SIGNAL CONDITIONING AND COMPUTER INTERFACING FOR A LOW-COST PORTABLE FIBRE OPTIC SENSOR
(SOFTWARE AND HARDWARE DEVELOPMENT)

Thesis presented in partial fulfilment for the award of the Advanced Diploma in Electrical Engineering of
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ABSTRACT

The main objective of this project is to design an interface of a low-cost portable optical fibre sensors measuring instrument with personal computer (PC). The measuring instrument has been designed to detect colour variation and measure physical displacement. The project uses a parallel printer port as an interface and Turbo C++ as a program language. The output from measuring instrument system is converted into digital by using Analogue to Digital Converter (ADC) and the result is manipulated into actual measurement (colour and displacement) by software before display on computer screen. The resolution for displacement measurement is the focus of this study.

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CONTENTS no page

CHAPTER 1

1.0 INTRODUCTION

Telecommunication have been revolutionised by fibre technology. In this decade a revolution is emerging, as designers combine the product outgrowths of fibre optic telecommunication with optoelectronic devices to create fibre optic sensors and their measuring instruments.

The measuring instrument can be developed by using solid-state light source such as light emitting diodes (LEDs), laser diodes (LDs) and semiconductor photodetector. A modulated light source allows the sensors to be used without any shielding from ambient light. A reference system is incorporated to compensate for any optical losses due to fibre coupling or bending[1].

Fibre optic sensors offer all-passive dielectric approach that is often crucial to success in applications such as electrical isolation of patients in medicine, elimination of conductive path in high-voltage environment and compatibility with placement in materials. The light weight and small size features are very important such as in aerospace technology. It is apparent that virtually any environmental effect that is conceivable needs to be converted to an optical signal to be interpreted. The usual case is that each environmental effect may be measured by a dozen fibre optic sensors and only the desired environment variables are sensed[2]. According to the structure of a typical Optical Fibre Sensor (OFS), it may be seen as