

**DEVELOPMENT OF AUTOMATED TEST SYSTEM FOR ELECTRONICS  
MEASUREMENT**

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**This report is submitted in partial fulfillment of the requirement for the award  
of Bachelor of Electronic Engineering (Computer Engineering) With Honours**

**Faculty of Electronics and Computer Engineering  
Universiti Teknikal Malaysia Melaka**

**April 2010**



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**  
**FAKULTI KEJURUTERAAN ELEKTRONIK DAN KEJURUTERAAN KOMPUTER**

**BORANG PENGESAHAN STATUS LAPORAN**  
**PROJEK SARJANA MUDA II**

**Tajuk Projek** : DEVELOPMENT OF AUTOMATED TEST SYSTEM FOR  
 ELECTRONICS MEASUREMENT

**Sesi Pengajian** : 2009/2010

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Dedicated to my beloved family especially my mother and father and also to my friends.

## ACKNOWLEDGMENT

First and foremost, I would like to express my greatest gratitude to my supervisor of this project, En.Noor Azwan Bin Shairi for the valuable guidance and advice. He inspired me greatly to work in this project. His willingness to motivate me contributed tremendously to my project. I also would like to thank him for showing me some example that related to the topic of my project.

I wish to express my deep sense of gratitude to my Internal Guide, NI forumers for their able guidance and useful suggestions, which helped me in completing the project .

Finally, yet importantly, I would like to express my heartfelt thanks to my beloved parents for their blessings, my friends/classmates for their help, ideas and wishes for the successful completion of this project.

## ABSTRACT

The purpose of this project is to build the system to control the Automated Test System (ATS) by using computer data acquisition. With data acquisition software and signal converting/conditioning circuits, a computer may measure different physical quantities. It can measure the parameters, such as current, voltage and etc of the electronic component. It will display the result in graph and show either the measurement is PASS or FAIL according to the measurement we had set. This system is control by LabVIEW where LabVIEW is one of the most-used software for data acquisition. LabVIEW can be a software interface between equipment that is build by NI.

## ABSTRAK

Projek ini bertujuan membina satu sistem untuk mengawal Automated Test System (ATS) dengan menggunakan salah satu daripada data perolehan. Dengan perisian data perolehan, komputer dapat mengukur kuantiti fizikal yang berbeza. System ini boleh mengukur komponen electronic seperti Arus, voltage , ciri-ciri komponen elektronik itu dan sebagainya. Sistem ini akan memaparkan keputusan dalam bentuk grafik dan menunjukkan sama ada pengukuran itu PASS atau FAIL mengikut pengukuran yang telah ditetapkan. Sistem ini dikawal menggunakan perisian LabVIEW. LabVIEW boleh dijadikan perisian antara muka diantara peralatan yang di bina untuk menguji komponen



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# CHAPTER 1

## INTRODUCTION

### 1.1 Background

Today, many computer data acquisition application packages are available. They offer many benefits over hand-held meters and other traditional measuring instruments. These benefits include measurement automation, data storage and display, and fast sample speed. It is also an advantage to have the measurement results stored in computer memory, so that subsequent analysis of the data can be performed. With data acquisition software and signal converting/conditioning circuits, a computer may measure different physical quantities. Compared to traditional measuring equipment, this may reduce the overall equipment cost. One of the popular computer data acquisition application packages is Laboratory Virtual Instrument Engineering Workbench (LabVIEW) developed by National Instruments. LabVIEW is a graphical software system for developing high performance scientific and engineering applications[1].

In the electronic manufacturing industry, they want to produce high volume electronic products in shorter time. Manual test are not practical because it involve many operators to work with, at the same time it cause many failure. This occurs due to human negligence and will cause loss which many. Because of that, they need optimized manufacturing process (low cost).The solution is to come out the automated test system (ATS) to overcome the problem.



## 1.2 Objective

The objectives of this project were to:

- (a) Produce high volume electronic products in shorter time especially in the electronic manufacturing industry
- (b) Minimize the failure
- (c) Optimized manufacturing process (low cost) and reduce cost.

## 1.3 Problem Statement

Electronic manufacturing industry, are mass-produced devices that have evolved considerably over the years. As these devices have grown in complexity, so has the overhead associated with testing them. Today, some electronic components are so sophisticated that the cost to test them is greater than cost to produce them. To keep component affordable in the long run, electronic manufactures must drive down test cost by reducing the time to test each device and minimizing instrumentation expenses. Electronic module and device manufacturing requires test systems that are extremely reliable and flexible. High-quality products and minimal test system downtime and changeover time are extremely important in the electronic industry. In addition, hardware and software must be easily adaptable to new products and variants[1].

