CHAPTER 1

INTRODUCTION

1.1 Background Study

Data Acquisition (DAQ) is a method of sampling the real world to generate data that can be manipulated by a computer. Commonly abbreviated as DAQ or Data Acquisition System (DAS), it is typically involves acquisition of signals and waveforms and processing the signals to obtain desired information. The components of DAQ include appropriate sensors that convert any measurement parameter to an electrical signal, which is acquired by DAQ hardware. The data obtained is then being displayed, analyzed and store on a computer by using vendor supplied software or custom display and control can be developed using various text – based programming languages such BASIC, C, Fortran, Java, LabVIEW, MATLAB and so on. [1]

Initially, DAQ starts with the physical phenomenon or physical property of an object (under investigation) to be measured. Examples of the physical property or phenomenon can be the temperature or the temperature change in a room, the intensity or intensity change of a light source, the pressure inside a chamber, the force applied to an object and many more. For these physical phenomenon or physical property to be measured, a transducer is required where it converts the physical phenomenon or physical property into a corresponding measureable electrical signal, such as voltage or current. After that the signals from the transducer should gone to a signal conditioning. It is necessary in case it is not compatible for the DAQ hardware to be used where it normally be amplified, deamplified or filtering. [1]

For a complete system, the DAQ hardware interface usually between the analog signal and a Personal Computer (PC). It could be in the form of modulates that can be connected to the computer's port (parallel, serial, or Universal Serial Bus (USB)) or cards that are connected to slots such as Peripheral Component Interconnect (PCI) or Industry Standard Architecture (ISA) on the motherboard of a PC. DAQ cards often contain multiple components such as multiplexer, Analog to Digital Converter (ADC), Digital to Analog Converter (DAC), Transistor-Transistor-Logic Input Output (TTL IO), high speed timers or Random Access Memory (RAM). All this devices are accessible via bus by a microcontroller, which can run small programs. At the end of the system, software driver took place whereby it allows the operating system in the PC to recognize the DAQ hardware and programs to access the signals being detect and display on the PC for monitoring and analysis. [1]

As for the term of wireless communication, it defines the transfer of electromagnetic signals which contains information over a distance without the use of electrical conductors or wires. The distances involved may be short (a few meters as in television remote control) or very long (thousands or even millions of kilometers for radio communications) [2]

Therefore, by combining the term data acquisition and wireless communication, it becomes Wireless Data Acquisition in which the title for this project. This new innovation technology has become the trend for most industries and companies around the world to gather information due to its reliability and outstanding outcome. The advantage of this technology is that it did not use any physical components or wires to transfer the data obtained from sensor at transmitter side to the receiver side. As a result, an effective system is developed where it is not only removes all the conventional hardware and replace with a transceiver modem for data transfer but also a cost effective system as well. Moreover, the data transmission range can be extended into longer range depending on the transceiver modem capability. With this feature, information from the transducer could be transmitted faster and acts as an early alert in case of accident or disaster such as fire, flood and earthquake. Thus, scientists and engineers could serve the citizens in providing more secure environment with fast alert and prevention of death can be accomplished.

1.2   Problem Statement

Scientists and engineers in different fields are facing similar difficulty in data collection. For examples, a design engineer needs a system that capable to collect data from the testing laboratory to his work place and buildings such as factories and offices need to monitor its surrounding's temperature for fire detection. Therefore, this project is aimed to develop data acquisition system via wireless communication and display the data directly to computer. As a result, a lot of time will be saved and the task will be easily accomplished and also mishap or disaster can be prevented on time.

1.3   Objectives

The objectives of this project are:

- to develop an embedded controller with a Liquid Crystal Display (LCD), an Analog-to-Digital Converter(ADC) multiplexer, memory and transmit data using serial Recommended Standard 232 (RS232) wireless communication;

- to make a Radio Frequency(RF) communication which is wireless communication between the transmitter part and the receiver part for data transmission ;

- to develop a monitoring system software using Visual Basic 6.0 software and display data in graphical form.