OFFICE INTELLIGENT SYSTEM (OIS)

Kamaruddin bin Hammade

BEKC

2009

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OFFICE INTELLIGENT SYSTEM (OIS)

KAMARUDDIN BIN HAMMADE

A Report Submitted In Partial Fulfillment of Requirements for the Degree of Bachelor In Electrical Engineering (Control, Instrument and Automation)

Faculty of Electrical Engineering
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2008/2009

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"I declare that this report entitle "Office Intelligent System (OIS)" is the result of my own research except as cited in the references. The report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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Name : KAMARUDDIN BIN HAMMADE

Date : 22 APRIL 2009

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Specially dedicated to

My beloved parents, sisters, brothers and friends

Thank you for the endless support and encouragement

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ACKNOWLEDGEMENT

In the name of Allah, The Beneficent, The Merciful. Firstly and foremost, I would like to heartfelt thanks to mu supervisor, En Ahmad Zubir Bin Jamil for his endless support, invaluable guidance and critical comments throughout the project.

Next, my heartiest thanks to my wonderful family especially my parents Hammade Bin Nenga and Nurmah Binti Sattare who always pray for my success continuously, giving me all the guidance and supports that I needs all the time, you are source of inspire of my life

Not forgotten, all my friends especially from Electrical Engineering Course which is always give me their assistance and guidance to finish up this entire project.

Once again, thank you all very much from the bottom of my heart. Without you, I could never have done it successfully.

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ABSTRACT

This project is to design and develop smart/intelligent office that has facilities such as lighting, computerized fire alarm monitoring system, Air-conditioner, Security System (CCTV), door access (digital code access) and other typical facilities. All these facilities will be controlled either by software setting or manually controlled in case there are system malfunction in auto mode. Signals from all these facilities will be fed into appropriate controller and then will be sent to central PC for data processing using parallel port cable. Visual Basic Software will be used to construct Graphical User Interface and program time setting of each facility.

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ABSTRAK

Projek ini dicipta dan dihasilkan adalah untuk mengeksplotasikan sistem pejabat yang mempunyai ciri-ciri pintar yang mengandungi kemudahan seperti lampu, penghawa dingin, sistem pemantauan penggera kebakaran, sistem keselamatan (penggera dan sistem kamera litar tertutup), teknologi pintu berkod dan kemudahan-kemudahan yang lain. Semua kemudahan ini akan dikawal oleh perisian yang telah diset operasinya atau kawalan secara sendiri (manual) sekiranya sistem tidak operasi dalam keadaan automatik. Isyarat dari semua kemudahan akan dibaca oleh pengawal yang sesuai (Input/output Module Interface Circuit) dan kemudiannya akan menghantar isyarat tersebut ke PC utama untuk proses data menggunakan kabel pelabuhan selari. Perisian Visual Basic akan digunakan untuk menghasilkan pengantaramuka pengguna dalam bentuk grafik dan program set masa ON/OFF bagi setiap kemudahan.

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CHAPTER 1

PROJECT BACKGROUND

1.1 Introduction

Basically an office intelligent system is the incorporation of information technology and communication system to make office more secure, easy to live, productive and cost effective. Various products of office intelligent system has emerged over the past years. Most of the product centers around using the facilities provided by the internet, mobile phones, telephones and various mean of communication to control some application in the office remotely, such as lighting television etc. Also most office intelligent system are also equipped with surveillance cameras for office owners to check their office visually using web browser. There are many more areas which need to be improved to make it safer, easier to live in, energy saving etc.

1.2 Objective of Project

The objectives of this project are:

i. To design and develop smart/intelligent system that consists of features:
   - Time Controlled ; Lighting and Air-conditioner
   - Security System; Door access, CCTV and Alarm for fire-detector.
   - GUI ; Monitoring and Control
   - Input/output Module Interface Circuit (Parallel Port); Communication between software (PC) and hardware

ii. To make user friendly system, low cost and easy to maintain.

