



Wireless System For Touchless Shopping Using IoT

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Abstract: Using an IoT based ordering system, pharmacy, auto service, hotels, and customer care units can be automated. The traditional method opted for ordering items or services is done by pen and paper. This method can be time taking when there are many people in the queue. In situations like a COVID-19 pandemic, these systems can help conduct touchless shopping and social distancing in most of the businesses, including but not limited to pharmacy, restaurants, auto service, and customer care centers. This project, wireless ordering systems for touchless shopping enables users to order products or services remotely from his/her table or queue and send those orders to the concerned based on application and industry. The system consists of two sections, transmitter and receiver section. The transmitter section has the touch screen display, which takes the input from the user, and sends it to the receiver section using an RF transmitter. In the receiver section, data is displayed on the LCD screen. The order taking department can take the order from the LCD display right after the buzzer sounds.

Index Terms - Automation, Buzzer, IoT, LCD screen, Ordering System.

I. INTRODUCTION

Employing information technology to enhance service quality and management efficiency by automation has always been a great opportunity in every industry. Today, the traditional methods opted for processing service requests, and ordering is done by using a pen and paper. When many people are requesting, waiting in the queues, and like to order a service or product, our traditional methods fail. This problem can be tackled by using IoT technology. With a simple touch screen interface, customers can order, select, and pay without human intervention [3,4,8]. Especially in these times of COVID-19, these systems are effective in controlling the spread of the virus by reducing human intervention and establishing social distance. The system has two sections, i.e., transmitter and receiver section. The transmitter section consists of Arduino Uno, TFT display, and RF transmitter. While the receiver section consists of Arduino Uno, LCD module, RF receiver, and a buzzer. Transmitter section is useful in ordering from the menu. Customers can select their menu displayed on the TFT display and place the order. After ordering, receiver section, which is in the management/dept side, sounds the buzzer and shows the ordered items in their display. So, the orders will be directly sent to the dept, and customers doesn't have to wait for the order. Also, the total bill will be displayed on the customer's LCD screen with a provision to pay.

A. Related Work

Most of the automation related to ordering systems happened in the hotel industry [2,15,16,17]. The menu ordering systems have been developed to ensure ordering the menu items and pay, without the intervention of waiter and cashier [5,6,7].

In the year 2016, Mrs. Anisha Cotta, " Smart Restaurant Menu Ordering System " the paper focuses on building a menu ordering system with the use of Bluetooth as a communication device and TFT LCD touch plus display module compatible with Arduino Mega 2560 as hardware. The system uses a TFT touch plus LCD module, which is placed on each customer's table to make an order. The customer needs to select the menu available on the screen. The completed order will be transmitted to the kitchen section once the order button is pressed, and the bill is sent to the manager using Bluetooth communication [1].

The paper discusses the hardware description of the proposed menu ordering device in section II. Sections III and IV describe software description and implementation of the proposed system respectively, followed by a conclusion in section V.

II. HARDWARE DESCRIPTION

A. Arduino

Arduino is one of the best open-source platforms used for building electronic projects. The Arduino Uno is a microcontroller board embedded with ATmega328 chip. The board consists of 14 digital input/output pins (of which six can be used as PWM outputs), six analog input pins, a USB connection, a power jack, a reset button, a 16 MHz crystal oscillator, and an ICSP header. It has everything which is required to support the microcontroller. You can connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. It features the Atmega8U2 programmed as a USB-to-serial converter. The Arduino can be powered by the USB cable or by an external AC-DC adapter (9-volts). Some of the features of this device are given below

- Digital input/output pins are 14, and Analog input pins are 6.
- Flash memory is 32 KB.
- Clock Speed is 16 MHz



Fig.1. Arduino UNO

B. Block Diagram

1. Transmitter Section

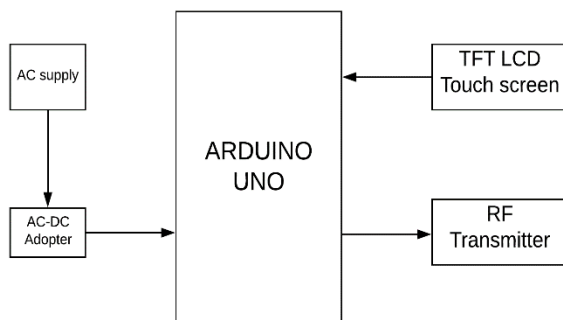


Fig.2. Block diagram of transmitter section

Arduino is powered by an AC-DC adaptor (9 volts). TFT LCD touch shield and RF transmitter are connected to the Arduino. The LCD shield is interfaced with Arduino to provide input from the user through the LCD. For communication with the receiver section, an RF-based transmitter was used.

2. Receiver Section

Arduino is powered by an AC-DC adaptor (9 volts). RF receiver, TFT LCD Touch Shield, Buzzer, I2C module are connected to Arduino Uno. Data received by the receiver will be passed to the Arduino, and received data is debugged and displayed on the LCD screen using the I2C module. Also, a buzzer sounds to alert the ordering department to take the order of food items.

