# RESTAURANT PAGING SYSTEM USING SMS

By

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FINAL YEAR REPORT

Submitted to the Electrical & Electronics Engineering Programme
in Partial Fulfillment of the Requirements
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Bachelor of Engineering (Hons)
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# CERTIFICATION OF APPROVAL

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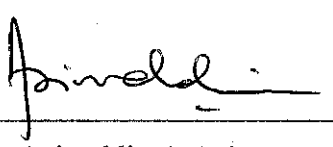
Approved:



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TRONOH, PERAK

June 2007

## CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except as specified in the references and acknowledgements, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

Nurul Iman Zairulshahfuddin

# ABSTRACT

This project is purposely designed as a solution to tackle the problem of maintaining customers of busy restaurants. The problem of unavailability of empty seats at peak hours in a busy restaurant tends to drive away potential customers. This can be a loss to the company if it is prolonged. The project of creating a package of both online restaurant booking and paging system using SMS requires knowledge on a few software as well as network providers in Malaysia. The main software used in this application is Microsoft Visual Basic and Microsoft Access. The language used to design the website is Active Server Pages (ASP) and Hyper Text Markup Language (HTML). Network provider involves in this project is GSM (Global System for Mobile). The objective of this project is to gain knowledge on programming language of the software in order to integrate it into a real application system. The system will be able to communicate between the server and mobile phone using network providers in Malaysia. There are two deliverables of this project that is an online booking system and also a system that can notify customers when their table is ready while they are mobile.

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All praises to Allah Almighty, first for answering my prayers and giving me the chance to complete this Final Year Project (FYP).

My heartiest thanks and utmost appreciation goes to these individuals who have contributed immeasurable amount of guidance, advice and assistance for my FYP throughout this semester:

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- My beloved parents and family

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# LIST OF ABBREVIATIONS

1. GSM: Global System for Mobile Communication
2. SMS: Short Messaging Service
3. ASP: Active Server Page
4. HTML: Hyper Text Markup Language
5. PAN: Personal Area Network
6. SDK: Software Designing Kit
7. ISDN: Integrated Services Digital Network
8. PSTN: Public Switched Telephone Network

# CHAPTER 1
# INTRODUCTION

## 1.1 Background of study

People have always wanted to communicate and their demands grow with the possibilities offered by technology. Nowadays, modern technology enables mobile communications in many situations. An important component in mobile communications is mobile messaging technology or Short Messaging Services (SMS). SMS has recently become a popular protocol for text messaging over the airways. This project will go in depth into the world of wireless communication.

With mobile messaging technology evolving rapidly, a new study on this particular technology has been implemented to create another use of the technology. The invention is called "Restaurant Paging System using SMS". From the name, this system serves two purposes that is to enable customers to book restaurant online and to be notified using SMS. The later replaces the use of pager with SMS.

This project will demand the learning of programming language for Microsoft Visual Basic and the use of Microsoft Access. This project also needs the basic understanding of GSM network and the concept of wireless system.

## 1.2 Problem statement

Big and busy restaurant tend to have peak hours where customers come in a bulk at one time. This is a sign of revenue and popularity of the restaurant. Problem arises when restaurants failed to convert these customers into profit. This happens when circumstances as no empty tables available and customers have to linger around to wait to be seated.

The dilemma of giving the best customer service whilst the restaurant is full is usually faced by many restaurants. Therefore, this project is designed to overcome such problem. The idea of this project is to provide customers with online order and reservation system with the intention to give customers freedom to arrange their own timing and also to create a wireless paging system using SMS to notify customers when their table is ready. Since the system uses SMS, it allows customers to be mobile while waiting for their turn to be seated.

The problem is already evident in restaurant such as Pizza Hut, TGI Fridays, Dome and many more, thus, this system has a potential to be marketed. This system will also help restaurant managers to strike a perfect balance between maintaining a good customer service and reducing the unnecessary labor cost. This is because the computer will eliminate the necessity of having extra hostess to manually track every waiting customer.

## 1.3 Objective and Scope of study

### 1.3.1 Objectives of the project

- To design a system which is able to communicate between the server and mobile phones using network providers in Malaysia
- To design a synchronize system connection through Microsoft Access (database), Microsoft Visual Basic (interface between user and the system) and mobile device.
- To attain knowledge on programming language (e.g. MS VB, Active Server Page (ASP) and Hyper Text Markup Language (HTML), database configuration (e.g. MS Access) and Nokia Application Tools (e.g. Nokia PC Connection SDK).
- To build an online booking system where user will be able reserve table and place order online.
- To integrate the knowledge on the programming language gained into a real application system.

### 1.3.2 Scope of study

The basic idea of this project is to design a webpage to serve the purpose of online restaurant booking system and also to design an interface that is able to store the data of customers and is able to send messages to mobile phones after a connection between server and GSM modem is established. Both systems will use mobile phone to perform as the antenna or GSM modem. In order to fully utilize the GSM network and its services, further knowledge about network and how it works must be gained.

The main software used in this project is Microsoft Visual Basic and Microsoft Access. Therefore an advanced knowledge on programming language is needed. Another additional application needs to be add-on into Visual Basic application software is the Nokia PC Suite. For the website design, the language used is ASP and HTML.

The project should produce a basic system that can be developed using limited resources that is two mobile phones, a computer, and computer software available off the shelf.

# CHAPTER 2
# LITERATURE REVIEW / THEORY

## 2.1 Global System for Mobile (GSM)

### 2.1.1 History of GSM

GSM was initiated when the Europeans realized that there is a different system used for analog cellular telephone system of different countries. Thus, each system is incompatible with everyone else's equipment and operation. This is an undesirable situation. As to that, in 1982, the Conference of European Posts and Telegraphs (CEPT) formed a study group called the Groupe Spacial Mobile (GSM) to study and develop a pan-European public land mobile system [1]. The proposed system had to meet certain criteria:

- Good subjective speech quality
- Low terminal and service cost
- Support for international roaming
- Ability to support handheld terminals
- Support for range of new services and facilities
- Spectral efficiency
- ISDN compatibility

In 1989, GSM responsibility was transformed to the European Telecommunication Standards Institute (ETSI), and phase I of the GSM specifications were published in 1990. Commercial service was started in mid-1991, and by 1993 there were 36 GSM networks in 22 countries. Although standardized in Europe, GSM is not only a European standard. Over 200 GSM networks are operational in 110 countries around the world. GSM systems now

exist on every continent, and the acronym GSM now aptly stands for Global System for Mobile communications [1].

### 2.1.2 Architecture of the GSM network

The architecture of GSM network is composed of several functional entities, whose functions and interfaces are specified. The GSM network can be divided into three broad parts. The Mobile Station is carried by the subscriber. The Base Station Subsystem controls the radio link with the Mobile Station. The Network Subsystem, the main part of which is the Mobile services Switching Center (MSC), performs the switching of calls between the mobile users, and between mobile and fixed network users. The MSC also handles the mobility management operations. The Mobile Station and the Base Station Subsystem communicate across the Um interface, also known as the air interface or radio link. The Base Station Subsystem communicates with the Mobile services Switching Center across the A interface.

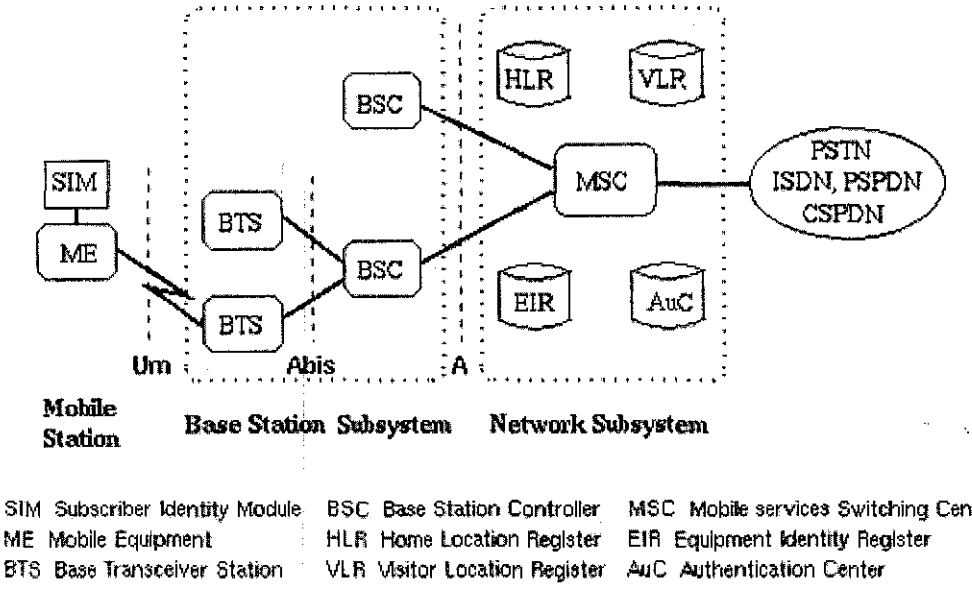


**Figure 2.1:** General architecture of GSM network. (Figure taken from Overview of the Global System for Mobile Communication, John Scourias, October 14, 1997 [1])

### 2.1.2.1 Mobile Station

The mobile station (MS) consists of the mobile equipment (physical equipment such as radio transceiver, display and digital signal processors) and a smart card called the Subscriber Identity Module (SIM). The SIM provides personal mobility; therefore, user can have access to subscribed services irrespective of a specific terminal (mobile equipment). By inserting the SIM card into another GSM terminal, the user is able to receive calls at that terminal, make calls from that terminal, and receive other subscribed services.

The mobile equipment is uniquely identified by the International Mobile Equipment Identity (IMEI). The SIM card contains the International Mobile Subscriber Identity (IMSI) used to identify the subscriber to the system, a secret key for authentication, and other information. The IMEI and the IMSI are independent, thereby allowing personal mobility. The SIM card may be protected against unauthorized use by a password or personal identity number [1].

### 2.1.2.2 Base Station Subsystem

The Base Station Subsystem is composed of two parts that is the Base Transceiver Station (BTS) and the Base Station Controller (BSC). These communicate across the standardized Abis interface, allowing (as in the rest of the system) operation between components made by different suppliers.

The Abis is the physical interface between a base transceiver station (BTS) and a base station controller (BSC) in a GSM network. On this interface much information between the mobile stations and the network is exchanged, and thus investigations of the individual calls made in the live network are possible by monitoring this interface [24].

The Base Transceiver Station houses the radio transceivers that define a cell and handles the radio-link protocols house with the Mobile Station. In a large

urban area, there will potentially be a large number of BTSs deployed; therefore the requirements for a BTS are ruggedness, reliability, portability, and minimum cost.

The Base Station Controller manages the radio resources for one or more BTSs. It handles radio-channel setup, frequency hopping, and handovers. The BSC is the connection between the mobile station and the Mobile service Switching Center (MSC) [1].

#### 2.1.2.3 Network Subsystem

The central component of the Network Subsystem is the Mobile services Switching Center (MSC). It acts like a normal switching node of the Public Switched Telephone Network (PSTN) or Integrated Services Digital Network (ISDN), and additionally provides all the functionality needed to handle a mobile subscriber, such as registration, authentication, location updating, handovers, and call routing to a roaming subscriber. These services are provided in conjunction with several functional entities, which together form the Network Subsystem. The MSC provides the connection to the fixed networks (such as the PSTN or ISDN) [1]. Signaling between functional entities in the Network Subsystem uses Signaling System Number 7 (SS7), a set of telephony signaling protocols used for trunk signaling in ISDN and widely used in current public networks [25].