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1.3 Scope of project

The scope of this project covers two main parts, hardware and software. For the hardware, it includes design and constructs model office hardware and indentifies facilities such as lighting, computerized fire alarm monitoring system, Air-conditioner, Security System (CCTV and door access using code access), Alarm for fire-detector and other typical facilities. All these facilities can be controlled either manually or by software control.

On the software sides, the type of controller will be indentified. Here, Graphical User Interface (GUI) developing using Visual Basic (VB). Programming Visual Basic also use to program time setting of each facility. Interfacing between both hardware and software are using Input/output Module Interface Circuit.

1.4 Problem Statement

1.4.1 Waste in energy consumption especially electricity

The energy consumption of electricity in office is greater and highest than at home. It because not have always supervise like at home, where at home had parents to supervise electricity consumption. At office, waste in electricity consumption always happen because time usage the electricity not have person to guard. Attitude of staffs in the office that no care about economically electricity consumption is one factor of this problem none stop. Careless to switch off all the electrical facilities like lamp, air-conditioner, and others also is the factor of this problem. So, this project (OIS) will be solving the problem. This system can switch on all the facilities office in time of work and switch off the facilities when finish time of work automatically every day. The on/off system is automatically using time-setting/time-controlled by Visual Basic 6.0 software.

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1.4.2 Thief, fire could not properly be monitored

Now, thief and fire problem can always happen at everywhere especially at office. This problem happens because they do not have control centre to properly monitor overall office every time. So, this OIS system will use CCTV to monitor overall area of office meanwhile fire alarm detector used to detect the fire/smoke and give alarm signal. For the security system, door access will be used to avoid robbery happened.

1.4.3 Hardwire not really secure.

Hardwire problem always happen in office had control system where all cable is connect directly from facilities to central PC for control process. This problem not really secure because maybe it can make the short circuit if hardwire not be arranged properly. So, this OIS system using Parallel Cable Communication to avoid hardwire problem and it can decreases the probability of short circuit to occur.

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CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Figure below shows a block diagram Office Intelligent System (OIS). This block consists of 4 parts:

i. Hardware consists of facilities such as:
   - Lighting
   - Computerized fire alarm monitoring system
   - Air-conditioner
   - Security System (alarm and CCTV), door access (code access)

ii. Interfacing System (Input/output Module Interface Circuit)

iii. GUI System and time setting (Visual Basic)

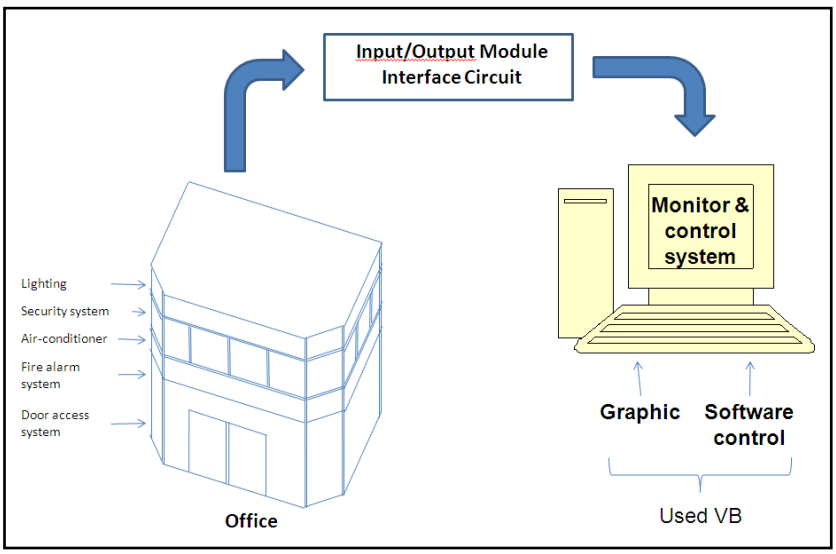

Figure 2.1: Block Diagram OIS

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2.2 Interfacing System

- Use Input/output Module Interface Circuit.
- Parallel port 25 pin.
- Its function to interface between hardware and software.