Test automation is the use of software to control the execution of tests, the comparison of actual outcomes to predicted outcomes, the setting up of test preconditions, and other test control and test reporting functions. Commonly, test automation involves automating a manual process already in place that uses a formalized testing process. Although manual tests may find many defects in a software application, it is a laborious and time consuming process. In addition it may not be effective in finding certain classes of defects. Test automation is a process of writing a computer program to do testing that would otherwise need to be done manually. Once tests have been automated, they can be run quickly. This is often the most cost effective method for software products that have a long maintenance life,

because even minor patches over the lifetime of the application can cause features to break which were working at an earlier point in time.

#### 1.4 Scope

The scope of this project is to design a program that can measure electronic components and capable to show the pass and failure of the components. The system is created by using LabVIEW. The system will be user friendly so that user can use it easily. This project not cover the model test because it costly.

#### 1.5 Organization

This thesis consists of five chapters. Chapter I will describe about the brief overview and the definition about the project such as introduction, objectives, problem statement and scope of the project. This chapter there will be summary the project progress.

Chapter II will discuss about research and information which are related to this project. Every fact and information are gained from different references will be discussed so that the best technique and method can be implemented on this project. This will be based on the literature review and information about the project. Every facts and information which found through journals or other references will be compared and the better methods have been chosen for the project. The software development that are using is LabVIEW 2009.

Chapter III will discuss about the project methodology used in this project such **Process Flow** and **LabVIEW Statechart**. All these methodology should be followed for a better performance. Get started labVIEW also will present in this chapter.

Chapter IV will describe about the project finding such as progress result and analysis. The result is presented by using tables, graph and figures.

The final chapter, Chapter V will explain about the conclusion of the whole project which includes project finding, achievement analysis and conclusion about the research implementation which have been used. The project suggestion for enhancement also discussed.

## CHAPTER 2

### LITERATURE STUDY

#### 2.1 Introduction

Basically this chapter will reveal the knowledge pertaining this field of project in which is gained through a lot of resources such as reference book, papers, journal, articles, conferences articles and documentations regarding applications and research work.

##### 2.1.1 Test Automation

There are two general approaches to test automation:

- (i) **Code-driven testing** - The public (usually) interfaces to classes, modules, or libraries are tested with a variety of input arguments to validate that the results that are returned are correct.
- (ii) **Graphical user interface** - testing. A testing framework generates user interface events such as keystrokes and mouse clicks, and observes the changes that result in the user interface, to validate that the observable behavior of the program is correct.

Test automation tools can be expensive, and it is usually employed in combination with manual testing. It can be made cost-effective in the longer term, especially when used repeatedly in regression testing.

### 2.1.2 Software

Developing software applications in almost any industry is a challenging process due to the increasing complexity of products and the decreasing development timelines. Essentially, test engineers and automation specialists are asked to create more elaborate applications in less time. The pressure of achieving short time to market and the reality of cost cutting mean that today's engineer is frequently focused on improving the productivity of the product-development process. LabVIEW has become a popular choice for system developers primarily because of its visual syntax and a multitude of high-level tools that dramatically increase productivity, lower cost, integration, performance, and reduced development time. LabVIEW is a graphical program development application developed by National Instruments in 1986 to integrate engineering tasks like [5]:

- (a) Interfacing computers with the instruments
- (b) Collecting, storing, analyzing, transmitting measured data
- (c) Developing program in a graphical environment
- (d) Providing an effective user interface.

LabVIEW delivers real solutions to the practical problems faster than any other graphical environment. More than a software package for controlling an instrument, LabVIEW can be used to integrate GPIB (it is to create a reliable bus system especially designed for connecting computers and instruments) for data acquisition, automation, motion control, measurement and almost everything to build a system. Since 1986, engineers and scientists have relied on LabVIEW for their testing, measurement, data acquisition, and control needs. Whether in research, design, validation, production test, or manufacturing. Many companies have successfully adopted LabVIEW for a wide variety of applications, ranging from

simple to sophisticated, in virtually every industry. Because of that, this project will focus more on LabVIEW for electronics measurement.