The Home Location Register (HLR) and Visitor Location Register (VLR), together with the MSC, provide the call-routing and roaming capabilities of GSM. The HLR contains all the administrative information of each subscriber registered in the corresponding GSM network, along with the current location of the mobile. The location of the mobile is in the form of the signaling address of the VLR associated with the mobile

The Visitor Location Register (VLR) contains selected administrative information from the HLR. Information is necessary only for call control and provision of the subscribed services. This is because each mobile is currently

located in the geographical area controlled by the VLR. Although each functional entity can be implemented as an independent unit, all manufacturers of switching equipment implement the VLR together with the MSC, so that the geographical area controlled by the MSC matches to the geographical area controlled by the VLR, thus simplifying the signaling required. The MSC contains no information about particular mobile stations; this information is stored in the location registers.

The other two registers are used for authentication and security purposes. The Equipment Identity Register (EIR) is a database that contains a list of all valid mobile equipment on the network, where each mobile station is identified by its International Mobile Equipment Identity (IMEI). An IMEI is marked as invalid if it has been reported stolen or is not type approved. The Authentication Center (AuC) is a protected database that stores a copy of the secret key stored in each subscriber's SIM card, which is used for authentication and encryption over the radio channel [1].

### 2.1.3 Services provided by GSM

Services offered by GSM is that GSM users can send and receive data, at rates up to 9600 bps, to users on POTS (Plain Old Telephone Service), ISDN, Packet Switched Public Data Networks, and Circuit Switched Public Data Networks using a variety of access methods and protocols, such as X.25 or X.32. Other data services includes Group 3 facsimile. A unique feature of GSM, which is not found in older analog systems, is the Short Message Service (SMS). SMS is a bidirectional service for short alphanumeric (up to 160 bytes) messages. Messages are transported in a store-and-forward fashion. For point-to-point SMS, a message can be sent to another subscriber to the service, and an acknowledgement of receipt is provided to the sender. SMS can also be used in a cell-broadcast mode, for sending messages such as traffic updates or news updates. Messages can also be stored in the SIM card for later retrieval. GSM also includes several forms of call forward (such as call forwarding when the mobile subscriber is unreachable

by the network), and call barring of outgoing or incoming calls, for example when roaming in another country [1].

### 2.1.4 GSM Modem

As for GSM modem, it can be an external modem device, such as the Wavecom FASTRACK Modem and also a PC Card installed in a notebook computer, such as the Nokia Card Phone. A GSM modem could also be a standard GSM mobile phone with the appropriate cable and software driver to connect to a serial port on the computer [2]. Therefore, this project will use Nokia 3230 as GSM modem for the server. It will be connected using Bluetooth.

## 2.2 Bluetooth connectivity

The Bluetooth concept is a cable replacement technology that simplifies person-to-person and machine-to-machine interaction. It utilizes short-distance radio link technology to enable wireless connection of mobile terminals such as desktops, laptops, printer, PDA (Personal Digital Assistant) and mobile phones can change data or voice with one another. The Bluetooth Specification defines an ordinary range (around 10 m) or optionally a long range (around 100 m) radio link capable of voice or data transmission to a maximum capacity of 720 kbps per channel. Bluetooth operates at a frequency lying between 2402 GHz and 2480 GHz, the ISM (Industry, Scientific and Medical) band that is meanwhile free and unlicensed throughout the world [6].

**Table 2.1:** Bluetooth range and power comparison [7]

| Class | Maximum permitted power (mW) | Maximum permitted power (dB) | Range (approximate) |
|---|---|---|---|
| Class 1 | 100mW | 20dBm | ~100 meters |
| Class 2 | 2.5mW | 4dBm | ~10meters |
| Class 3 | 1mW | 0dBm | ~1meter |

Bluetooth wireless technology was born in 1994 when Ericsson Mobile Communications decided to investigate the feasibility of a low-power, low-cost radio interface between mobile phones and their accessories. It was developed jointly by Ericsson, Nokia, IBM, Toshiba and Intel. Ericsson contributed the basic radio technology expertise; Toshiba and IBM are developing a common specification for integrating "Bluetooth" technology into mobile devices. Intel is contributing their advanced chip and software expertise and Nokia contributes expertise in radio technology and mobile handset software [3].

The heart of the Bluetooth specification is the Bluetooth protocol stack. By providing well-defined layers of functionality, the Bluetooth specification ensures interoperability of Bluetooth devices and encourages adoption of Bluetooth technology.

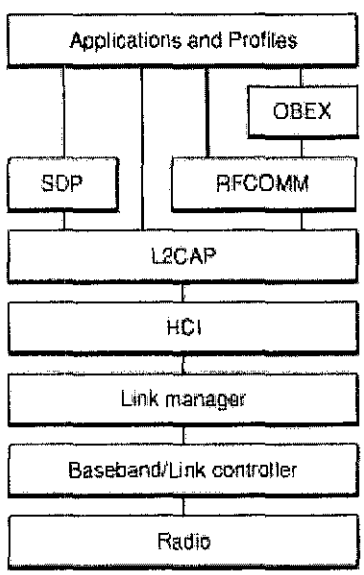


**Figure 2.2:** Bluetooth protocol stack (Figure taken from Bluetooth architecture [4])

At the base of the Bluetooth protocol stack is the radio layer. The radio module in a Bluetooth device is responsible for the modulation and demodulation of data into RF signals for transmission in the air. The radio layer describes the physical characteristics a Bluetooth device's receiver-transmitter component must have. These include modulation characteristics, radio frequency tolerance, and sensitivity level.

The baseband portion of the layer is responsible for properly formatting data for transmission to and from the radio layer. It handles the synchronization of links. The link controller portion of this layer is responsible for carrying out the link manager's commands and establishing and maintaining the link stipulated by the link manager.

The link manager itself translates the host controller interface (HCI) commands it receives into baseband-level operations. It is responsible for establishing and configuring links and managing power-change requests, among other tasks.

The HCI (host controller interface) layer acts as a boundary between the lower layers of the Bluetooth protocol stack and the upper layers. The Bluetooth specification defines a standard HCI to support Bluetooth systems that are implemented across two separate processors. The L2CAP employs the concept of channels to keep track of where data packets come from and where they should go. Because it plays such a central role in the communication between the upper and lower layers of the Bluetooth protocol stack, the L2CAP layer is a required part of every Bluetooth system.

The SDP (service discovery protocol) defines actions for both servers and clients of Bluetooth services. A single Bluetooth device can be both a server and a client of services. An SDP client communicates with an SDP server using a reserved channel on an L2CAP link to find out what services are available. The RFCOMM protocol emulates the serial cable line settings and status of an RS-232 serial port. RFCOMM connects to the lower layers of the Bluetooth protocol stack through the L2CAP layer.

OBEX (object exchange) is a transfer protocol that defines data objects and a communication protocol two devices can use to easily exchange those objects.

There are a number of competitors to the Bluetooth technology such as IrDA, Ultra-Wideband Radio (UWB) and Home RF. However, the Bluetooth concept offers several benefits compared with those techniques. The main advantages of Bluetooth are the minimal hardware dimensions, the low price on Bluetooth components and the low power consumption for Bluetooth connections.

### 2.2.1 Bluetooth profile

At the top layer of Bluetooth stack there is a profile. Profile here means general behaviors through which Bluetooth units communicate with other units [5]. There are 13 profiles that constitute the basis for user models and their profiles. The profiles also provide the foundation for future user models and profiles. The 13 profiles are:

1. Generic Access Profile (GAP)
2. Service Discovery Application Profile (SDAP)
3. Cordless Telephony Profile
4. Intercom Profile
5. Serial Port Profile
6. Headset Profile
7. Dial-up Networking Profile
8. Fax Profile
9. LAN Access Profile
10. Generic Object Exchange Profile (GEOP)
11. Object Push Profile
12. File Transfer Profile
13. Synchronization Profile

In this project, profile 7 that is dial-up networking profile was used. This profile defines how a modern-connection over the public telephone network can be linked to a Bluetooth-equipped cellular phone [5].

## 2.3 Nokia characteristics

In this project, Nokia 3230 is chosen as the GSM modem. It was chosen based on the cost, features and availability. Since this project requires Bluetooth connection, this hand phone has Bluetooth connectivity. It will act as a GSM modem foe the computer server. Messages will be sent between server and modem through a defined connection that is Bluetooth. The message costs will depends on the service provider rate. The specifications on this model can be viewed in the **Appendix A.**

# CHAPTER 3
# METHODOLOGY / PROJECT WORK

A description on methodology used in this particular project is mainly discussed in this chapter. At the beginning of this project, the preface research was conducted to gather a clear overview of the specific task. In the two semester's project completion, the time frame needed to be strictly followed. In the first semester, the project objectives are based on planning and getting a deep understanding about the project and materials needed. Implementation was done to certain design. The second semester focuses more on implementing, designing and testing of the product.

## 3.1 Desk study

Desk study plays significant impact to strengthen the basic knowledge about anything related to the project. Desk study includes collecting information from internet; get an overall view of the function of Microsoft Visual Basic and Microsoft Access. It also includes getting a rough idea about designing website and using ASP language. It basically is an understanding and getting the idea of the whole system and finding ways to make it done.

## 3.2 Project milestone

Project milestone is the overall flow process of the two semesters work.

### 3.2.1 Planning phase

Phase 1 involves the planning of a specific outline of the proposed work, requirements and deliverables of the project. A dated table was produced as per asked by the supervisor. Dated table consists of work needs to be accomplished week by week. This is where the choice of software used is done. Software chosen is by availability and latest edition.

### 3.2.2 Research and literature review

Phase 2 encompasses of a literature review and background research on the topic, choosing a methodology and implementation process for the completion of the project. The theories need to be paralleled with materials and system application chosen to implement this project. This is to ensure a smooth flow of the project.

### 3.2.3 Design development and codes programming

Phase 3 is the most difficult of all phase. This is where the most of the project will take part. Coding was done for VB and a website with function was designed using ASP language. Programming language and software learnt was self studied; either by referring to books, e-tutorials on the internet, referring to friends and also by referring to Information Technology (IT) lecturers.

### 3.2.4 Testing and troubleshooting

Phase 4 involves testing and troubleshooting of the project. This is the phase where the project will be tested to see if it works and if it works as planned. New idea keeps coming and the design keeps changing until one final decision.

### 3.2.5 Final testing and documentation

Phase 5 is the final stage where the project is finalized. This needs to be done to ensure that the project really works and to avoid any chaos in presentation. The project is documented as a technical writing report.

## 3.3 Tools and equipment used

Tools needed for this project consists of hardware and software. They are:

1. Hardware:

- Mobile phone type Nokia 3230 – to act as GSM modem
- Any types of mobile phone - to act as customer's mobile phone
- Bluetooth dongle – to connect between server and modem
- A whole set of computer – as a server

2. Software:

- Microsoft Visual Basic 2005 – to do the interface of the server
- Microsoft Access – as a database
- Nokia PC Connectivity software Designing Kit (SDK) – to establish connection between GSM modem with Microsoft VB 2005

### 3.4 Project work

The main focus is to develop an interface using Microsoft Visual Basic and Microsoft Access that will integrate with Nokia PC Suite software to send SMS using mobile device. The additional part of this project is to create a website that could connect to database so that it can be used to order food and do reservation online. Provided here is the flow chart of the overall process of the system.