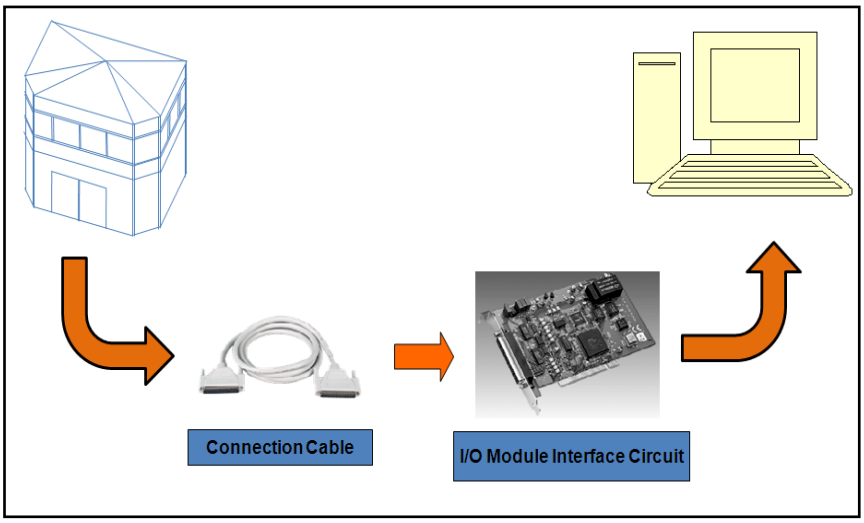

Figure 2.2: A complete block diagram of OIS and its monitoring and control system.

