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Special dedication to my beloved father and mom, siblings, my supervisor and all my friends for their support and advice towards the project successfulness.

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ABSTRACT

Internet is the most popular communication system being used in this globalisation world. This security system was developed based on internet application. Visual studio 2005 is used to create interface for user to communicate with the system. Magnetic sensor is used to detect whether there are intruder entered the house during ON mode of the system. The use of PIC16F877A is to control and link the main component such as sensor, serial port and Graphical User Interface. This GUI can communicate with user by using internet. As long as there are internet connection surround, this system can be access. Hardware and GUI part communicate through the serial port of a PC. A serial connector called DB9 is used to exchange data between PC and PIC16F877A. This system required user to enter username and password for safety reason. Liquid crystal display (LCD) is used to display the result of the systems.

ABSTRAK

Internet merupakan satu bentuk komunikasi yang terkenal yang telah digunakan dalam era globalisasi ini. Sistem keselamatan ini telah dibangunkan menggunakan aplikasi internet. Studio Visual 2005 digunakan untuk membina satu pengantara muka antara manusia dan komputer. Sensor magnet digunakan untuk mengesan samada terdapat penceroboh yang menceroboh di rumah semasa system dalam keadaan aktif. Penggunaan PIC16F877A adalah untuk mengawal dan menghubungkan komponen-komponen utama yang digunakan iaitu pengesan, port sesiri dan Graphic Pengantaramuka. GUI ini boleh berkomunikasi dengan manusia menggunakan internet. Selagi ianya terdapat capaian internet, system ini boleh diakses. GUI dan perkakasan berkomunikasi melalu port sesiri yang terdapat di computer. Satu penghubung sesiri yang dikenali sebagai DB9 digunakan untuk membolehkan pertukaran data berlaku di antara computer dan PIC16F877A. Sistem ini memerlukan katanama dan kata laluan sebagai satu langkah keselamatan sistem.

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CHAPTER 1

INTRODUCTION

This chapter will discuss the term in developing a home security which using internet connection. The objectives of developing home security are discussed. The problem statement stated the reasons to the creation and development of the home security around the world. The objective and scope of this project is also presented in this chapter.

1.1 Objectives

The main objective for this project is to develop a home security based on internet application. By developing this home security, it will help to reduce home intruder cases.

1.2 Problem Statement

Nowadays, there are a lot of home intruder cases during sleep time, holidays and other times. This caused lot of losses to the owner. Many of home owners provide security system at their house to avoid such cases. But incomplete security system will not provide a safe environment for the house. By developing this project, users are able to upgrade the security at the house.

1.3 Project scope

This project concentrates on developing a home security system which can be access using internet. In this project, magnetic sensor is used as a detection switch. GUI interface created using Microsoft Visual Studio 2005. PIC16F877A is used as a controller for hardware part. Serial port is used to communicate the GUI and hardware part.

CHAPTER 2

LITERATURE REVIEWS

2.1 Introduction

Literature Review is important in each project as a base for gathering information necessary to complete the project. All information is gathered from various sources such as:-

1. Journal
2. Books
3. Conference Transcript
4. Thesis
5. Patent
6. Website

After searching through all this various material, all information will be filtered to be related to home security systems. All this information will be compiled to be included in the report.

2.2 Home Security Systems

The wireless home security alarm systems offer the latest in technology, open up a multitude of new solutions to protect a property, its possessions, and to safeguard the family. The self-contained systems for the home offer safety, are often cost effective, and give that versatility factor. These systems can be mounted at most locations throughout a property to accommodate the security needs. [7]

. These systems are often installed in an existing property, and can be modified or added to in times of renovating the property. Whereas the hard-wired systems are often installed at the time the property is construction, as it would be complicated to get the entire house rewired at a later date.[7]

The more advanced alarms are able to detect a break-in or fire, as well as to communicate when the kids are home, and able to contact a number of private telephone numbers if the alarm is activated. Alternatively, with some systems it's possible to monitor the home via a web browser or mobile phone.[8]