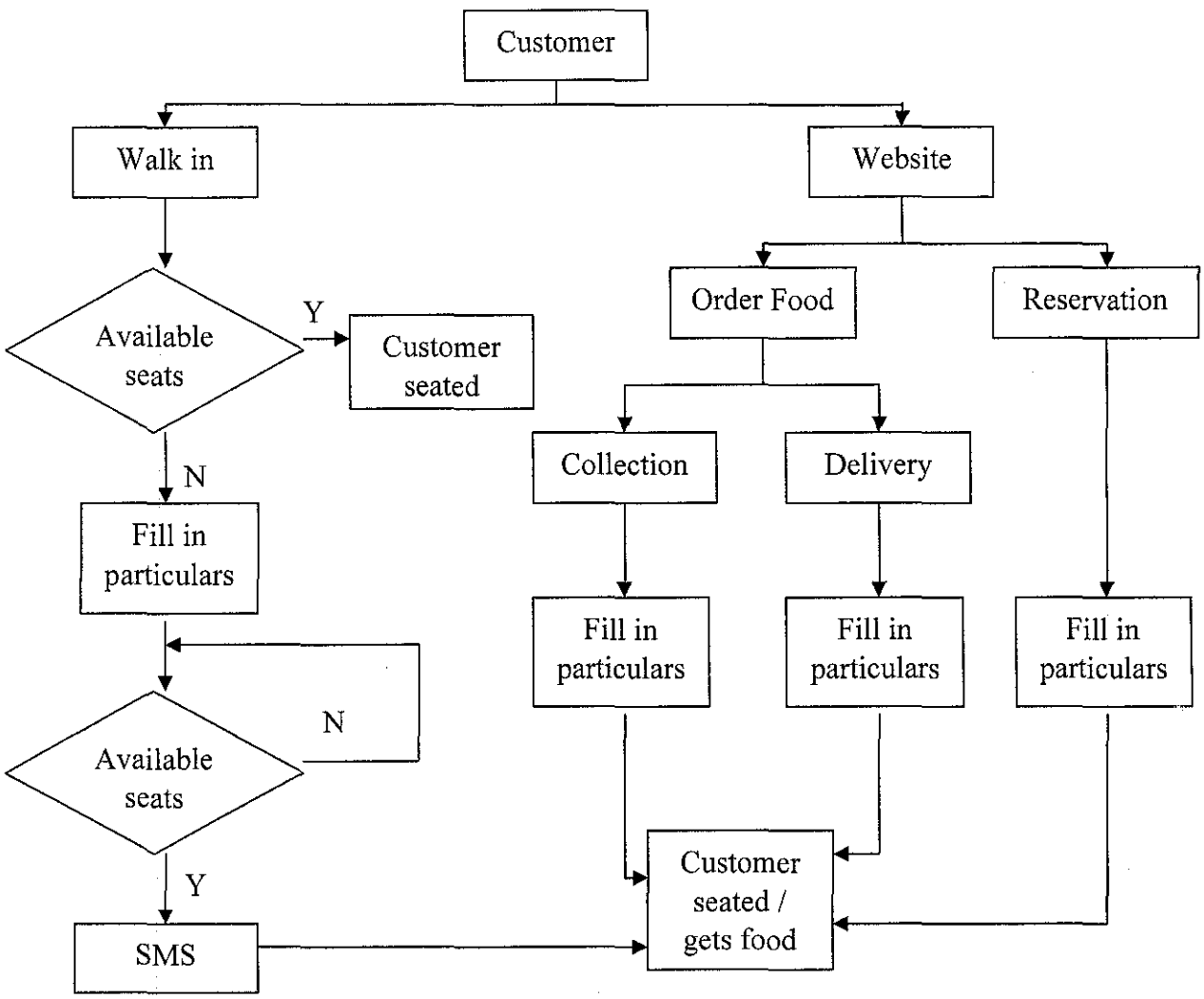


**Figure 3.1:** Flowchart of the overall system

# CHAPTER 4
# RESULTS AND DISCUSSION

This chapter covers the details of the result. Generally, this project is divided into four main parts that are the hardware or devices, software or application tools that are applied, website and analysis.

## 4.1 Hardware

### 4.1.1 Computer server

To develop the system, the basic device that needs to be connected together is the mobile devices such as computers (as a server), mobile phone and Bluetooth. The computer is the main features of this project where this is where database is kept and SMS was sent. Computer that will act as server will need a minimum requirement that is:

1. Operating systems: Windows 2000, or Windows XP
2. Minimum hardware requirements:
    - Intel Pentium III
    - 256Mb RAM
    - 40MB free hard disk space
    - USB port

### 4.1.2 Nokia 3230

Nokia phones are one of the favorites among mobile phone users. The price varies depending on the features and application of the design. There is a variety of choice for users to select from. Because this project is within a limited budget, Nokia hand phone is chosen as the GSM modem instead of the real modem.

Nokia phones is special in a way that they provide software for users that is unique for Nokia model. The software, called PC suite software was used to support the GSM protocol. Since the requirement for this project is to connect the server to GSM modem via Bluetooth, and to send message with the use of PC suite software, therefore Nokia hand phone with Bluetooth features is needed.

Nokia 3230 was chosen due to its features and price. It has Bluetooth and infra red connectivity.

### 4.1.3 Bluetooth connectivity

The Bluetooth concept is a cable replacement technology that simplifies person-to-person and machine-to-machine interaction. It utilizes short-distance radio link technology to enable wireless connection of mobile terminals such as desktops, laptops, printer, PDA (Personal Digital Assistant) and mobile phones can change data or voice with one another. Bluetooth operates at a frequency lying between 2402 GHz and 2480 GHz, the ISM (Industry, Scientific and Medical) band that is meanwhile free and unlicensed throughout the world.

Bluetooth enabled electronic devices can communicate, even if they are not in the same room, up to 100 meters. Bluetooth devices are social and periodically send inquiries to see if other Bluetooth devices are within range. When Bluetooth enabled devices come into contact with one another, there is a physical agreement that takes place through an electronic conversation.

The Bluetooth enabled devices will form a small network. This network is known as a personal area network (PAN or a piconet). The device that started the conversation becomes the "master" unit and the responder the "slave". Once the network has been formed, the "master" sends "slave" information about how the two devices will communicate. Up to eight Bluetooth enabled

devices can connect within a single piconet. If there are more that eight devices, the additional devices wait in standby mode to join the piconet. Members of the network frequency hop simultaneously to avoid other active PAN's in the area. This is known as a peer-to-peer connection.

Bluetooth connection was required to be used in this project since it was one of the latest technologies. Bluetooth USB dongle was used to enable the server to be Bluetooth-enabled device. The Bluetooth USB dongle is an USB-powered Bluetooth-enabled transceiver that facilitates communication with any other Bluetooth-enabled device.

## 4.2 Software

The development of software requires a lot of phases. There are many things need to be learned and try-and-error needs to be done. Software used were Microsoft Visual Basic 2005 (MS VB) and Microsoft Access. MS VB 2005 is used to create the interface of the server. Microsoft Access is for the database.

### 4.2.1 Microsoft Visual Basic 2005

MS VB 2005 is the latest version of Visual Basics. It is powerful software in creating and designing an interface using programming language. This software as used in this project to create the interface and to control the database. MS VB is a connection between software to another. The interface done using software was described in detail under this section.

Using MS VB, one form was created as the interface. This form uses a tab-concept where there are a few tabs under one form. These tabs were classified according to the number of person per table. Information keyed in these tabs will be kept in a separate database. The design of the form is as below

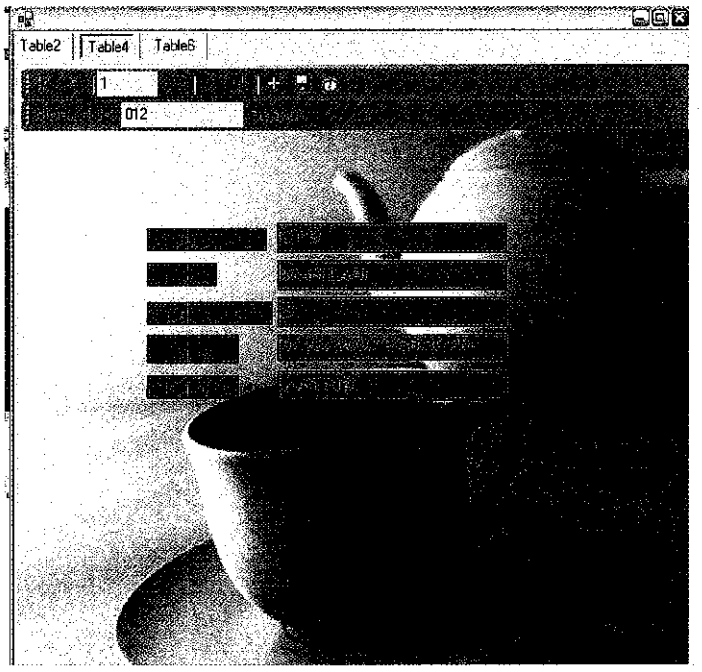


**Figure 4.1:** The VB interface

From figure above, the tab was clearly labeled according to the number of person per table. Tab 'Table2' would bring meaning that the requested table is for two or less people. 'Table4' and 'Table6' would mean that the requested table is for four or less and six or less number of people. The content of the form is the same for all tables. The difference is that the information of each tables is supplied to each own unique database.

This is done due to the reason to make the database more systematic and for easier reference and use. It is also designed to avoid chaos during business hours.

As for the functionality, the navigation button allows user to navigate back and forth of the records. The cross-like button is to add a new record. And the save button is to save the added record to the database. The clock icon functions as a button and it will link the interface to Nokia PC suite, where user will send SMS to customers notifying them that their table is ready. The search button is for user to search a specific record within the specific database. The search criterion is by mobile phone number since it is unique to each customer. As for the content of the form, the required personal details of customers are included. But for the 'Time:', user need not to type the current

time. The 'Time:' itself is a button that will generate the current time and also date to user.

For the 'Remark' textbox, this is where users will keep track of waiting customers. Users will enter 'waiting' as customers first register their details. After SMS was sent, the remark will be changed to 'sent'. By doing that, user will know the status of customers and thus keeping track of them. Should customers want to cancel their queue, user will change the 'Remark' from 'waiting' to 'cancel'.

### 4.2.2 Microsoft Access

Microsoft Access is a powerful tool in managing and creating database. It has many built in features as assistance in constructing database and retrieving information. Database is a collection of records stored in the computer in a systematic way. In this project, database was used to store customer's details. A few tables are created using MS Access.

