Smart Ordering System via Bluetooth

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Abstract— **Conventional method that usually been used in restaurant is by taking the customer's orders and write it down on a piece of paper. Many ordering system have been proposed in order to undertake this issue. The project is proposed with the Bluetooth technology as the communication medium and Peripheral Interface Controller (PIC) as the hardware which implements faster ordering system. It consists of a keypad at customer's table as a remote control and monitor at kitchen or counter to display the ordering information systematically. The aim for this project is to build and design both hardware and software for the ordering and delivering system at restaurants by using keypad, display screen via Bluetooth communication. The project also targeted to receive information that works around 100m away with the specific location. Result shows that the hardware and software are successfully functional and able to be used as a smart ordering system. The project was able to solve the lack number of the worker, reduce the lateness and the error on ordering foods by the customers. For the future target, using touch screen display and compress the device to more compact device are recommended as the nowadays demand to interact young generation for using this system.**

Keywords— **Bluetooth, Ordering System, PIC, Remote Control**

I. INTRODUCTION

The smart ordering system is proposed with the use of a handheld tool which is used to make an order at the restaurant. It is proposed to solve the problems which are faced by the restaurant's entrepreneur in the attempt to organize the restaurant more efficiently skilled and capable. The system uses a small keyboard which is placed on each table for the customer to make orders. Order is made by inserting the menu code on the small keyboard. This code comes together with the menu. A signal will be sent to the order section by Bluetooth communication, and automatically will be displayed on a screen in the kitchen. The project will reduce time to be spent on making the orders and paying the bills, whereby the cost and man power also can be optimized.

The project started with reviewing several sources as the literature review. S. A. Rosle proposed a smart ordering system by using cable and PIC [1]. The project used electronic order keypad with transmitter and receiver circuit has been materialized. The project was not successfully functioned because the keypad designed is mismatching with the transmitter and receiver circuit. The improvement been done by using of keypad with other serial port device as an alternative to undertake the problem.

The company of GeneralSoft Ltd, Silwood Business Centre had proposed "The SMART System" [2]. They proved that by using this SMART system, it will guarantee not only improve of customer efficiency. By using the SMART system and its technologies restaurant will improve their company speed and accuracy.

Advanced Analytical, Inc at Westlake village had introduced one system can eliminated application in Restaurant in acquaint as LRS Restaurant Server Pager Starter Kit [3]. The objective is to make sure that the present foods still burning and two give more space for waiter to serve other customers. This system is easy to be used, when foods are prepared in the kitchen the chef will press a button. Then, server pager will send their signal to waiter by vibrant, which is indicate the foods are prepared. The sweating time can be used by waiter to carry out other task. This system necessitated battery, transmitter, pager and server pager to enable all function. Transmitters are placed at wall in the restaurant to enable the signal to pager. The system used WHF frequency 467MHz as the communication medium.

Another popular method that uses the Bluetooth technology is MGI Multimedia Sdn. Bhd.'s Malaysian Delights. The system allows waiters use an electronic submit order system to submit the order directly to the kitchen, bar and cashier by using Bluetooth or Wi-Fi connection from their handheld personal digital assistants (PDAs). The system's infrastructure relies on Bluetooth or Wi-Fi connection. The wireless access points are need to strategically place throughout the restaurant and waiters are equipped Bluetooth or Wi-Fi enabled PDAs using their Malaysian Delight application. The number of access points will depend on the restaurant's size and the number of PDAs used by the waiters [4].

Based on the all literature reviewed, the proposed project came with the aim to build one ordering and delivering system at restaurants using keypad, display screen and Bluetooth communication. Further, the hardware and software need to be working and functioning synchronously. For this purposed, a circuit of PIC microcontroller with connection to the both transmitter and receiver need to be designed in order to control instructions the whole system.

II. MATERIALS & METHODS

The methodology used will be divided into two parts as system design and system process flow.

