Automated Restaurant Menu and Billing System

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Abstract: All restaurants mostly use hard paper printed menu card. Printed menu cards are subjected to damage and creates issues when updating of menu card is required such as adding or deleting the menu items or updating the price. This adds to wastage of paper and also to cost in updating the menu. The proposed work is to design and develop a ON-TABLE mounted electronic menu device capable to provide the menu details, receive orders and generate bill automatically. The proposed work is to avoid the manual error and printing of paper or hard menu cards. Apart from technical benefit, the electronic menu improves aesthetics of restaurant table and also minimize the manual system for taking order and also updating the menu is easy that too without involving any cost. The proposed design is having three modules, one at table to place order, one in kitchen to get order with table ID and one at billing counter to get the details of the order place against specific table for billing.

I. Introduction

In [1] smart restaurant with e-menu card is discussed. The proposed work consists of android app, customer tablet or smartphone and kitchen display connected to customer tablet or smartphone. In the proposed work customer uses android app on customer's table to place order. The customer tablet is directly connected to kitchen display. As the customer places the order it reaches to kitchen in real time without any delay. The kitchen module is developed around ARM processor.

[2] provided smart restaurant system using RFID. The system discussed consists of smart table, application server, order monitor, and order delivery system. The application uses the most recent Internet of Things technology. RFID authentication is used to deliver the order at the correct table. The system is developed around Raspberry Pi hardware board and uses MySQL for web database.

In [3] Bluetooth based smart ordering system is developed around PIC microcontroller. The discussed system consists on PIC microcontroller, keypad and display in the kitchen. In this the customer selects the menu items through the code and the microcontroller decrypts the item codes. The decrypted item codes are communicated to the kitchen via Bluetooth link. Another module receives the order details through Bluetooth link and processes the information. After processing the information received, the second microcontroller module sends the order information to kitchen computer for the preparation of order. The second module also sends the order details to counter computer for the purpose of billing.

In [4] text to voice system for reading out the restaurant menu for blind people is discussed. The system captures the image of the menu on mobile device. Then image is processed using character recognition API. After processing the image, words are combined into food name and price. Finally, the system provides the food name and price as synthesized voice. The system is able to achieve 87% accuracy and the processing time is nearby 10 seconds.

A robotic serving waiter and android based menu system is discussed in [5]. Android application provides the menu to the customer from which the order can be placed. The placed order is received at the counter equipped with laptop connected to android app through WiFi. When the order gets ready the serving robot serves the order precisely using the coordinate mapping method. The system uses Bluetooth for local communication and Arduino mega as processing board.

Arduino mega based handheld restaurant menu ordering system is discussed in [6]. The handheld device is available with each table and is mapped to the table with table number assigned to each table.

The customer will place the order through the handheld device. The order so place will be communicated to the kitchen through Bluetooth link and will be displayed there. The bill will also be displayed on the handheld device.

II. Proposed Restaurant Menu and Billing System

The motive and objective to digitalize the restaurant menu and billing system is to save time, resources, reduce human error to minimum and making the menu system more environmentally friendly. Most of the work done in this area uses high cost devices such as Raspberry Pi, Android tablets or android application to be installed by the user on their phone. One of the implementations developed handled device using Arduino mega. Another important short coming in most of the implementation is use of Bluetooth for transmitting the order information. Bluetooth has limited range and range decays with obstacles, which may not be suitable or feasible solution in big restaurants.
The current paper proposes a system which overcome both the high cost and communication range limitation of the existing systems in restaurant menu and billing automation system without using any sophisticated complex hardware board. Figure 1 gives the block diagram of the proposed system