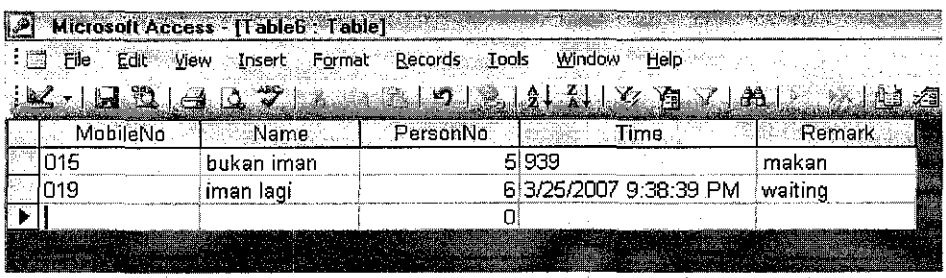


**Figure 4.2:** Database for VB interface

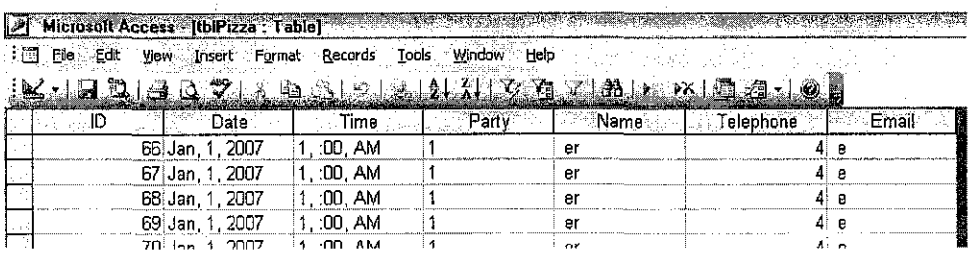


**Figure 4.3:** Database for reservation page on the website

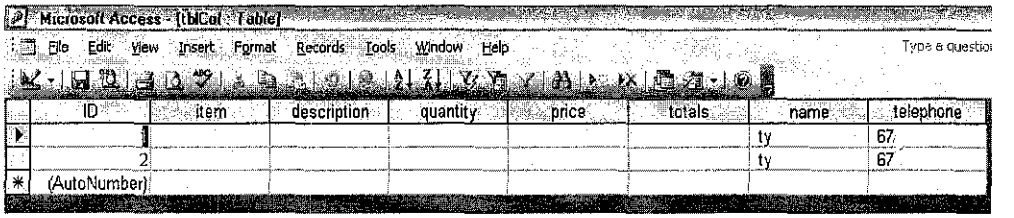


**Figure 4.4:** Database for order online (collection type) on the website

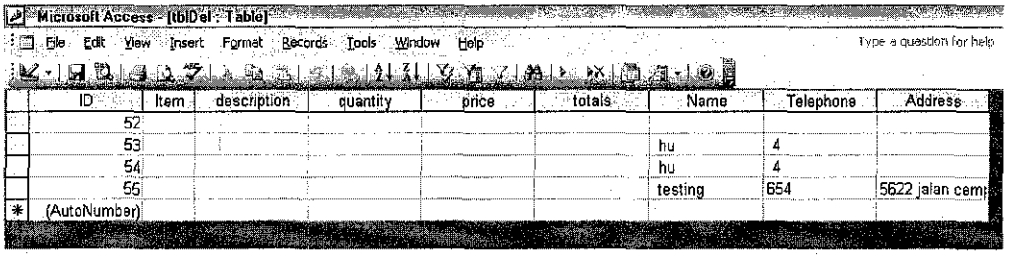


**Figure 4.5:** Database for order online (delivery type) on the website

### 4.2.3 Nokia PC Connectivity Software Design Kit (SDK)

The Nokia PC Connectivity SDK is a sophisticated and easy-to-use programming interface for Nokia phones. It is software used to connect between Nokia 3230 hand phone that will act as GSM modem to computer server. There are four types of connection that can be made using this software that is:

- Serial bus
- Infrared Radiation (IR)
- Bluetooth
- USB Data Cable

This project uses Bluetooth to create a connection between the two devices. Since Bluetooth technology is the latest and affordable technology, it became the requirement for this project. Bluetooth is required to be used in connecting the GSM modem to computer server.

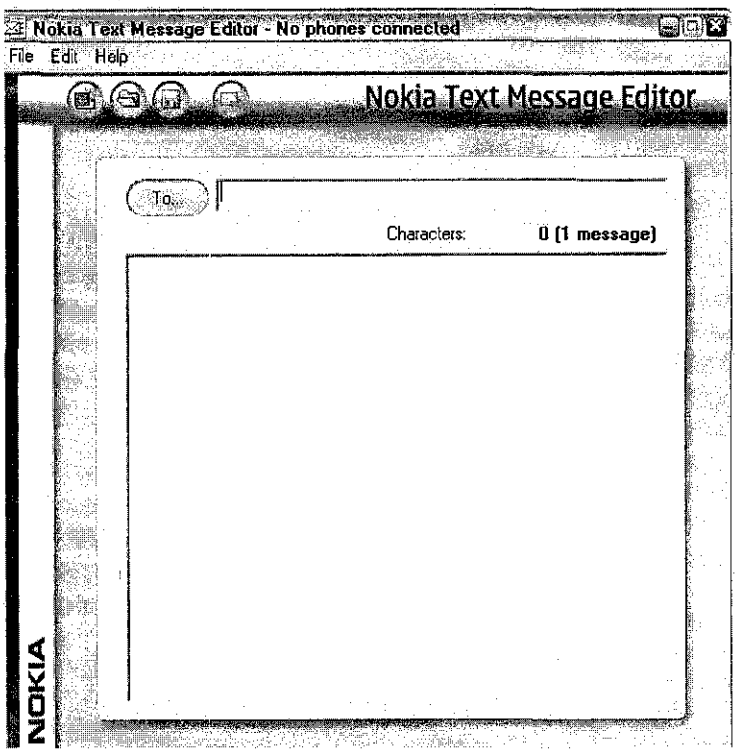


**Figure 4.6:** Nokia SDK text message editor

### 4.2.4 IVT BlueSoleil

IVT BlueSoleil is an Application Software Suite for computers (PC) and laptops. BlueSoleil for Windows is a set of Bluetooth Application Profiles implementation on Windows operating system and fully compliant to Bluetooth SIG (Special Interest Group) latest specifications. It enables PCs to form networks and exchange information wirelessly. BlueSoleil supports more than ten Bluetooth chip-sets and different HCI interfaces which include USB, UART, PCMCIA and Compact Flash, where in this project, USB is used. The server for this project, with the BlueSoleil application software suite installed thus becomes capable of wirelessly communicating with other Bluetooth products in various applications.

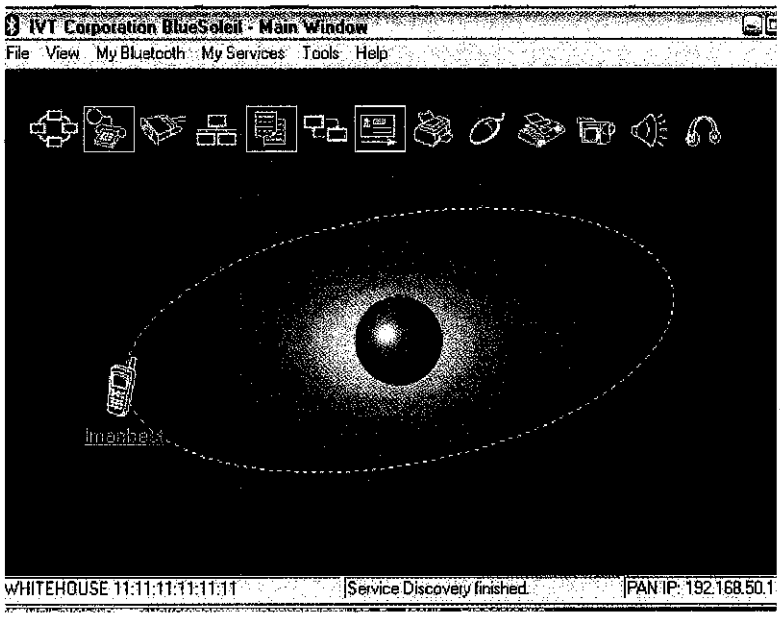


**Figure 4.7:** IVT BlueSoleil main window

## 4.3 Website

The additional feature for this project is to create a website for the reservation and order online system. Since some function needs to be done, a programming language needs to be used. The chosen language is Active Server Page (.ASP). As for the design, a basic Hyper Text Markup Language (HTML) was used.

The development of website needs a lot of practice and understanding about codes and language. All the small codes were tested to see the output and then combined to create a larger coding and web pages. Software like Macromedia was not used in this project since this is the integration of ASP and HTML. Also, by using Macromedia, should anything go wrong, it was hard to determine which line of codes involved. By not using Macromedia makes it harder and limit the design for the website. But it strengthens the knowledge of HTML codes.

This system of replacing pager with SMS can be used in many occasions. But in this project's context, it is implemented in a restaurant. Therefore, in designing a website, a non-existent restaurant was created. The created restaurant is a pizza restaurant. The purpose of narrowing the scope down to pizza restaurant is to give the audience the sight on how this system is going to be when implemented in any other restaurants.

Due to that, menus and layout of the website is referred to the created pizza restaurant. Below is the reservation page and online order page. The rest of the website pages were included in **Appendix B.**

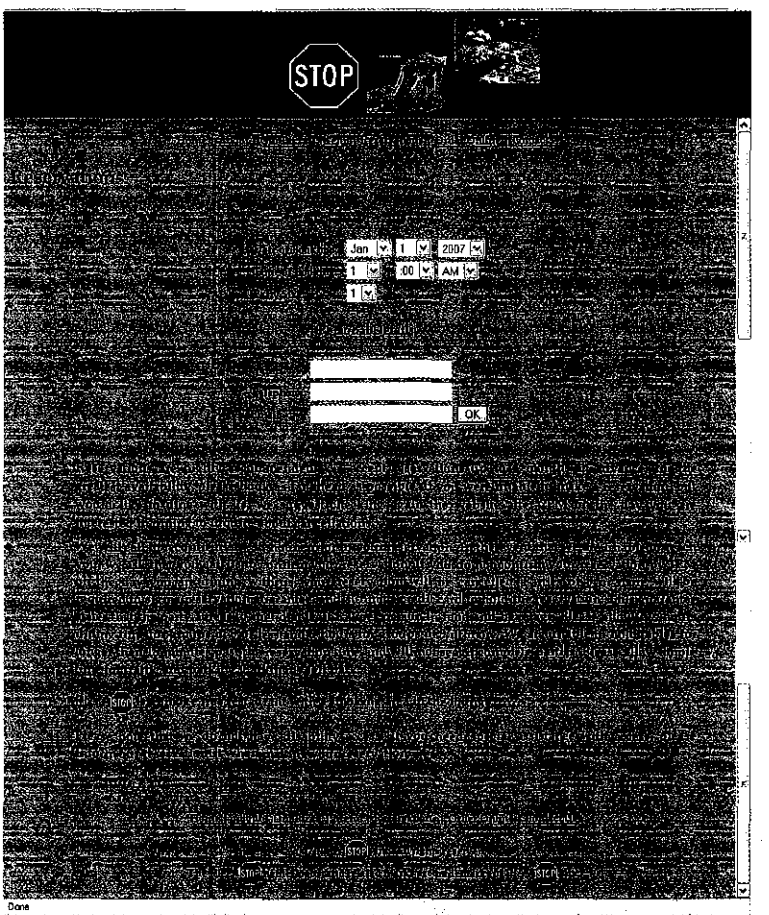


**Figure 4.8:** Reservation page of website

Customer will reserve the tables based on their preferred time and date. They will have to enter their particulars such as name, mobile number and email. The reason for email request is because if this project were to be extended, an email function can be implemented here. A confirmation email will be sent to customers. The OK button will post the information to database where a webmaster will keep track of every reserved table.