Out of the hard-wired and the wireless alarm systems, it has been known in the past for the wireless systems to sound more false alarms. Although the latest models on the market now offer a range of false warning reduction features to enhance the reliability. The wireless home security alarm system is a great deterrent to deter the burglar and can often be picked up at any of the large hardware stores.[8]

2.3 Microsoft Visual Basic 2005

Visual Basic was a revolution to Basic programmers worldwide as it enabled them to drag and drop controls from a toolbox onto their forms without having to write any code at all. It also changed the focus of the actual code to an event-oriented model that reacted to things happening, as opposed to making things happen. Visual Basic's versatility enabled third-party companies to develop add-ins and additional controls that Visual Basic programmers could use in their own applications and the popularity of the language grew hugely.[4]

Subsequently, versions of Visual Basic introduced database support (ODBC in VB2, and Jet in VB3) and the ability to create own add-ins and classes (in VB4), and ultimately controls (in VB6). While all of this was happening, Basic appeared in other applications such as Access Basic and VBScript for Internet Explorer. This integration of Basic as a way of programmatically accessing features in Windows and applications culminated in Visual Basic for Applications, which first appeared in Microsoft Office 97. Throughout all these stages of its evolution, however, Visual Basic was still crippled with additional runtime components and a (much) less than perfect implementation of object-oriented programming that hurt its reputation in the performance and pure programming stakes.[4]

That all changed with .NET. Visual Basic .NET was the first fully compiled language and required no extra runtime component other than the one required by all other .NET languages—the .NET Common Language Runtime (CLR). Visual Basic.NET programs compile down to the same assembled code that the other .NET languages do; and because of this, Visual Basic has no performance issues in comparison to C# or C++.[4]

2.4 Advantages of Microsoft Visual Studio 2005

The beauty of this latest move for Visual Basic is that it has not lost the ease of use and additional features that make it the choice of many programmers—wizards, intuitive user interface design, and some excellent debugging features (although edit and-continue was removed in the early days of .NET, it lives again in Visual Basic2005 Express).[4]

In fact, the modern development environment for .NET has more in common with the way Visual Basic 6 worked than the C++ equivalent. The toolbox, Solution Explorer, and properties pages are almost unchanged, and the way of associating code with user interface elements is identical to previous versions. For people with previous experience in Visual Basic programming, the only real hurdle is learning how to handle the new way of actually coding—proper object-oriented programming is admittedly different from the way VB6 did it.[4]

Visual Basic was the world's most popular programming language for over a decade, but when Visual Basic .NET appeared, things changed. Because of the .NET framework's added complexity, Visual Basic lost its appeal for beginning , amateur, and small-business programmers. Its popularity has declined.[4]

In this newest iteration of Visual Basic —Visual Basic Express 2005 — Microsoft has tried to win back this segment of programmers. It is, after all, the largest segment of programmers, considerably outnumbering professional developers working in large organizations. Visual Basic 2005 comes in two versions: Visual Basic 2005 for Developers and Visual Basic 2005 Express Edition. VB for Developers focuses on technologies that assist people working in groups on the same program (OOP has many such features). [4]

2.5 Microsoft Office Access

2.5.1 Introduction

Microsoft Office Access, previously known as Microsoft Access, is a relational database management system from Microsoft that combines the relational Microsoft Jet Database Engine with a graphical user interface and software development tools. It is a member of the 2007 Microsoft Office system.[6]

Access can use data stored in Access/Jet, Microsoft SQL Server, Oracle, or any ODBC-compliant data container (including MySQL and PostgreSQL). Skilled software developers and data architects use it to develop application software. Relatively unskilled programmers and non-programmer "power users" can use it to build simple applications. It supports some object-oriented techniques but falls short of being a fully object-oriented development tool.[6]

Access is used by small businesses, within departments of large corporations, and by hobby programmers to create *ad hoc* customized desktop systems for handling the creation and manipulation of data.[6]

Some professional application developers use Access for rapid application development, especially for the creation of prototypes and standalone applications that serve as tools for on-the-road salespeople. Access does not scale well if data access is via a network, so applications that are used by more than a handful of people tend to rely on Client-Server based solutions. However, an Access "front end" (the forms, reports, queries and VB code) can be used against a host of database backends, including JET (file-based database engine, used in Access by default), Microsoft SQL Server, Oracle, and all other ODBC-compliant product.[6]