A. System Design

The operation of the whole system can be seen through the block diagram. The Fig. 1 below shows the project block diagram. Keypad is used as the input and LCD display is used as the output for the system design.
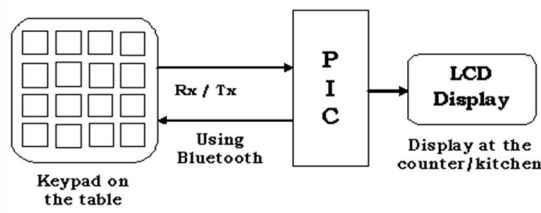

Fig. 1 General Block Diagram of System Design

The system uses a small keyboard which is placed on each customer table to make an order [9]. Customer need to press the menu by using the keypad for making an order. The completed order will be transmitted to counter or kitchen with Bluetooth communication. Finally the information will be displayed at the LCD display.
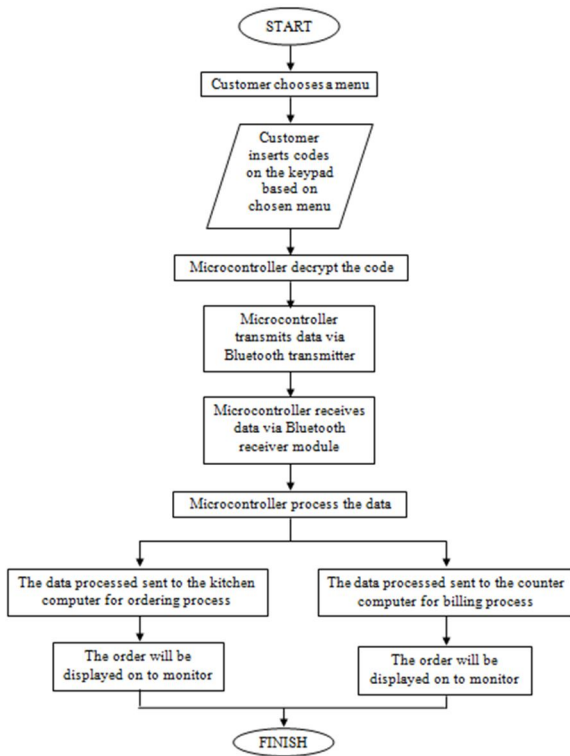
B. System Process Flow

Fig. 2 System Process Flow

The system uses a small keyboard which is placed on each table for the customer to make orders. Firstly, customer needed to choose their menu. Order is made by key in the menu code on the small keyboard. This code comes together with the menu.

Then, the code is decrypted by a microcontroller. The microcontroller later transmits the data via Bluetooth transmitter. The microcontroller will continuously receive data via Bluetooth receiver module. The data is processed by the microcontroller when it received signal from Bluetooth communication.

The processed data is to be sent to the kitchen computer for ordering purpose, and to the counter computer for billing process. This system will be done after the customer completed their orders.

C. Circuit Construction Process

All the circuits have been combined to form a complete whole system circuit. The circuit has been design using software Protel. Then circuit is designed for Printed Circuit Board (PCB).
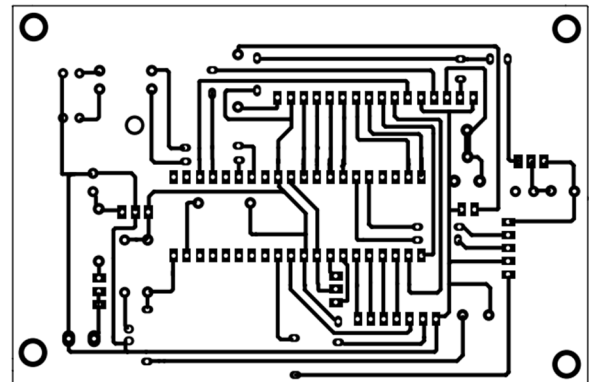