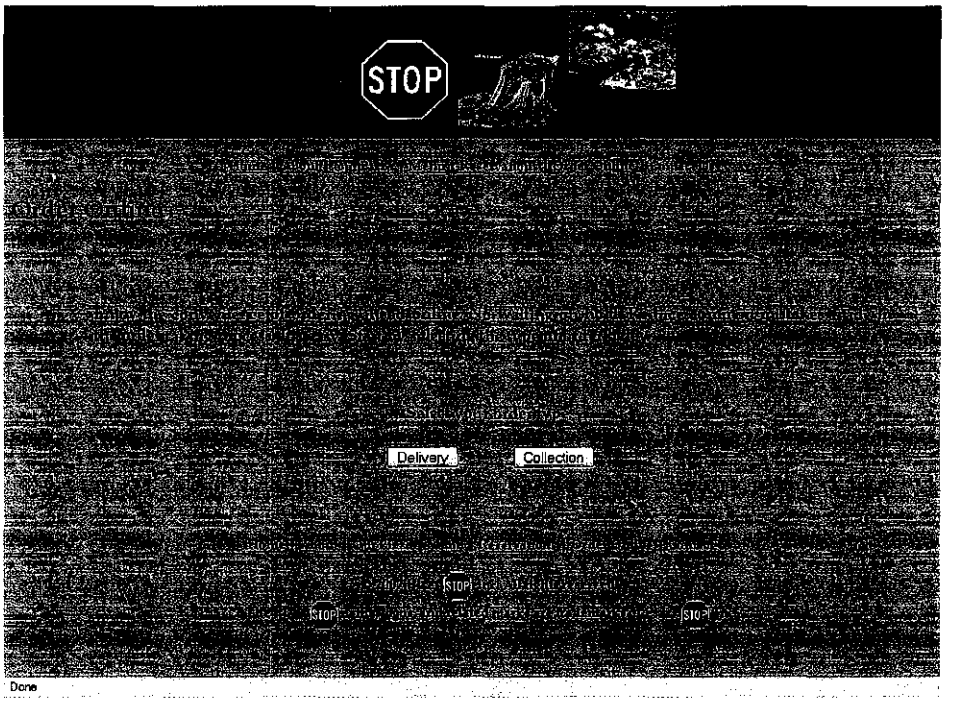


**Figure 4.9:** Order online main page of website

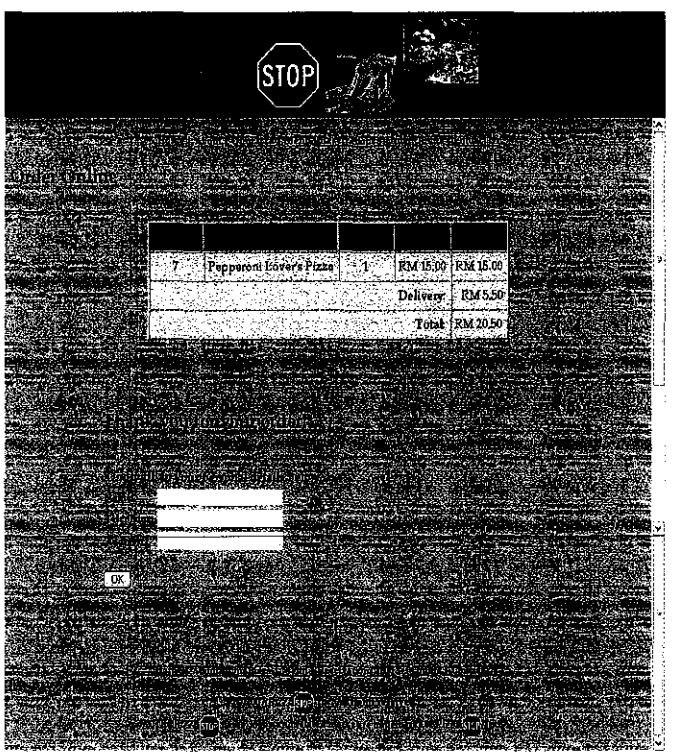


**Figure 4.10:** Order online page-delivery

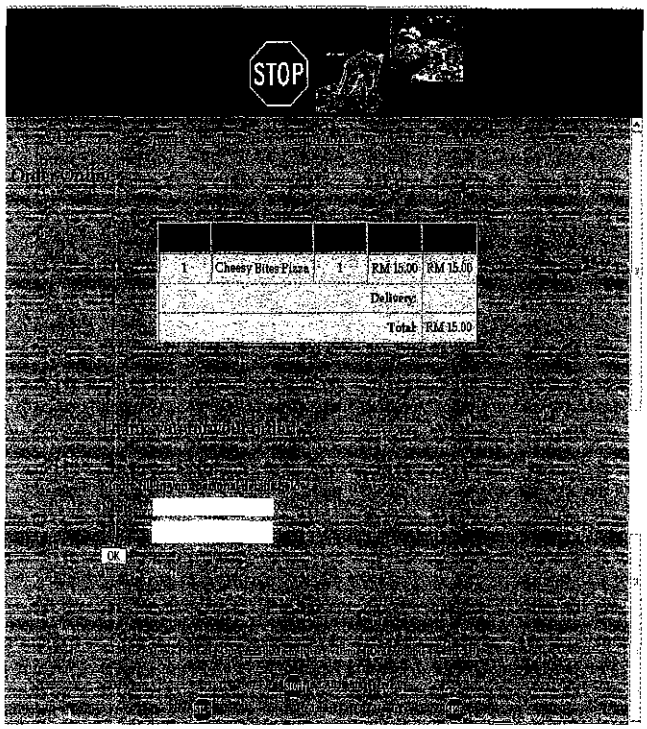


**Figure 4.11:** Order online page-collection

From the order online page, customer will be given an option to their preferred type of order which is either delivery or by collection. The difference between the two based on the website page is that for delivery, customer will need to enter their address in order for the food to be delivered. There will also be an extra delivery charges posted on them. As for the collection type, customer will need not to enter their address as this is not needed. Customers will collect the food by themselves. Therefore, no additional delivery charges were imposed on them.

## 4.4 Analysis

### 4.4.1 Survey

For analysis, a survey was conducted. This survey was done to see the feasibility and practicality of the system to customers. The targeted group is UTP students. The survey form is attached in **Appendix C**.

There are eight questions done for the survey. Each question was done for different purposes. Question 1 is to see the general size of market. This

question is a general but vital question since the main part of the system uses SMS. From this question, 100% of respondents own a mobile phone. Question 2 narrows down the scope of market from question 1. It also provides information on the habit of customers, of which, is important for this system. . Therefore, from the 100% of candidates in question 1, 75% of respondent usually eats outside at restaurants. Question 1 and question 2 mainly focus on paging system using SMS.

Question 3 surveys the current condition of restaurants. And 55% admits that they have to queue up for seats. This causes them to navigate away to another restaurant. Question 4 serves the purpose of finding out about the practicality of the system if it were to be implemented. Due to the reason in question 3, 90% of them liked to be notified using SMS when their table is ready so that they can be mobile and does not have to waste time queuing.

Question 5 starts to shift the focus to table reservation and online food ordering. This is also general question to see the size of market since this system need customers who regularly gets online. Since they are UTP students, 90% of them get online easily. The other 10% includes those who do not have personal computers in their room.

Question 6 and question 7 is to know the feasibility of the online system if it were to be implemented. For question 6, 60% of them say that they have heard of booking system. But from question 7, only 30% is using it.

The last question that is question 8 is to get the information on feasibility of the integrated system. Referring to pie chart below, majority of respondent which is 32% gives an overall of 8/10 to the system if it were to be implemented. This is followed by 24% that gives 6/10 and 20% that gives 5/10 to the system implementation. A total of 24% rated 9/10 and 2/10 with 12% each.

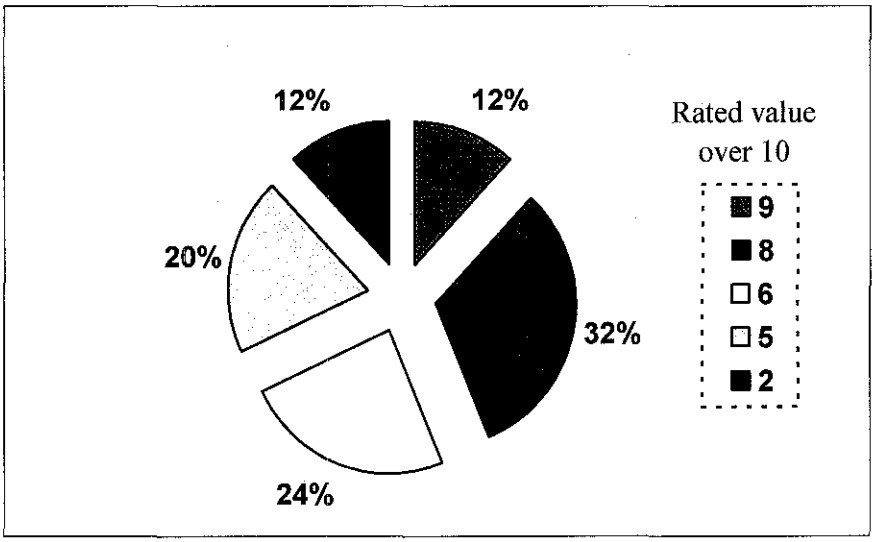


**Figure 4.12:** Results of survey in pie chart of Question 8

Results may vary should the survey is distributed to wide demographic; age, culture, gender, level of education and lifestyle.

### 4.4.2 Cost analysis

The cost analysis is summarized in the table below:

**Table 4.1:** Cost analysis

| No. | Item | Quantity | Price (RM) |
|---|---|---|---|
| 1. | Nokia 3230 mobile phone | 1 | 600 |
| 2. | Mobile phone | 1 | 150 |
| 3. | Bluetooth dongle | 1 | 45 |
| Total | | | 795 |

Since other equipments used in this project are software, therefore the costing is not included in the cost analysis.

### 4.4.3 Other applications

This system (of paging using SMS) is not only applicable to restaurants. It can also be used for different purposes such as at the hospital, where patients need not to wait for their turn in the hospital. Instead, they are allowed to be mobile and when their turn is near, an SMS will be sent to their mobile phone to notify them.

This can also be implemented at immigration office where people usually queue up waiting for their numbers to be called. The same goes to other suitable application and places.

# CHAPTER 5
# CONCLUSION & RECOMMENDATIONS

This chapter consists of the conclusion and recommendation. The conclusion section discussed on the objectives accomplished. The recommendation section focuses on future improvement of the project and in what other area the project can be implemented.

## 5.1 Conclusion

The project successfully reached the first objective that is to design a system which is able to communicate between the server (i.e. computer) and mobile phone using network providers in Malaysia. Under GSM network, Nokia 3230 acts as GSM modem and any hand phone types is acting as a receiver. GSM service that is SMS was sent from computer to receiver.

The second objective that is to design a synchronize system connection through Microsoft Access, Microsoft Visual Basic and mobile device was achieved. The system was done so that all the related software was linked together to produce an application.

The third objective is to attain knowledge on programming language (e.g. MS VB), database configuration (e.g. MS Access) and other Nokia Application Tools (e.g. Nokia PC Suite). This objective was successfully done all along.

The fourth objective is to build an online booking system where user will be able reserve table and place order online. This was done and thus objective was achieved.

The final objective that is to integrate the knowledge on the programming language gained into a real application system is also achieved. The programming done is not

just a stand-alone programming; in fact, it was the application of programming that makes this whole project functions.