## **2.2 Integrated I/O Capabilities**

LabVIEW is best known as a data acquisition and instrument control tool. These capabilities are built into the language and are pervasive throughout the environment. The language itself naturally manages continuous, looping data acquisition operations, and delivers significant time savings to developers simply because the tool provides functionality throughout with an engineering and scientific perspective in the areas listed below:

### **2.2.1 I/O Libraries:**

- (a) Plug-in data acquisition devices
- (b) Modular instruments
- (c) Stand-alone instruments (GPIB, RS232, etc)
- (d) Vision/image acquisition
- (e) Motion control

### **2.2.2 Analysis**

- (a) Signal processing
- (b) Sound and vibration
- (c) Order analysis (rotational machinery analysis)
- (d) Spectral measurements and modulation

### 2.2.3 Display

- (a) Graphs, strip charts
- (b) Knobs, meters, gauges
- (c) Pumps, valves, pipes, Thermometers, tanks

## 2.3 Industry-Standard Software

It is lower risk when use the software that is considered an industry standard. In the case of LabVIEW, many companies have successfully used it for a large number of applications. The preference of engineers across the globe speaks for itself. In 2003, National Instruments sold products to more than 25,000 different companies in more than 90 countries around the world.

Market research shows the widespread adoption of LabVIEW for data acquisition and control applications. The following findings illustrate that many engineers and scientists prefer LabVIEW and National Instruments products over other options for their PC-based data acquisition and test instrumentation needs.

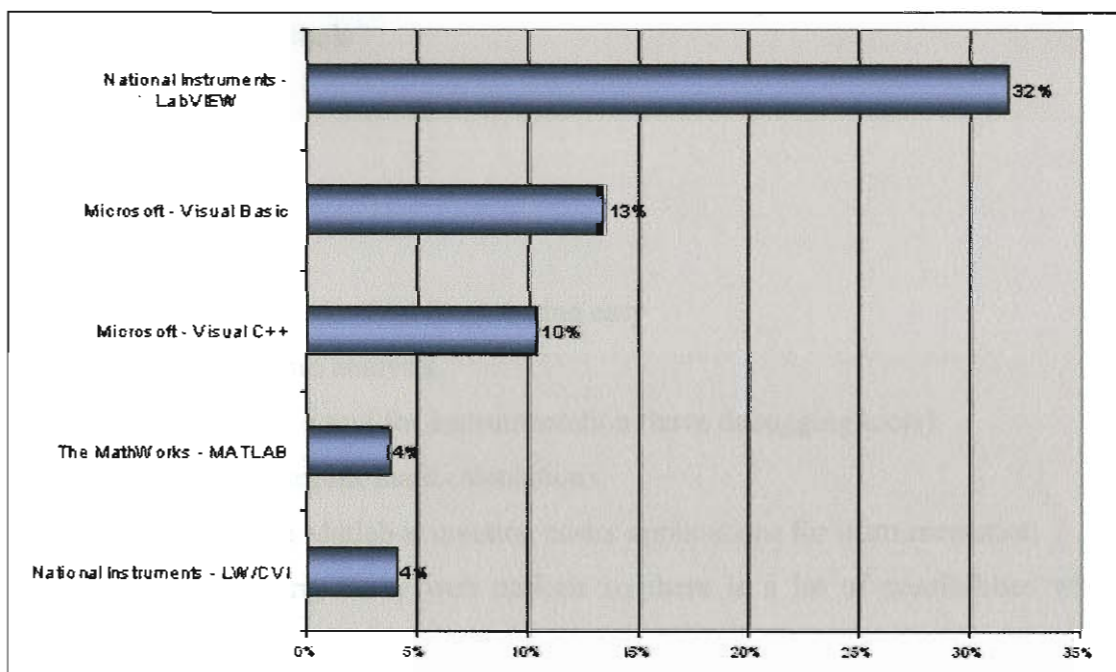


Chart 2.1: Most-Used Software for Data Acquisition and Instrument Control – Product Awareness Study Conducted by Reed Research Group, Sponsored by National Instruments, Q1 2004

## 2.4 Acquisition

Before this, user more prefer to use MATLAB, Visual basic and others in their project rather than LabVIEW to simulate and etc. First, look at the differences between MATLAB and LabVIEW:

### 2.4.1 MATLAB

- (a) for DSP, Communication analysis, mathematics modeling
- (b) can now do test Engineering (GPIB tool Box etc...)
- (c) Was essentially a tool for matrix calculation
- (d) allow control and data acquisition
- (e) still better regarding big matrixes
- (f) Matlab is like C programming but more user friendly
- (g) No debugging tools

### 2.4.2 LabVIEW

- (a) Labview is to make Test Engineering easy
- (b) can now do more analysis.
- (c) was essentially a tool for instrumentation (have debugging tools)
- (d) allow more complex math calculations
- (e) still better than Matlab at creating easier applications for instrumentation
- (f) has been adding many web options so there is a lot of possibilities with Labview.

Summary: Labview is a next generation language, extremely convenient for non-professional programmers, engineers, researchers and students.