Fig.3 Circuit by Using Protel

After all the error in the schematic designed is corrected, layout for a PCB is constructed. A constructed layout will be simulated in order to know either the circuit requires jumper or it can works on its own at the real circuit. Besides providing layout on PCB, location of the other component can be predetermined for the actual circuit.
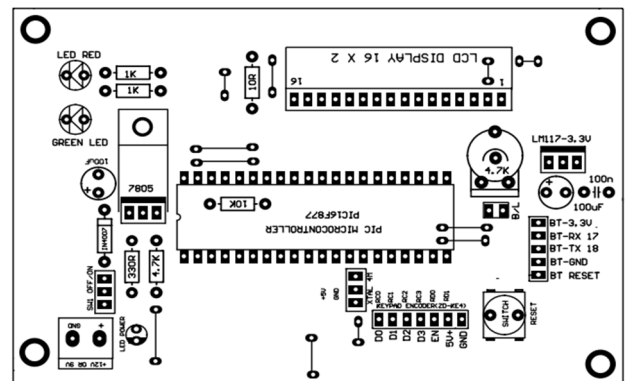

Fig. 4 Circuit by Using Protel

After the circuit has been designed using Protel software, the circuit will be ironed at the PCB which has been cut according to suitable the size of the circuit. Finally, component is soldered to the board and the circuit is ready to be powered up, tested and used. Fig. 4 shows the circuit where the components were placed.

D. Software Development

For the software development, the Visual Studio (VB) 6.0 software is used to design the Graphical User Interfacing (GUI) of the project. Microsoft® Visual Studio® 6.0 is a powerful developer tools suite for Windows and Web applications [5]. The VB software is used to display the menu order from customer at the computer screen.

Another software was used is C language. The C language is used to write a source codes for this microcontroller which is then will be compiled. When the program can be successfully run no error in the source code, then the microcontroller will be programmed.

III. RESULTS/FINDINGS AND DISCUSSION

Testing is conducted to evaluate the capacity, functions and effectiveness of the developed application. Information about the results and analysis are based on functionality and implementation process.

A. Electronic Order Keypad

The keypad consists of normally open push button switches. A 1K pull-up resistor on each input pin can help eliminate outside noise. The circuit 4x4 keypad is used in particular with the PIC 16F877 microcontroller [6], [7], for which it has been designed considering a supply of 5V, 16F877 I/O pins leaking current, the voltage level recognized as a high or low state while in TTL mode when a key is pressed the 16F877 micro detects it and transmits the ASCII character [8], [9].

Each push button defines the ID or special code for difference menus. As an example, the key "A" will set to "NEXT". To ensure that the keypad works, observation on the PIC 16F877 microcontroller that was already programmed will be observed. From the observation, the PC will display a number if a push button had been pressed. Table I shows the action that been taken by the system after one of the button had been pressed.

TABLE I
OUTPUT OF EVERY BUTTON

Button	Action
When button '1' is pressed	Quantity of the menu
When button '2' is pressed	Quantity of the menu
When button '3' is pressed	Quantity of the menu
When button '4' is pressed	Quantity of the menu
When button '5' is pressed	Quantity of the menu
When button '6' is pressed	Quantity of the menu
When button '7' is pressed	Quantity of the menu
When button '8' is pressed	Quantity of the menu
When button '9' is pressed	Quantity of the menu
When button 'A' is pressed	Change the list of menu
When button '*' is pressed	Send order to the monitor

B. Testing and Troubleshooting

All the circuits need to be tested and troubleshoot. It would be necessary to solder all components into the PCB and then test the completed model.

Once phase 1 of designing circuit was completed, testing and troubleshooting are needed to ensure that the circuit works properly. The testing on this project has been done independently before all of the parts are connected together to form a complete system. Some equipment that has been used in this process is Multimeter, Oscilloscope, Solder and Sucker.

