



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF PC-BASED DIGITAL IC TESTER USING
BLUETOOTH**

This report submitted in accordance with requirement of the Universiti Teknikal
Malaysia Melaka (UTeM) for the Bachelor Degree of Electrical Engineering
Technology (Industrial Power) (Hons.)

by

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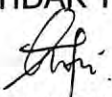
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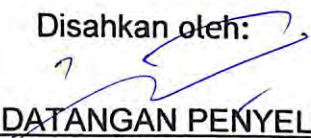
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I hereby, declared this report entitled “Development of PC-Based Digital IC Tester using Bluetooth” is the results of my own research except as cited in references.

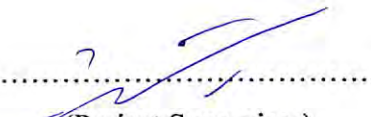
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APPROVAL

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Industrial Power) (Hons.). The member of the supervisory is as follow:


(Project Supervisor)

ABSTRACT

The main goal of my final year project is to design and implement a user friendly and small size of PC –Based IC Tester for customer facilities. This project focuses on how to design and develop an IC tester using microcontroller and PC where the user can easily use this application because the IC tester able to test the IC according the type of IC using computer to display the result. This project is based on testing of IC by verifying. The hardware consists of Microcontroller which IC to be tested is connected to its socket and interface it using computer. We all know that the different of IC have different input and output pins. The first produce is to program which pins are input and output. This is done by programming the microcontroller so that individual pins can work as per the software instructions. Source code is written in MicroC language, thus making it platform independent without support from computer. This project is using PIC16F877A as the IC tester brain. This microcontroller can receive a command signal and it will operate to justify the function of the socket. The test socket can use 16 pins for 74 series and 64 pins for microprocessor then a display to show results of a fail or good indication.

ABSTRAK

Projek ini direka khusus untuk penguji litar bersepadu berasaskan komputer dengan mempunyai ciri-ciri mesra pengguna dan bersaiz kecil untuk kemudahan pelanggan. Di dalam penghasilan projek ini, ia menumpukan kepada penghasilan dan merekabentuk satu penguji litar bersepadu yang menggunakan kawalan mikro serta komputer bagi mempamerkan keputusan pngujian terhadap litar bersepadu melalui komputer. Penguji yang dihasilkan ini mempunyai mikro pengawal yang digunakan sebagai pusat proses untuk mentafsir litar bersepadu dan menghantarkan keputusan melalui komputer. Kod sumber ditulis dalam bahasa C dengan menggunakan perisian MikroC dan menyimpan datanya didalam PIC16F877A sebagai pusat proses sistem penguji. Mikro pengawal ini akan menerima data dari soket dan memproses data keputusan dimana akan dipaparkan melalui komputer.

DEDICATIONS

**Special dedicated to
My beloved parents, my friend and siblings, who have encourage, guided and
supported me throughout my study.**

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I would like to take this opportunity to express my deepest gratitude to my project supervisor, En. Ahmad Idil Bin Abdul Rahman who has persistently and determinedly assisted me along the progress of the project. It would have been difficult to complete this first half of the project without enthusiastic support, insight and advice given by him.

My outmost thanks a lot for my family and friends who has given me support during my academic years. Without them, I might not be able to finish the project. I have gained a lot of help and support from friends and staffs in their faculty. I want to take this opportunity to say thank you to them for their advices and idea that help me with the project.

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LIST OF SYMBOLS AND ABBREVIATIONS

| | | |
|--------|---|----------------------------------------------------|
| IC | = | Integrated Circuit |
| PC | = | Computer |
| GUI | = | Graphic User Interface |
| ac | = | Alternating Current |
| Dc | = | Direct Current |
| (A/D) | = | Analogue / Digital |
| MicroC | = | Microcontroller |
| PLC | = | Programmable Logic Control |
| PIC | = | Peripheral Interface Controller |
| UART | = | Universal Asynchronous Receiver/Transmitter |
| ASCII | = | American Standard Code for Information Interchange |

CHAPTER 1

INTRODUCTION

1.0 Introduction

Integrated circuit or IC are used in almost all electronic equipment's in use today and have revolutionized the world of electronics. IC can construct more than one component on it without using a lot of component like transistor or gate. To make sure all the IC pins is functional; we need the tester to verify it. The tester is more compact and do not need to used different hardware circuit for different IC models. In this project, it used PC to interface with the tester for more reliable and easier tester. It is because, when we used the PC program, we able troubleshoot and more easily detected the damage of the pins on IC using the dynamic monitoring. Furthermore, the PC-based can be record and print while the standalone only can record the less information. For this project, this IC tester is more users friendly and easy to use.