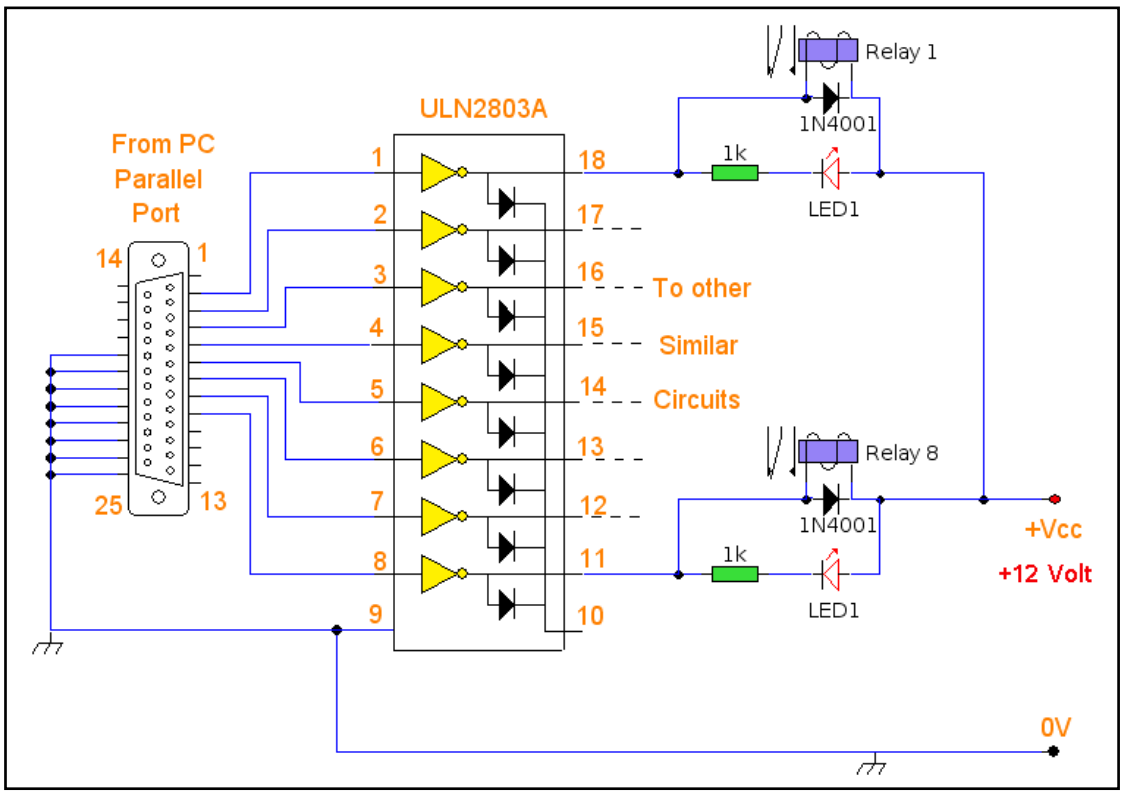

Figure 2.3: Input/Output Module Interface Circuit

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2.2.1 IC ULN 2803 Pinout & Working

IC ULN2803 consists of octal high voltage, high current Darlington transistor arrays. The eight NPN Darlington connected transistors in this family of arrays are ideally suited for interfacing between low logic level digital circuitry (such as TTL, CMOS or PMOS/NMOS) and the higher current/voltage requirements of lamps, relays, printer hammers or other similar loads for a broad range of computer, industrial, and consumer applications.

Features:

- Eight Darlingtons with Common Emitter
- Open–collector outputs
- Freewheeling clamp diodes for transient suppression
- Output Current to 500 mA
- Output Voltage to 50 V
- Inputs pinned opposite outputs to simplify board layout

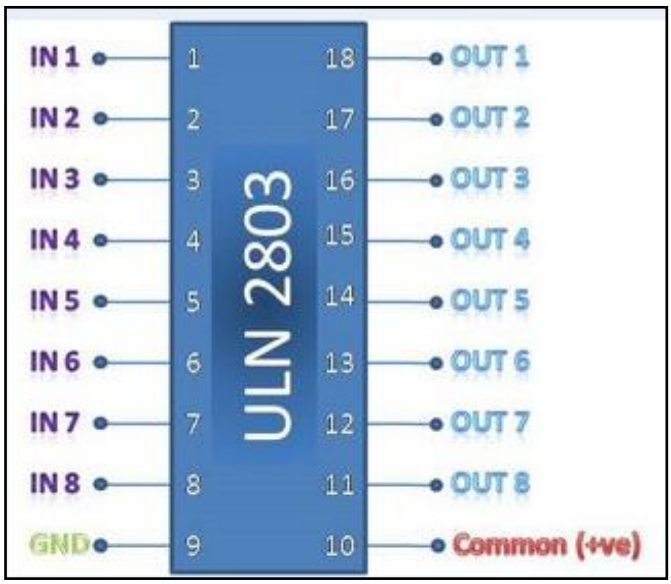

Figure 2.4: IC ULN 2803 Pinout

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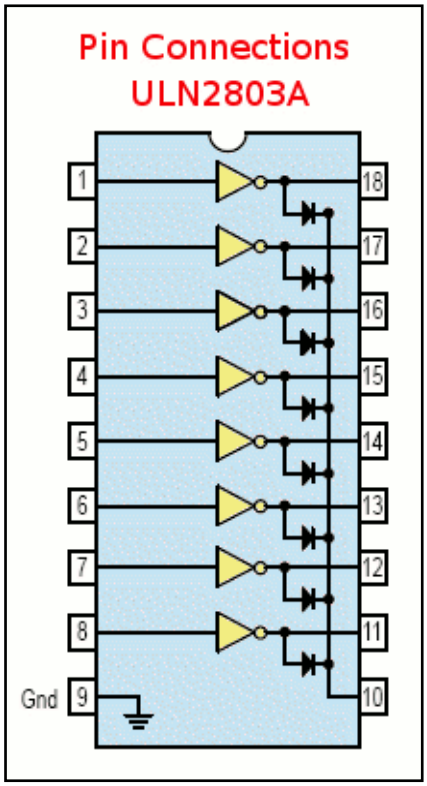