In addition to traditional ODBC methods, Access also offers "Access Data Projects" for accessing SQL Server data, which provides a number of advantages over linked tables. Unfortunately, there are also several bugs with the technology, and after years of promoting it, Microsoft now appears to be downplaying its use.[6]

2.5.2 Advantages of Microsoft Access

One of the benefits of Microsoft Access from a programmer's perspective is its relative compatibility with SQL (structured query language) where queries can be viewed graphically or edited as SQL statements, and SQL statements can be used directly in Macros and VBA Modules to manipulate Access tables. Users can mix and use both VBA and "Macros" for programming forms and logic and offers object-oriented possibilities.[6]

MSDE (Microsoft SQL Server Desktop Engine) 2000, a scaled down version of Microsoft SQL Server 2000, has been a free download for a decade and may be used with Access as an alternative to the Jet Database Engine. Unlike other RDBMS, Microsoft Access does not implement database triggers or stored procedures.[6]

Starting in Access 2000 (Jet 4.0), there is a new syntax for creating queries with parameters, in a way that looks like creating stored procedures, but these procedures are still limited to one statement per procedure. [6]

In ADP files (supported in Access 2000 and later), the database-related features are geared more towards a client-server architecture with MSDE or Microsoft SQL Server serving as the back-end instead of using the Jet Engine. Thus, it supports the creation of nearly all objects in the underlying server (tables with constraints and

triggers, views, stored procedures and UDF-s). However, only forms, reports, macros and modules are stored in the ADP file (the other objects are stored in the back-end database). This centralization of queries and tables in the database server provides a more reliable development environment for most businesses.[6]

Access allows relatively quick development because of very good GUI design tools, and high level integration of GUI design and data objects. All database tables, queries, forms, and reports are stored in the database. For query development, Access utilizes the Query Design Grid, a graphical user interface that allows users to create queries without knowledge of the SQL programming language. In the Query Design Grid, users can "show" the source tables of the query and select the fields they want returned by clicking and dragging them into the grid. Joins can be created by clicking and dragging fields in tables to fields in other tables. Access allows users to view and manipulate the SQL code if desired.[6]

The programming language available in Access is, as in other products of the Microsoft Office suite, Microsoft Visual Basic for Applications. Two database access libraries of COM components are provided: the obsolete Data Access Objects (DAO), which has not been included in Office, Windows or MDAC for most of the past decade.[6]

Many developers who use Access use the Leszynski naming convention, though this is not universal; it is a programming convention, not a DBMS-enforced rule. Except in VBA, it is also made redundant by the fact that Access categorises each object automatically and always shows the object type, by prefixing *Table:* or *Query:* before the object name when referencing a list of different database objects.[6]

Microsoft Access can be applied to small projects (the Access 97 speed characterization was done for 32 users) but scales poorly to larger projects with more than several 10MB of data or many users because of the way indexing and locking are handled. As a Microsoft Access database can be cached locally when used on network,

processing speed may be substantially better when there is only a single user. Because of the effect of packet latency on the record locking system, Access databases are effectively too slow to be used on a Virtual Private Network or a Wide Area Network. Access Data Projects work great over VPN and WAN.[6]

Access includes an Upsizing Wizard that allows users to upsize their database to Microsoft SQL Server if they want to move to an ODBC client-server database. One recommended technique is to migrate to SQL Server and utilize Access Data Projects. This allows stored procedures, views, and constraints using standard SQL. Additionally this full client-server design significantly reduces maintenance and availability problems.[6]

Access allows no relative paths when linking, so the development environment should have the same path as the production environment (though it is possible to write a "dynamic-linker" routine in VBA). This technique also allows the developer to divide the application among different files.[6]

If the database design needs to be secured to prevent changes, Microsoft Access databases can be locked/protected (and the source code compiled) by converting the database to an .MDE file. All changes to the VBA project (forms or reports) need to be made to the original MDB and then reconverted to MDE. Some tools are available for unlocking and 'decompiling', although certain elements including original VBA comments and formatting are normally irretrievable.[6]

2.4.2 Comparison with Others Database Software

Microsoft Access	Filemaker
<ol style="list-style-type: none"> 1. Very powerful set of features. 2. Can support online databases 3. Free with Office 2003 for Windows 4. Includes charting 	<ol style="list-style-type: none"> 1. Not quite as powerful as other databases (although it has become more powerful in recent years). 2. Does not support online databases well 3. Plugins needed for charts and other functions.

