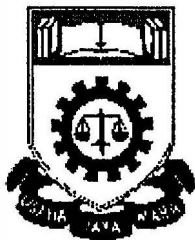


**COMPUTERISED REMOTE MONITORING  
FOR LOW VOLTAGE HARMONIC  
MEASUREMENT SYSTEM**

**Thesis is presented in partial fulfillment for the award of the  
Bachelor of Electrical Engineering (Honours)  
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**RUSLAAN BIN ABD. GHANI**  
**Faculty of Electrical Engineering**  
**INSTITUT TEKNOLOGI MARA**  
40450 Shah Alam  
Selangor Darul Ehsan

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## **ABSTRACT**

This project involves the design and development of a computerised remote monitoring low voltage harmonic measurement system. The project is an improvement of a previous work which consists of Remote Data Acquisition Unit (using PCL-818L data acquisition card), (RDAU), Monitoring Unit (MU) and Hayes compatible modems as communication link. The improvements involve the development of new features for the Remote Harmonic Monitoring Software (RHMS), the sampling frequency for Data Acquisition Software (DAS) and the hardware for transducer circuit. The RDAU and MU communicate through the Hayes compatible modem via telephone line. Sampling technique and Fast Fourier Transform (FFT) were used to compute system voltage and current for harmonic analysis. The software developed on Visual Basic is also able to determine the value of system powers and power factor. The new development system using ADAM-4550 Radio Modem Modula is the alternative solution for the Computerised Remote Monitoring System if the telephone line is not available.

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# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction.

Nowadays power quality (PQ) has become an important issue. Power Quality is defined as “ *the availability of pure sinusoidal wave voltage of the declared magnitude and current at the incoming point of the supply system* ” [1]. Although power quality is the commonly used term, it is the voltage that is being referred to in most cases. Subsequently power quality problem is also defined as “ *any power problem manifested in voltage, current, or frequency deviations that results in power failure or misoperation of customer equipment* ” [1]. Any alteration or modification of the pure sinusoidal wave - in terms of both magnitude and shape - can cause expensive failures.

The driving force behind the interest in power quality is the economic value. Utilities, customers and suppliers of equipment are all interested in power quality and its economic impacts.

Due to the rapid development of electronic and semiconductor devices, harmonic problems have become a major concern for present day engineers. A harmonic is *the non-fundamental frequency component of a distorted 50 Hz waveform* [2]. The primary sources of undesired harmonics are from rectifiers. Common applications of rectifiers are solid-state drives, uninterruptible power supplies (UPS), and electric arc furnaces. At present, there are many electronic equipment which are very sensitive to harmonics. Effect of harmonics can cause an increase in conductor size, heating, controllers burn-out, communication interference and etc.