Figure 2.5: Pin connections

Working

The ULN 2803 IC consists of eight NPN Darlington connected transistors (often called a Darlington pair). Darlington pair consists of two bipolar transistors such that the current amplified by the first is amplified further by the second to get a high current gain β or h_{FE}. The figure shown below is one of the eight Darlington pairs of ULN 2803 IC.

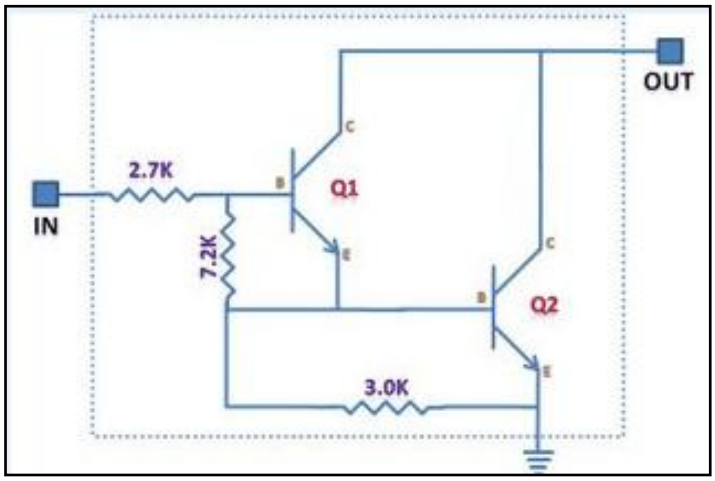

Figure 2.6: NPN Darlington

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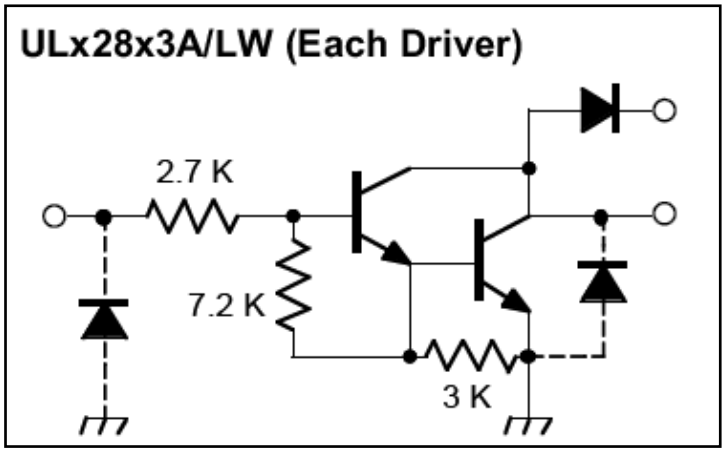

Figure 2.7: Darlington pair

Now two cases arise:

Case 1: When IN is 0 volts

Q1 and Q2 both will not conduct as there is no base current provided to them. Thus, nothing will appear at the output (OUT).

Case 2: When IN is 5 volts

Input current will increase and both transistors Q1 and Q2 will begin to conduct. Now, input current of Q2 is combination of input current and emitter current of Q1, so Q2 will conduct more than Q1 resulting in higher current gain which is very much required to meet the higher current requirements of devices like motors, relays etc. Output current flows through Q2 providing a path (sink) to ground for the external circuit that the output is applied to. Thus, when a 5V input is applied to any of the input pins (1 to 8), output voltage at corresponding output pin (11 to 18) drops down to zero providing GND for the external circuit. Thus, the external circuit gets grounded at one end while it is provided $+V_{cc}$ at its other end. So, the circuit gets completed and starts operating.

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