Table 2.1: Microsoft Access vs. Filemaker

Microsoft Access	Oracle
<ol style="list-style-type: none"> 1. Easy to learn and doesn't required experienced database administrator to do the set-up properly 2. available with the Microsoft Office Professional suite 	<ol style="list-style-type: none"> 1. Require experienced and trained database administrators to do the set-up properly 2. Expensive

Table 2.2: Microsoft Access vs. Oracle

Microsoft Access	Microsoft SQL
<ol style="list-style-type: none"> 1. User friendly interface 2. Quick query set-up 3. Easy to Link files 4. Linking to other software (particularly Microsoft products using VBA) 	<ol style="list-style-type: none"> 1. Not user friendly 2. Difficult to master 3. Expensive 4. Difficult setup and administration

Table 2.3: Microsoft Access vs. Microsoft SQL

Microsoft Access was chosen as the database management system for vehicle identification system because of the advantages over another database such as oracle, SQL and Filemaker.[6]

2.5 PIC16F877A microcontroller

PIC16F877A is a small piece of semiconductor integrated circuits. The package type of these integrated circuits is DIP package. DIP stand for Dual Inline Package for semiconductor IC. This package is very easy to be soldered onto the stripboard. However using a DIP socket is much easier so that this chip can be plugged and removed from the development board. This microcontroller is popular because it is very cheap. Apart from that it is also very easy to be assembled. Additional components that you need to make this IC work are just a 5V power supply adapter, a 4MHz crystal oscillator and 2 units of 33pF capacitors. This IC can be reprogrammed and erased up to 10,000 times. Therefore it is very good for new product development phase. Figure 2.1 shows the PIC16F877A.



Figure 2.1: PIC16F877A

There are 40 pins on PIC16F877A. Most of them can be used as an IO pin. Others are already for specific functions. The pin functions are shown in table 2.4 and figure 2.2.

1. MCLR – to reset the PIC	21. RD2 - port D pin 2
2. RA0 – port A pin 0	22. RD3 - port D pin 3
3. RA1 – port A pin 1	23. RC4 - port C pin 4
4. RA2 – port A pin 2	24. RC5 - port C pin 5
5. RA3 – port A pin 3	25. RC6 - port C pin 6
6. RA4 – port A pin 4	26. RC7 - port C pin 7
7. RA5 – port A pin 5	27. RD4 - port D pin 4
8. RE0 – port E pin 0	28. RD5 - port D pin 5
9. RE1 - port E pin 1	29. RD6 - port D pin 6
10. RE2 – port E pin 2	30. RD7 - port D pin 7
11. VDD – power supply	31. VSS - ground
12. VSS – ground	32. VDD – power supply
13. OSC1 – connect to oscillator	33. RB0 - port B pin 0
14. OSC2 – connect to oscillator	34. RB1 - port B pin 1
15. RC0 – port C pin 0	35. RB2 - port B pin 2
16. RC1 – port C pin 0	36. RB3 - port B pin 3
17. RC2 – port C pin 0	37. RB4 - port B pin 4
18. RC3 – port C pin 0	38. RB5 - port B pin 5
19. RD0 - port D pin 0	39. RB6 - port B pin 6
20. RD1 - port D pin 1	40. RB7 - port B pin 7