## 5.2 Recommendation

Despite the success of this project, there are still rooms for improvements. For example, the website can be integrated with SMS function so that a confirmation of reservation via SMS can be sent to customers. The confirmation can also be sent via email.

Other recommendation is to put a search button on the website at the reservation page. This button serves the purpose of making sure if the table reserved by customer is available based on the date and time chosen by customer.

Another thing is that, a table layout can be included in the website. This gives customer more options to choose from.

A template for SMS can be provided to the user of this system. There maybe a different user at a different time. There are chances that everybody will use different sentences to sent message to customers. In order to avoid the situation, a standard template can be provided so that the message that goes out to customer is the same and systematic. It will show the professionalism of the restaurant.

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# APPENDICES

**Appendix A:** Nokia 3230 Specifications

**Appendix B:** Website pages

**Appendix C:** Survey questions

# APPENDIX A

# NOKIA 3230 SPECIFICATIONS


| | | |
|---|---|---|
| **General** | Network | GSM 900 / GSM 1800 / GSM 1900 |
| | Announced | 2004, 4Q |
| | Status | Available |
| **Size** | Dimensions | 109 x 49 x 19 mm, 90 cc |
| | Weight | 110 g |
| **Display** | Type | TFT, 65K colors |
| | Size | 176 x 208 pixels, 35 x 41 mm |
| | | - 5-way navy key<br>- Downloadable screensavers, wallpapers |
| **Ringtones** | Type | Polyphonic (48 channels), MP3 |
| | Customization | Download, order now |
| | Vibration | Yes |
| **Memory** | Phonebook | Advanced |
| | Call records | Yes |
| | Card slot | RS-MMC, 32 MB card included, buy memory |
| | | - 6 MB internal memory<br>- Up to 60 min video clips |
| **Data** | GPRS | Class 10 (4+1/3+2 slots), 32 - 48 kbps |
| | HSCSD | No |
| | EDGE | Yes, 118.4 kbps |
| | 3G | No |
| | WLAN | No |
| | Bluetooth | Yes, v1.1 |
| | Infrared port | Yes |
| | USB | Yes, Pop-Port |

| | | |
|---|---|---|
| | OS | Symbian OS v7.0s, Series 60 SE UI |
| | Messaging | SMS, MMS, EMail, Instant Messaging |
| | Browser | WAP 2.0/xHTML, HTML |
| | Games | Agent V, Rally Pro, Warrior + downloadable, order now |
| | Colors | Black, Red |
| | Camera | 1.23 MP, 1280x960 pixels, video(QCIF) |
| **Features** | | - Push to Talk<br>- Java MIDP 2.0<br>- Mono MP3 player<br>- Stereo FM radio<br>- Visual radio<br>- T9<br>- Organiser<br>- Voice dial/memo<br>- Built-in handsfree |
| | | Standard, Li-Ion 760 mAh (BL-5B) |
| **Battery** | Stand-by | Up to 150 h |
| | Talk time | Up to 4 h |