1.1 Problem Statement

In this project there are the few problem statement carried out from this project. Firstly, to produce Integrated Circuit need the tester to test their IC to prevent from making a bad production. Furthermore, the standalone IC tester cannot record the number of defect IC efficiency and need to record manually. With the manually record, it will be hard for company or factory to analyse their production. Other than that, the display of IC tester is not attractive, difficult to read and need to be a user-friendly tester.

From the problem statement is:

- 1) To produce the integrated circuit requires testers to test and avoid making bad production.
- 2) The standalone IC Tester cannot record the number of defect IC efficiency.
- 3) The display of IC tester is not attractive.

1.2 Objective of Project

From the problem statement that we get, the main objective in this project is:

1. To identify the function of microcontroller and apply into this project.
2. To build a successful portable and compact PC-based IC Tester using Bluetooth that can interface between Tester (hardware) and computer.
3. To Develop the user friendly software that have an attractive display and easy to use without installation and used the space of computer.

1.3 Scope of Project

- ZIF SOCKET
- Microcontroller PIC16F877A
- Bluetooth Module
- Computer

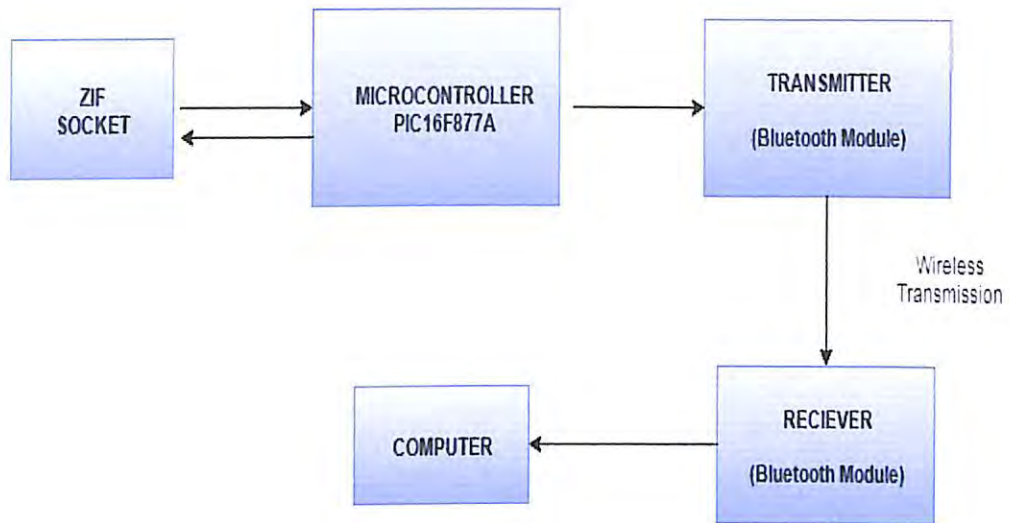


Figure 1.1: System Block Diagram

Based on the system Block in figure 1.1, the project scopes are to develop program for microcontroller PIC16F877A which is can test the IC. It also can communicate with computer to displaying the result of the testing. It is also use Bluetooth module to connect to a computer. Then build the complete circuit hardware and software for tester. The software will be able to record and register the data as the tester history.

CHAPTER 2

THEORETICAL BACKGROUND

2.0 Introduction

The purpose of the literature review is to convey the knowledge and ideas have been established on a topic and what are the strengths and weaknesses. Literature review has been conducted to obtain the information on the technology available and the methodologies that has been used by the other researchers. This chapter provides the summary of literature reviews on key topics related to the IC Tester.

Recently, there are various types of IC tester in the market. These type of product appeared with much kind of features and character, but with the same task. This part will discuss about the IC tester that exists in the market, their specification and how it functions. Many component and software also use in his project.