Table 2.4: PIC16F877A pins description

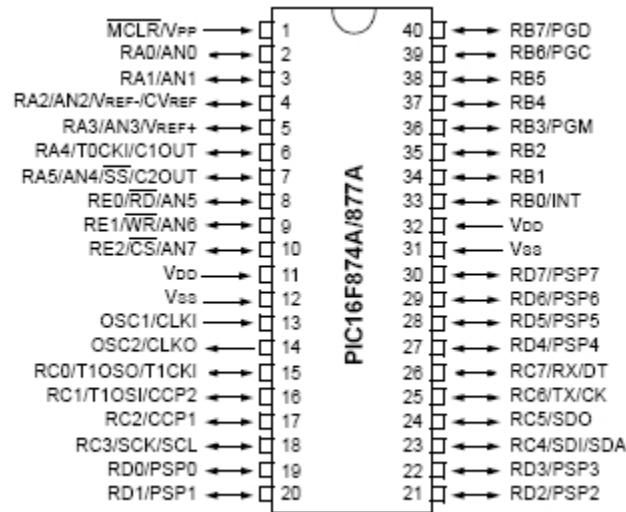


Figure 2.2: PIC16F877A pins descriptions

2.6 LCD Display

Liquid Crystal Display also called as LCD is very helpful in providing user interface as well as for debugging purpose. The most common type of LCD controller is HITACHI 44780 which provides a simple interface between the controller & an LCD. These LCD's are very simple to interface with the controller as well as are cost effective. Figure 2.3 show the LCD Display.



Figure 2.3: LCD Display

The most commonly used **alphanumeric** displays are **1x16** (Single Line & 16 characters), **2x16** (Double Line & 16 character per line) & **4x20** (four lines & Twenty characters per line).

The LCD requires 3 control lines (RS, R/W & EN) & 8 (or 4) data lines. The number on data lines depends on the mode of operation. If operated in 8-bit mode then 8 data lines + 3 control lines i.e. total 11 lines are required. And if operated in 4-bit mode then 4 data lines + 3 control lines i.e. 7 lines are required. Its simple if you have sufficient data lines you can go for 8 bit mode & if there is a time constrain i.e. display should be faster then we have to use 8-bit mode because basically 4-bit mode takes twice as more time as compared to 8-bit mode. Table 2.5 shows the LCD pins description.

Pin	Symbol	Function
1	Vss	Ground
2	Vdd	Supply Voltage
3	Vo	Contrast Setting
4	RS	Register Select
5	R/W	Read/Write Select
6	En	Chip Enable Signal
7-14	DB0-DB7	Data Lines
15	A/Vee	Gnd for the backlight
16	K	Vcc for backlight

Table 2.5: LCD pins description

When **RS** is low (0), the data is to be treated as a command. When RS is high (1), the data being sent is considered as text data which could be displayed on the screen.

When **R/W** is low (0), the information on the data bus is being written to the LCD. When RW is high (1), the program is effectively reading from the LCD. Most of

the times there is no need to read from the LCD so this line can directly be connected to Gnd thus saving one controller line.

The **EN** pin is used to latch the data present on the data pins. A HIGH - LOW signal is required to latch the data. The LCD interprets and executes our command at the instant the EN line is brought low. If you never bring EN low, your instruction will never be executed.

2.6 Magnetic Sensor

Magnetic contact switches are used in doors and windows which work when magnetic fields are cut by the opening of doors. These are used in conjunction with the doors or windows with the moving parts fixed with magnets and sensors or switches being installed on the fixed frames. Thus the principle of working is circuit breaking when door or windows open and setting off the alarm.

A door contact switch of this kind can be fitted on either recess of doors and windows or surfaces. Recess fixed electric contact switches go in to the door jams or window tracks. The magnetic alarm switches are connected in a loop which is always closed (always in contact). They consist of electric contact switches and magnets. When doors or windows are closed, the switches sensitive to magnets close the circuit and when they open breaks the contact thus cutting the circuit. This sets off the alarm. Figure 2.4 shows the magnetic sensor.



Figure 2.4: Magnetic Sensor

CHAPTER 3

SYSTEM DESIGN

3.1 Introduction

Projects are usually split into phases often along the lines of initiation, control and closure. During each phase a number of documents are produced as part of the project control process. Project Methodology is a description on every step in the project life cycle. Project methodology required a flowchart in order to guide the project management. There are several phases included in developing this security system.