# APPENDIX B

# WEBSITE PAGES


Figure B-1: Home page

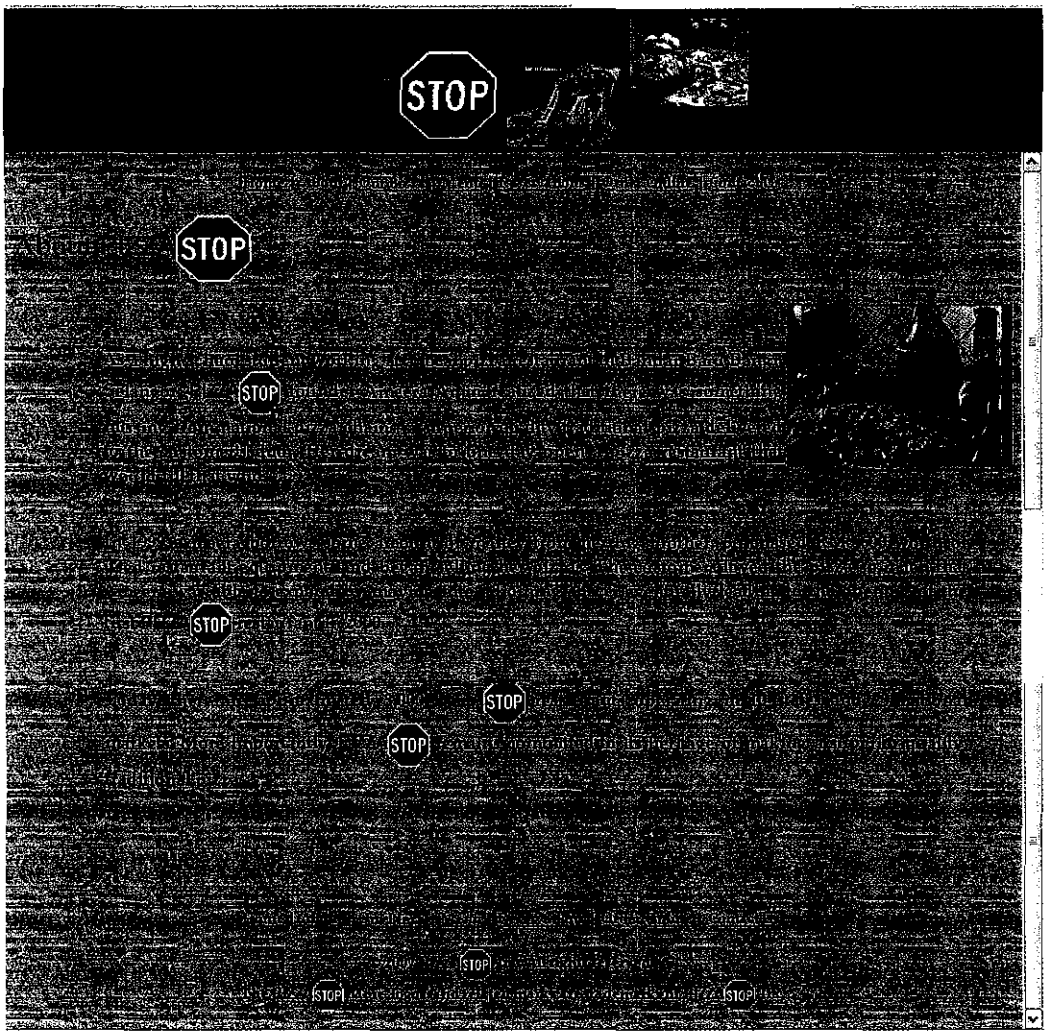



Figure B-2: About page

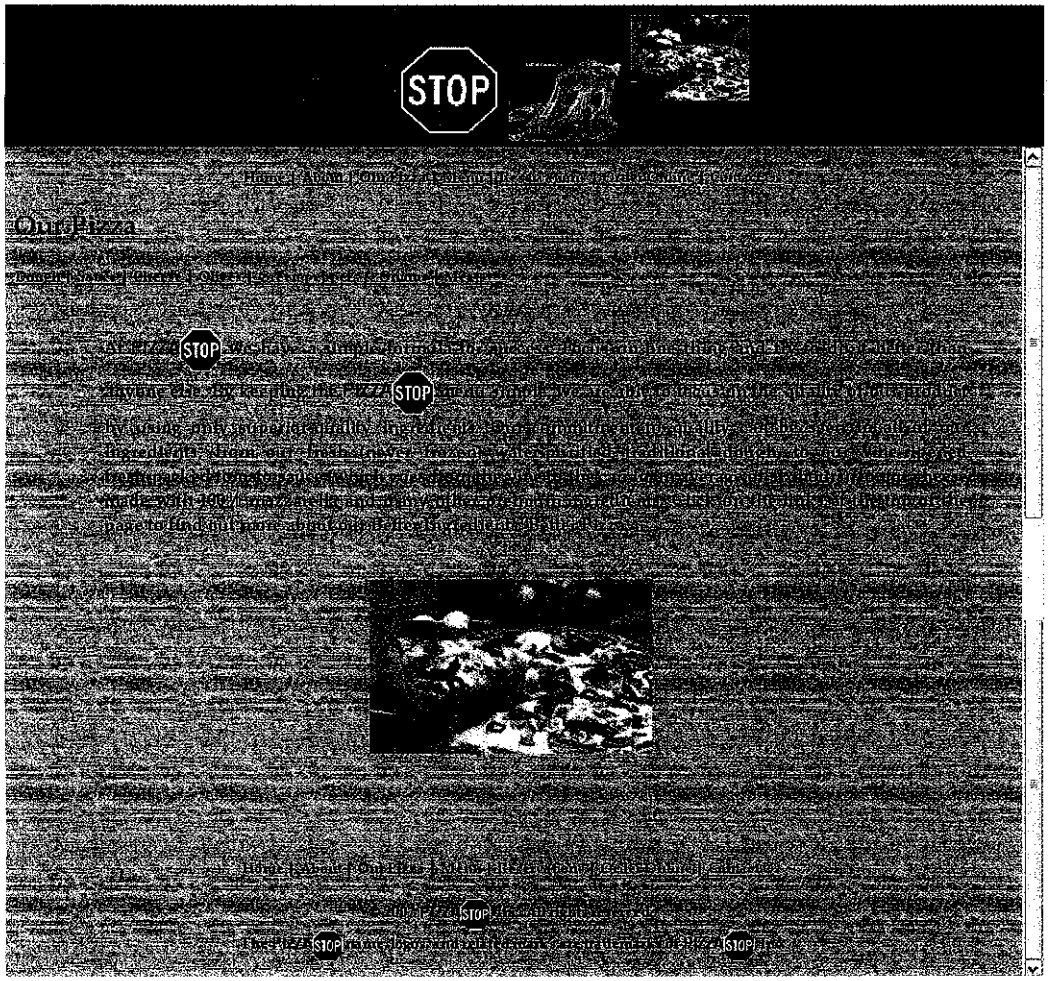



Figure B-3: Our Pizza page

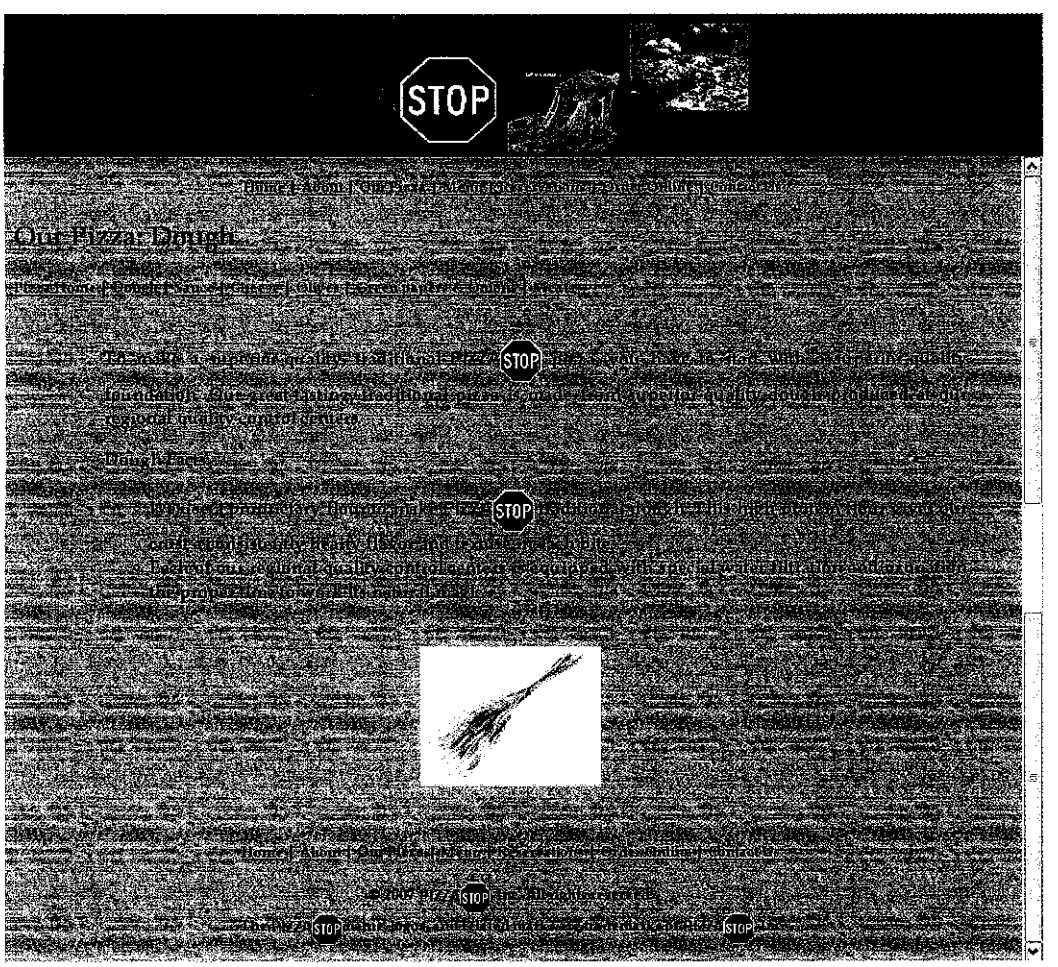
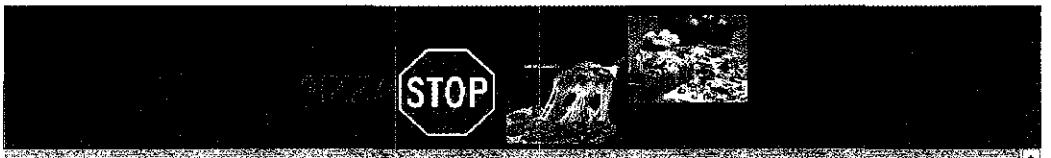



Figure B-4: Our Pizza: Dough page






## Our Pizza: Sauce



Superior-quality pizza sauce begins and ends with superior-tasting, fresh tomatoes. Our tomatoes are grown in the rich, fertile valleys of central California. The tomatoes are harvested each summer when they are at the peak of their ripeness. PIZZASTOP takes extra care (and incurs extra cost) to make sure the tomatoes used to make our sauce go from the vine to the can in an average of six hours, producing a just-picked fresh tomato flavor. Our sauce contains only natural ingredients: fresh tomatoes, a blend of sunflower and extra virgin olive oil, sugar, salt, oregano, spices and citric acid.

Tomato sauce facts:

- Packed from fresh, vine-ripened tomatoes
- The tomatoes used to make our sauce go from the vine to the can in an average of six hours
- Tomatoes are harvested only once a year at the peak of ripeness
- Processed using minimal time and temperature
- Water is never added to our sauce