C. Power Supply of the Microcontroller

Based on Fig. 5 below, suitable components were used to convert from 12V to 5V. From experiments that had been conducted, voltage regulator that was used will steps down high voltage 12V to low voltage 5V. For this project, its need to use 10V and above to avoid and support LCD display from dim condition.
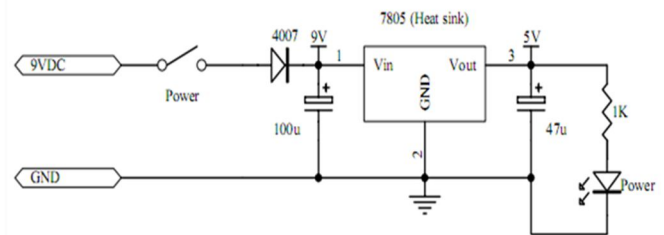

Fig. 5 Voltage Regulator 5V Circuit

D. Microcontroller Input and Output

The microcontroller used in this project is the Microchip PIC16F877A. This controller has 33 inputs and outputs. The input and output for the microcontroller can be used in any combination. All input and output are connected to the outside world through the registers which are called port.

For this microcontroller, it has 5 ports which are PORT A-E. PORT A has 6 bits while each of PORT B, C and D has 8 bits. Only PORTE has 3 bits. The ports are been used and their connections are described in Table II.

TABLE II
CONNECTION OF THE PIN ON PIC16F877A

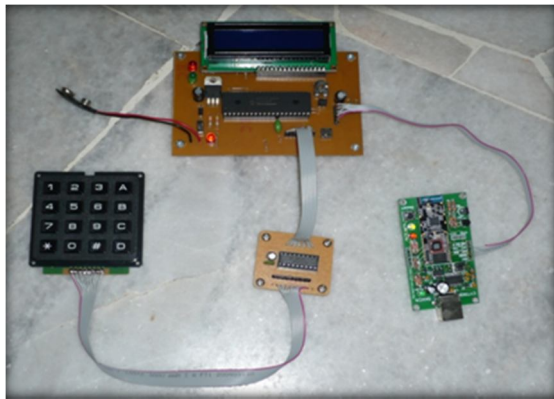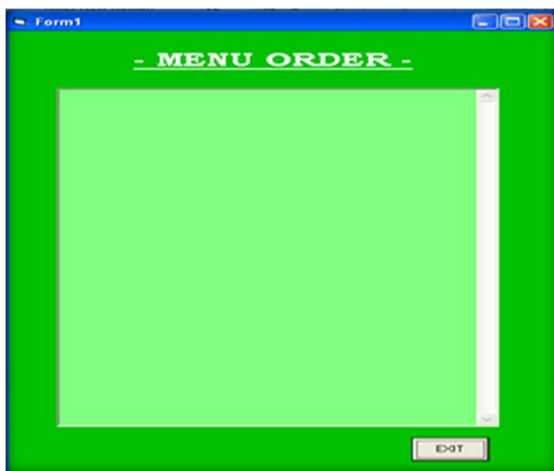| Pin I/O	Connection
RB3 – RB5	Connection to the LCD display
RC0 – RC3	Connection to the keypad
RC6 –RC7	Connection to the Bluetooth device
RD0 – RD7	Connection to the LCD display

E. Final Project

Fig.6 Connection all circuits

Fig.7 Interface at Monitor

IV. CONCLUSIONS

As a conclusion, this hardware and software of project is successfully functioned as the objectives of the project. This project solved the problem which is faced by the restaurant's entrepreneur in the attempt to organize the restaurant more efficiently skilled and capable. It is also can be used to reduce the lateness and the error on ordering foods by the customer's by restaurant. By using this system, there are no more complaints about the services.

This project can contribute to the advancement of science and technology by having upgrading keypad with touch screen to further develop on Smart Ordering System. This project can be redesigned the electronic order keypad with more reliable function and mismatch with other hardware e.g. smart phone. The interface of the keypad can be modifying for a better service to the customers. A LCD display can be added to the keypad for the customer as a reference to them during making an order. This is to avoid from sending wrong information to counter or the waiters.

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