The first phase is about getting the idea on how to develop the hardware system. This is called feasibility study. The literature reviews will include the requirements of the system. Then, the second phase is designing the GUI. After that, the development of the GUI in source code will be managed in third phase. Second and third phase is managed continuously until the best result is achieved. Finally, the GUI will be integrated with hardware to test it functionality. Figure 3.1 shows the flowchart of system development

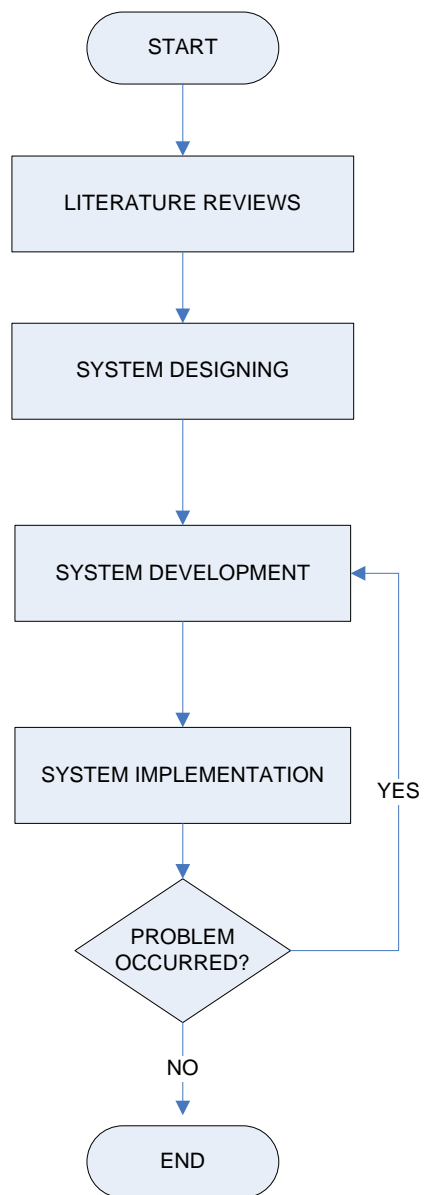


Figure 3.1: System development

3.2 Hardware Design

3.2.1 Power Source

There are two power sources being used for circuit testing in this project. The main power source is power supply. Another power source is AC/DC converter. Figure 3.2 is the picture of power supply.



Figure 3.2: Power supply specifications

Usually, only 5V was used as a supply to the microcontroller circuit. The black port on the power supply is connected to the GND (ground) part of the circuit. The red port on the power supply is connected to the VCC part of the circuit.

3.2.2 Voltage Regulator

A voltage regulator circuit is designed to automatically maintain the voltage at the constant level. A 7805 is provided up to 1 A current at 5V supply.

7805 voltage regulator IC is used to regulate 12-volt power supply to 5-volt power supply for microcontroller and operational amplifier. From the front side of the IC, we can see 3 leg or pin. The left pin must be connected to 12-volt DC. The centre pin must be connected to ground. The right pin is the 5-volt output voltage. A heat sink is required for heat dissipation and can mount at the back of the IC. Figure 3.3 shows voltage regulator circuit draw using Proteus 7.2.

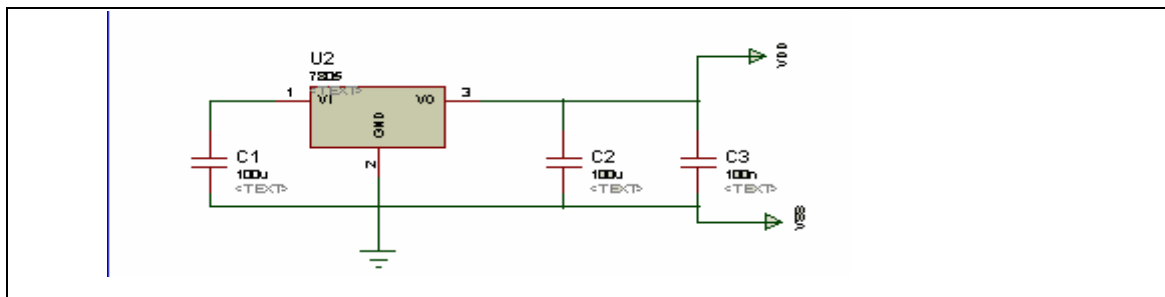


Figure 3.3: Voltage regulator circuit

3.2.3 Microcontroller

PIC16F877A is the microcontroller that being used in this project. This microcontroller used to control the whole systems. PIC Basic languages are used to program this microcontroller. In this project, Port B and Port C used as the output pins while Port A is used as input pin.