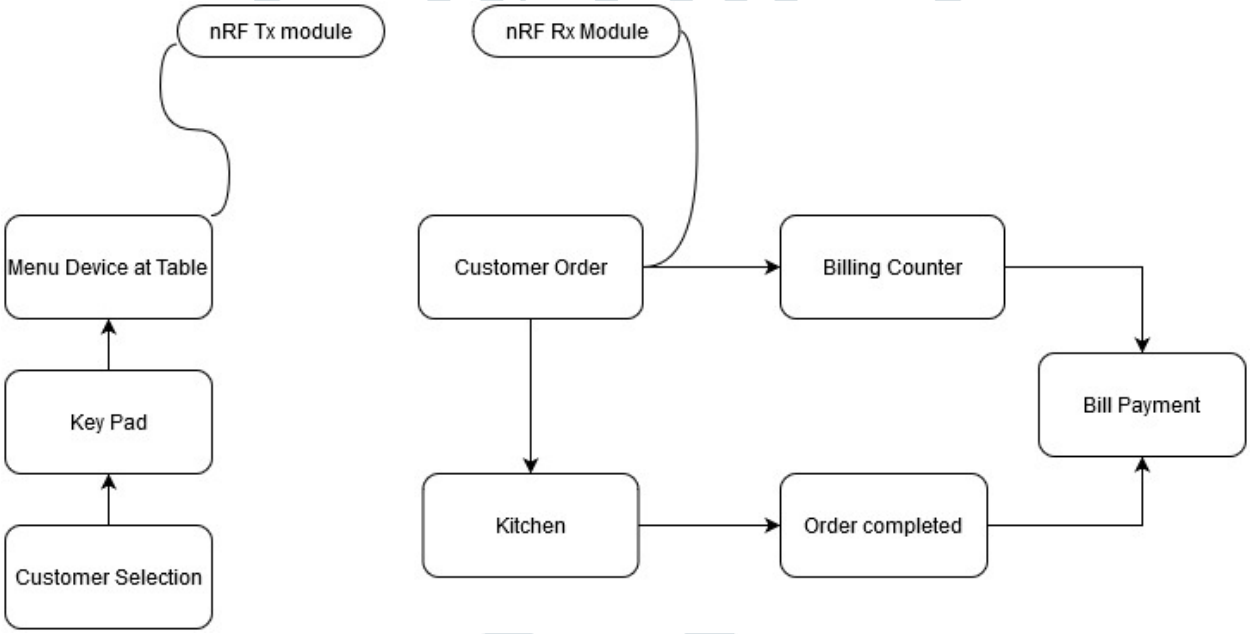

Figure 1: Block diagram of proposed system

The system proposed is build using Arduino UNO, TFT screen, keypad and nRF24l01 communication module.

A. Arduino UNO

Arduino UNO is an open source prototyping board developed around AVR ATmega328P microcontroller. Arduino UNO is programmed using Arduino IDE (Integrated Development Environment). The board has 14 digital I/O pins, 5 PWM pins, 6 ADC channels and is much cheaper than Raspberry Pi and Arduino Mega. Figure 2 gives the pictorial view of Arduino UNO.

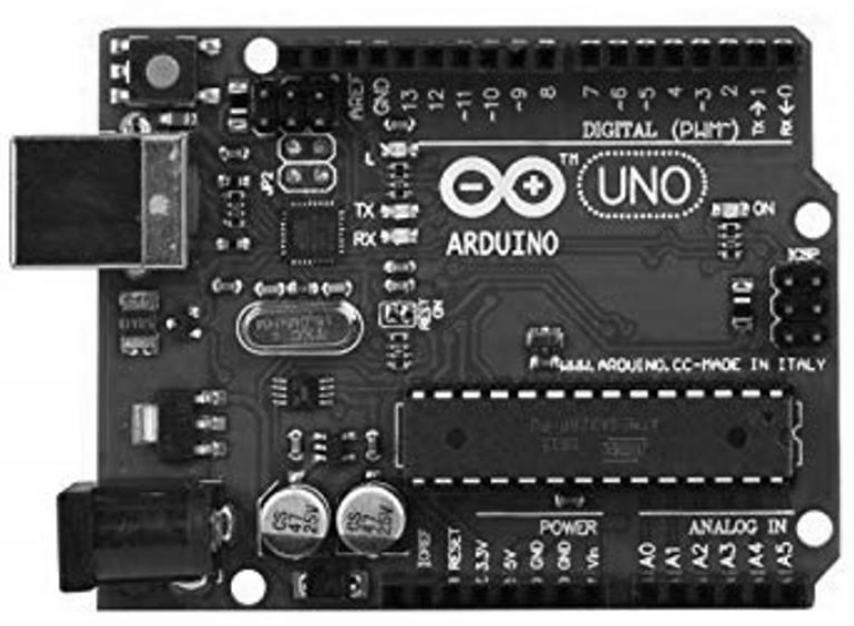

Figure 2: Arduino UNO board

B. Arduino TFT 2.4 Shield and Keypad

TFT in the proposed system is used to display the menu items along with their pricing. The keypad is used for browsing the menu, selecting the items and finally placing the order. Arduino TFT 2.4 shield is shown in figure 3.

Figure 3: Arduino TFT 2.4 shield

C. nRF24l01 Communication Module

nRF24l01 is a single chip transceiver using 2.4GHz – 2.5 GHz frequency band. Figure 4 give the nRF24l01 module. Two such modules are required, one at receiver and one at transmitter end.

Figure 4: nRF24l01 module

III. Conclusion and Future Scope

A system for restaurant menu and billing system to reduce human error, save time, reduce menu reprinting cost, simplify menu updating method and to reduce the paper usage in restaurant menu is proposed. The system proposed in simplified, low cost with long range communicating module. Programming of touch screen of the Arduino TFT 2.4 shield will make the system mor compact. Connecting the system with IoT technology to the cloud will make the management of account, inventory and sale management more transparent to the owner of the restaurant.

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