2.1 Review Digital IC Tester

2.1.1 Circuit Description

When power is supplied to the board, it first passes through bridge rectifier REC1, if the input supply is a.c, REC1 converts to d.c. If the input is already d.c it ensures that the polarity is correct for IC1, which then regulates the voltage down to approximately 5V. Capacitors C1 to C4 plus C11 provide smoothing. A PIC16F877-20 microcontroller, designated as IC3, is used as the core of the circuit and is run at its maximum speed of 20MHz, as defined by crystal X1. Since this design uses RS232 protocol to interface to a serial port on a PC, a voltage level converter is employed to convert the PIC's 5V logic levels to the $\pm 12V$ levels required by the RS232 standard (many PCs do not actually require this higher voltage for serial com

input and will accept +5V/0V inputs. Ed). This is accomplished by IC2, a MAX232 line driver. Capacitors C5 to C8 are used by IC2's internal circuitry to convert the supplied voltage from 5V to $\pm 12V$. Connection to the PC is via a 9-pin female D-type connector, SK2. To test the functionality of a digital logic i.c., a known set of logic levels must be presented on each pin and the resulting responses received back from the i.c. then analysed (JOE FARR, 2004).

2.2 Review PC-Based IC Tester

2.2.1 Circuit Description

For this project, it build a portable and compact PC-based IC tester. After that, it develops the user friendly software that has an attractive display and use the space of the computer. For this project, it uses the MAX232 and RS232 driver for connect to the computer. Besides that, this project use microcontroller PIC16F877A because is a capable microcontroller that can do many tasks because it has a large enough programming memory (large in terms of sensor and control projects) 8k words and 368 Bytes of RAM. This is enough to do many different projects (IHSANUDDIN,2010).

2.3 IC Tester

2.3.1 Instek GUT – 6000A (Digital IC Tester)

Features:

- Loop Test
- Auto search
- Self-Diagnosis
- Over-Load Protection
- Measures 1800 Kinds Device
- 54/74 Series TTL and High Speed CMOS

- 4000 and 4500 Series CMOS
- Test Socket : 28-Pin



Figure 2.1: Instek GUT – 6000A (Digital IC Tester)

(Source: <http://www.gwinstek.com/englobal/products/Other_Meters/Digital_IC_Testers/GUT-6000A>20/05/2015)

The Instek GUT-6000A Digital IC Tester shown in Figure 2.1 has a high test speed at an average of 0.8 second for one IC. It measures 1800 kinds of devices. The tester can run in loop test, do auto-search, a self-diagnosis and has over-load protection.

Tester specification:

| | |
|---------------------------------------------------|-----------------------------------------------------|
| Test Range | 54/74 series TTL and high speed CMOS |
| 4000 and 4500 series CMOS 55 and 75 series TTL | |
| Device Type | About 1800 kinds |
| Test Voltage | 5V DC |
| Test Time | High test speed at an average 0.8 second for one IC |
| Power Source | AC 110V/220V \pm 10%, 50/60Hz |
| Accessories | Power cord x 1, |
| Instruction Manual x 1 | |
| Dimensions & Weight | 335(W) x 105(H) x 300(D) mm, Approx. 1.5kg |

Table 2.1: Tester Specification

(Source: <http://www.gwinstek.com/global/products/Other_Meters/Digital_IC_Testers/GUT-6000A>20/05/2015)

2.3.2 Instek GUT- 6600 (Handy Digital IC Tester)

GUT- 6600 (Handy Digital IC Tester) that develops by Instek shown in Figure 2.2 is the easy-operating tester and particularly be design for Digital IC tester. The tester support 74/54/40/45 Serial and drive 2xxx. The tester is small and dimension of tester make it more portable and it have a feature like power-saving that able to used battery to operate.



Figure 2.2: GUT-6600 (Handy Digital IC Tester)

(Source:<http://www.gwinstek.com/en-global/products/Other_Meters/Digital_IC_Testers/GUT-6600A>21/05/2015)

Tester specification:

- 5V test voltage
- 0.8 second average search time
- 16 character in 1 line LCD display
- Using 4 x 1.5V (AA) battery and can used optional 9V with 500mA adapter
- Dimension : 160 (W) 45(H) 110(D)
- Approximate to 0.34kg weight

The importance of gray-scale transformation is to reduce image information and characteristic to be extracted in the system. Colour image have plenty of information regarding on RGB transformation leads to the complex process in the system. In gray-scale, colour information being ignored and the system will focus on the object characteristic for easier processes.