Port A is connected to magnetic sensor. Port B connected to the LCD pins. Port C connected to buzzer, red LED and green LED.

Microcode Studio is the software which being used in this project to write and assemble the coding for the microcontroller.

Microcode Studio is developed by **Mecanique** from UK. MicroCode Studio is a powerful visual Integrated Development Environment (IDE) with In Circuit Debugging (ICD) capability designed specifically for MicroEngineering Labs PICBasic PRO compiler. Figure 3.4 shows the interface for MicroCode Studio.

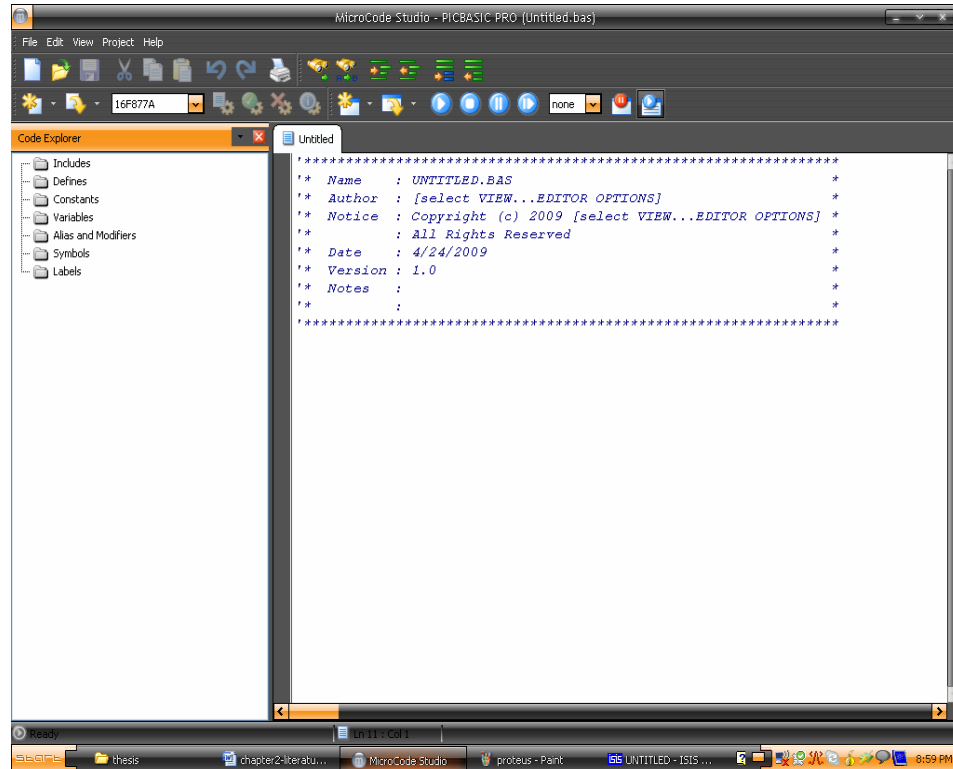


Figure 3.4: Microcode Studio

Compilation and assembler errors can easily be identified and corrected using the error results window. MicroCode Studio even comes with a serial communications window.

3.2.4 LCD Display

The LCD may be connected to the PIC microcontroller using either a 4-bit bus or an 8-bit bus. If an 8-bit bus is used, all 8 bits must be on one port. If a 4-bit bus is used, it must be connected to either the bottom 4 or top 4 bits of one port. Enable and Register Select may be connected to any port pin. R/W should be tied to ground as the LCDOUT command is write only. PICBasic assumes the LCD is connected to specific pins unless told otherwise. In this project, the LCD is used with a 8-bit bus with data lines DB0 - DB7 connected to PIC microcontroller PORTB.0 - PORTB.7, Register Select to PORTD.0 and Enable to PORTD.1. It is also preset to initialize the LCD to a 2 line display.

