement process is controllable from the PC and the results are graphically and numerically displayed on a GUI. Experiments and calibration reveals that the accuracy of this system is dependent on the NI DAQ 11-bit resolution. LVDT shows its superiority compared to two other sensors in accuracy with only ±0.05 mm while potentiometer and magnetostrictive sensors are ±0.07 mm and ±0.1 mm respective.

Keywords: LabVIEW, STM32F429, CooCox, position measurement, microcontroller, serial connection

DEDICATION

I dedicate this works to God Almighty Who makes everything possible.

ACKNOWLEDGEMENTS

For the completion of this thesis, first of all, I would like to express my gratitude to God Almighty for his blessings from start until the end of this journey. I would like to thank my advisor Prof. Dr.–Ing. Werner Krybus for giving me this chance for doing my thesis work in Germany, and Sascha Schmidt, B. Eng. For his guidance and patience during this thesis work. Also for Ir. Arko, Ph.D. for his guidance and supports during this thesis work and during pre-thesis defense.

I would like to thank for all the supports that has been given from my families, especially my parents who keep worrying about me.

Last but not least, I want to thank to all of my friends who are also doing their thesis in Germany, especially who is also doing their thesis in FH Soest, for all of encouragement and their company during this journey.

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