Figure B-5: Our pizza: Sauce page

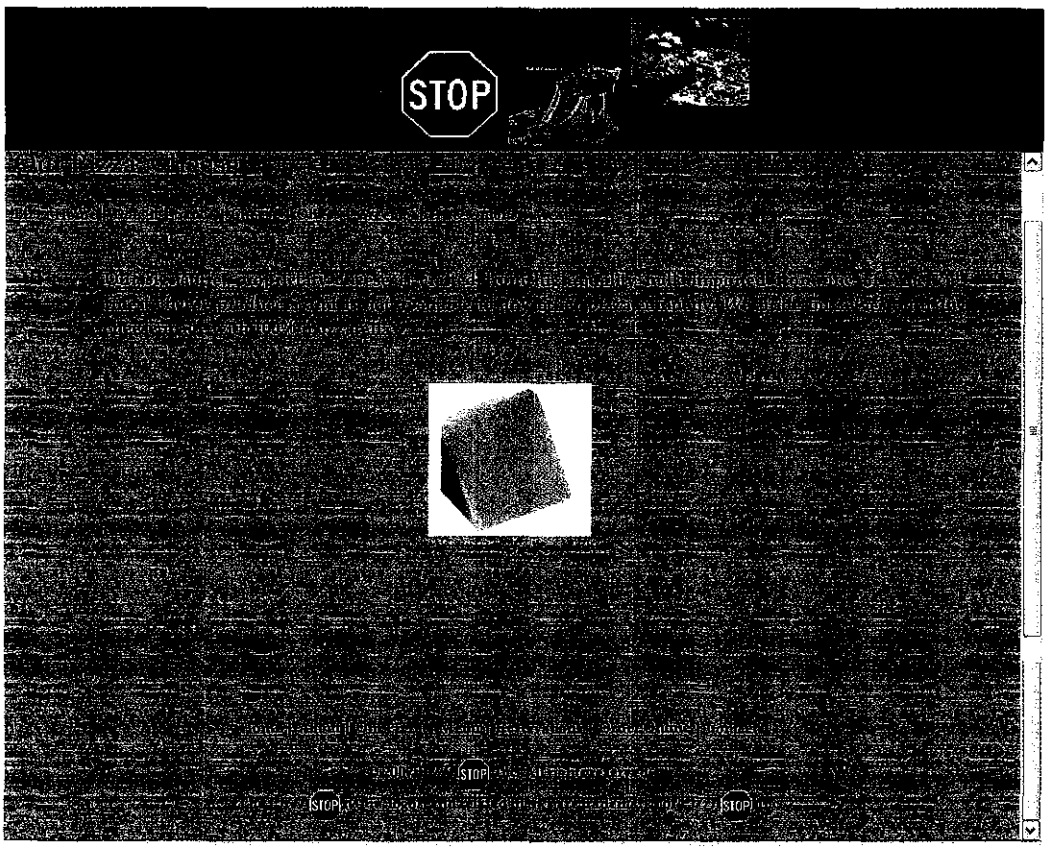



Figure B-6: Our pizza: Cheese page

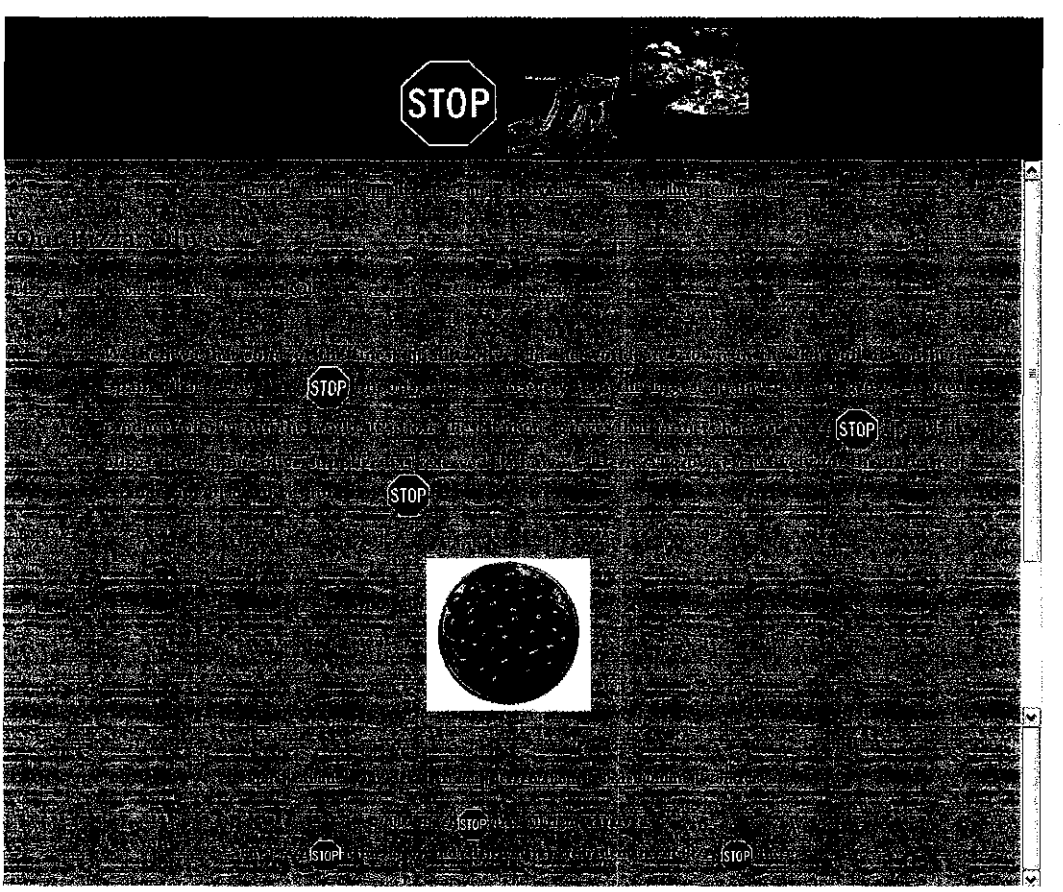



Figure B-7: Our pizza: Olives page

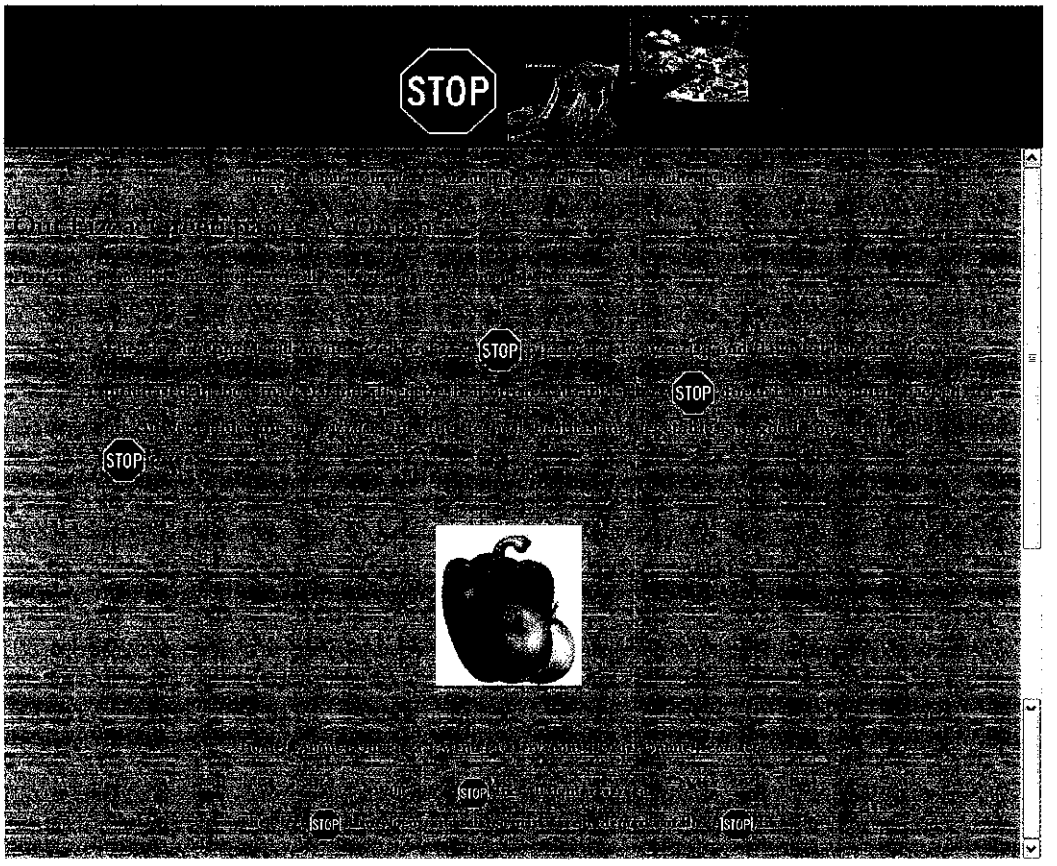



Figure B-8: Our pizza: Green pepper & onions page

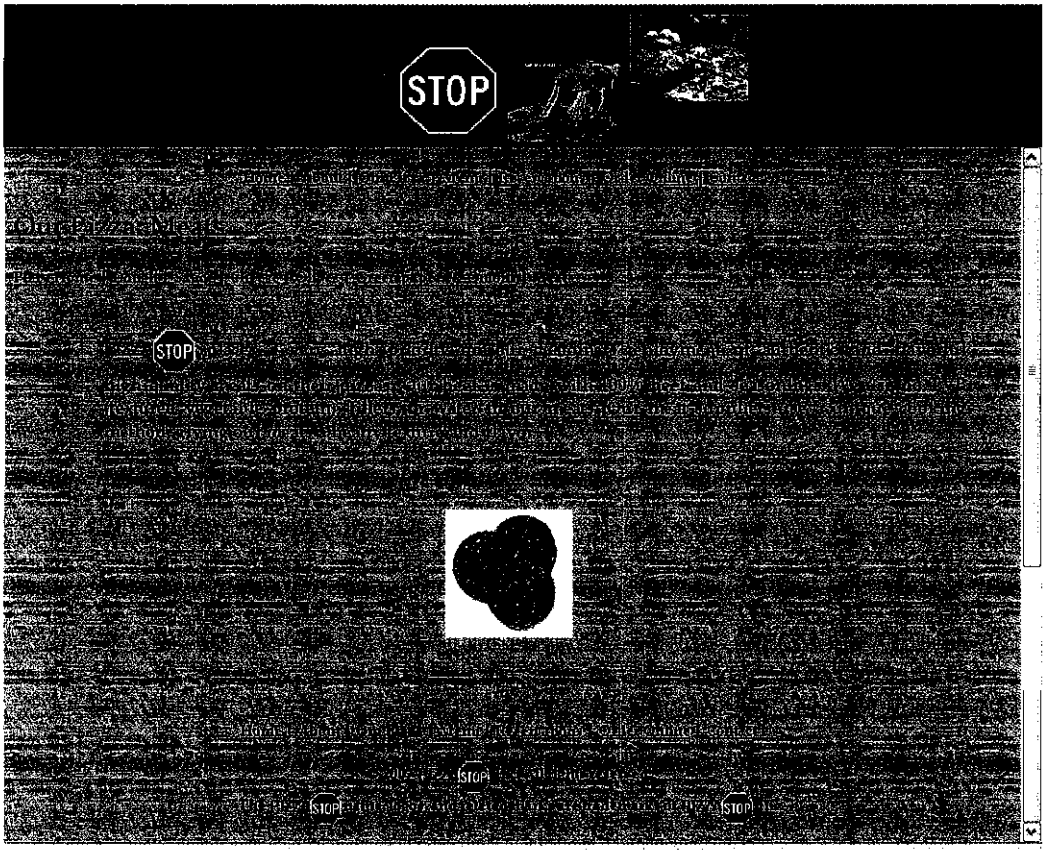



Figure B-9: Our pizza: Meat page

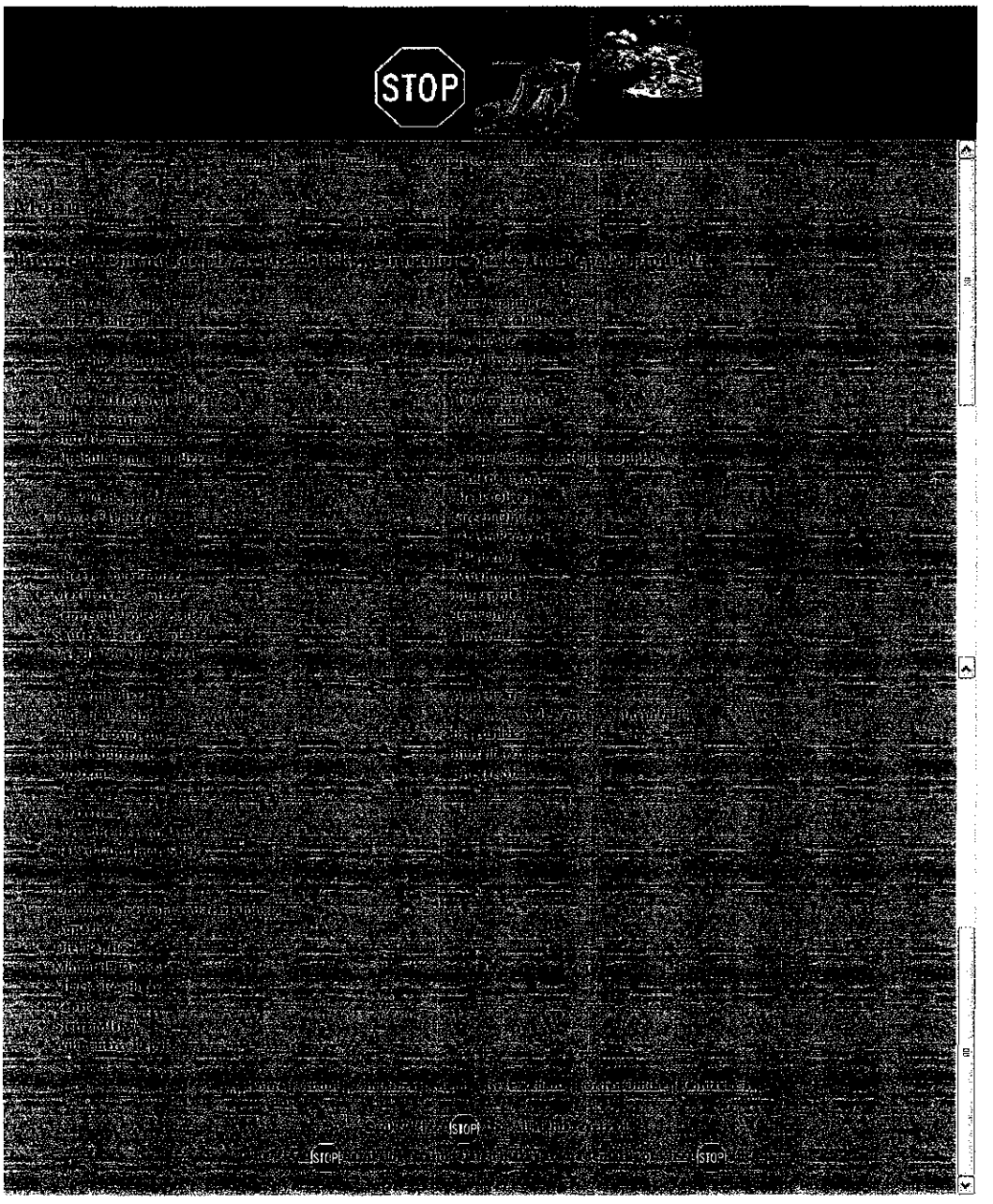



Figure B-10: Menu page

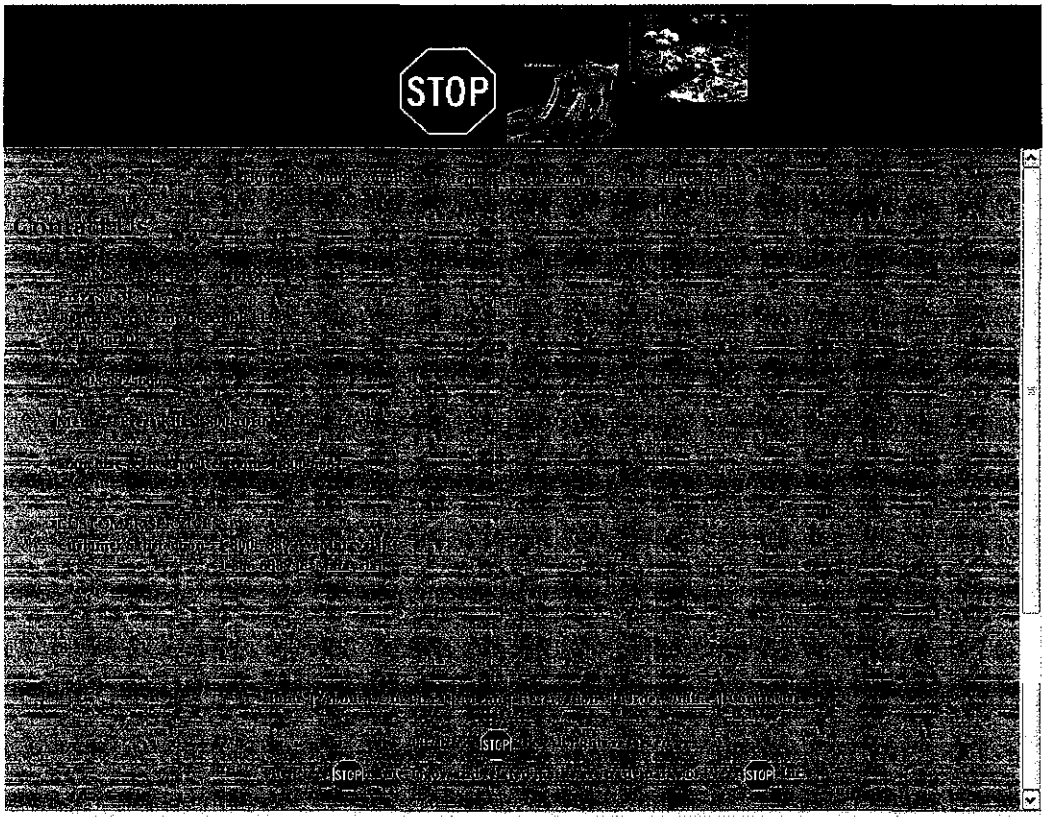



Figure B-11: Contact us page

# APPENDIX C
# SURVEY QUESTIONS

**"Food4U": Online Order & Table Reservation with Paging System Using SMS**

Please fill in the survey form. Your feedback will help in improving the current system towards contributing to own conduciveness.

1. Do you own a mobile phone? ☐ Yes ☐ No
2. Do you usually eat out at restaurants? ☐ Yes ☐ No
3. Do you usually have to queue up for table at restaurants? ☐ Yes ☐ No
4. Do you like to be notified via SMS when your table is ready? ☐ Yes ☐ No
5. Do you get online easily? ☐ Yes ☐ No
6. Have you heard of table reservation online? ☐ Yes ☐ No
7. Do you usually use it? ☐ Yes ☐ No
8. If "Food4U"were to be implemented, would it be helpful? Please circle the answer below.

(No) (Yes)

1 2 3 4 5 6 7 8 9 10

Thank you for your co-operation