To define the LCD in PicBasic, place one or more of the following DEFINES, all in upper-case, at the top of your PicBasic program:

```
DEFINE LCD_DREG PORTB ' Set LCD Data port
DEFINE LCD_DBIT 0 ' Set starting Data bit (0 or 4) if 4-bit bus
DEFINE LCD_RSREG PORTD ' Set LCD Register Select port
DEFINE LCD_RSBIT 0 ' Set LCD Register Select bit
DEFINE LCD_EREG PORTD ' Set LCD Enable port
DEFINE LCD_EBIT 1 ' Set LCD Enable bit
DEFINE LCD_BITS 8 ' Set LCD bus size (4 or 8 bits)
DEFINE LCD_LINES 2 ' Set number of lines on LCD
DEFINE LCD_COMMANDUS 2000 ' Set command delay time in us
DEFINE LCD_DATAUS 50 ' Set data delay time in us
```

This setup will tell PICBasic that a 2-line LCD is connected in 8-bit mode with the data bus on the top 4 bits of PORTB, Register Select on PORTB.1, and Enable on PORTB.0. Figure 3.5 shows schematic diagram draw using Proteus 7.2.

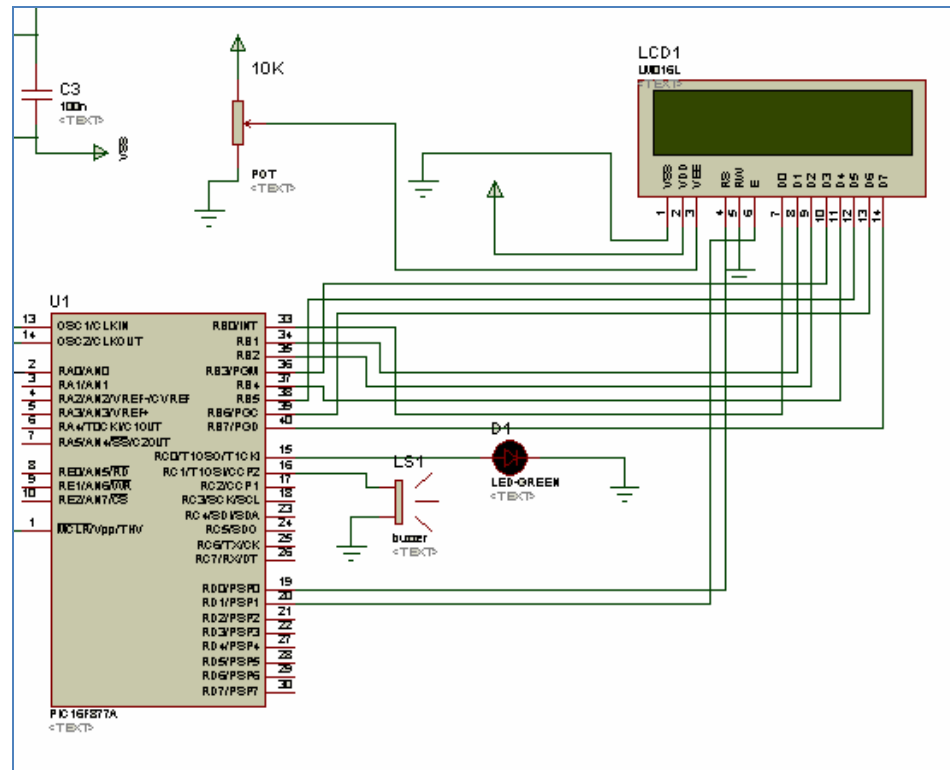


Figure 3.5: schematic diagram for LCD

3.2.5 Magnetic Sensor

Magnetic sensor is used as a detection switch in this project. It is connected to PORTA as an input. This sensor has two side magnets which send logic '1' to the microcontroller if they are contacted to each other. But will send logic '0' to the microcontroller if they are separated. Its means the sensor will detect the intruder when the door was opened.