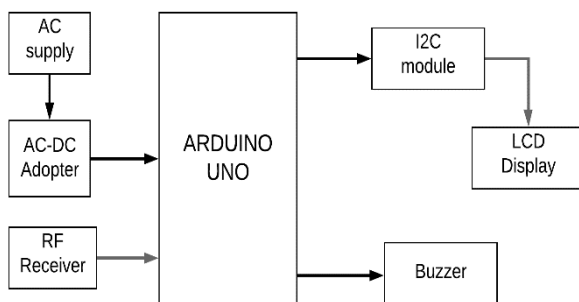


Fig.3. Block diagram of receiver section

C. Components

1. 433MHz RF Transmitter and Receiver

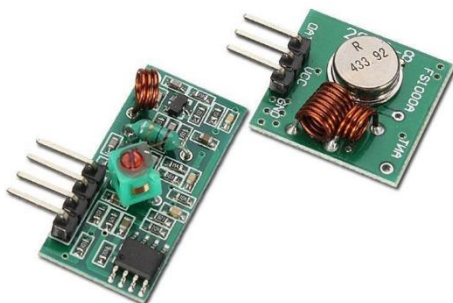


Fig.4. RF transmitter and Receiver

This component is useful in transmitting the data from one location to another location. This module contains a radio frequency transmission system of 433MHz frequency. Both the transmitter and receiver operated at the same frequency. The serial data is getting transmitted at the rate of 1Kbps – 10Kbps. This RF transmitter works with a 3V power supply.

Features: -

- Receiver frequency 433MHz
- Receiver supply current 3.5mA
- Receiver operating voltage 5v
- Transmitter frequency range 433.92MHz
- Transmitter supply voltage 3v~6v
- Transmitter output power 4v~12v

2. 2.4" TFT LCD Display module



Fig.5. 2.4-inch TFT Display module

This component can display the desired information with desired colors. TFT LCD consists of an array of 240 X 320 small LEDs that are capable of displaying multiple colors. The desired data can be viewed by varying the colours in these small LED's. Along with displaying this sensor can also detect touch. Using some libraries, this module can be interfaced with Arduino software. This module operates at an input voltage of 3.3V.

Features: -

- Pixels: 240x320
- Voltage: 3.3V
- Mode of operation: SPI and 8-bit mode
- Interface IC: 74LVX245
- bitmap images can be displayed through SD card

3. I²C module

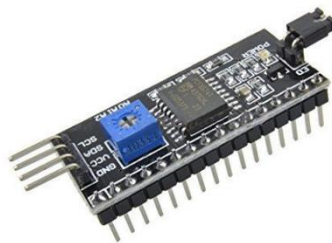


Fig.6. I²C module

This module helps the 'LCD display' by converting I²C serial data to parallel data with the help of an inbuilt PCF8574 I²C chip. These modules have a default I²C address of either 0x27 or 0x3F. This module requires screen adjusting to display text correctly.

4. 16x2 Character LCD Display

This module is useful for displaying the data. This module can display 16 columns and two rows of characters. It receives parallel data from the I2C module. This module contains 16 pins to collect input data.



Fig.7. 16X2 Character LCD display

Features: -

- Operating Voltage: 4.7- 5.3V
- The alphanumeric LCD display module
- Consists of two rows of led's and each row can print 16 characters.
- Each character is built by a 5x8 pixel box
- Can display custom generated characters

5. Buzzer

A buzzer is a tiny speaker that can be connected directly to the Arduino. The device works on the principle of piezoelectricity. It is an effect where certain crystals will change their shape when electricity is applied to them. By applying an electric signal at a frequency, the crystal vibrates and makes a sound.



Fig.8. Buzzer

Features: -

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep
- Resonant Frequency: ~2300 Hz

6. AC-DC Adaptor



Fig.9. AC-DC Adaptor

AC/DC adapters accept A.C. input voltage directly from a wall outlet and output D.C. voltage. The main features are wall-mount, where the adapter unit plugs directly into a wall, and the D.C. lead then goes to the D.C. device and desk mount, where the adapter unit is in-line between the A.C. plug and the D.C. output. This adaptor is used by many D.C. devices, such as household items, printers, low-voltage D.C. boards, etc.

III. SOFTWARE DESCRIPTION

A. IDE

The Arduino Integrated Environment is a cross-platform application that is written in functions from C and C++. Arduino IDE application is used to write and compile the codes for Arduino compactable boards. It is an open-source software in which code can be written, compiled, and can be uploaded to Arduino boards. It contains the text editor to write code, message area, text console to compile code, a toolbar with buttons for common features, and series of menus. Programs that are known as sketches are written in a text editor and are saved with the file extension. The message area gives the feedback which saving the code and exporting and also displays errors. The console displays the output of the program. It runs on various platforms like Windows, Linux, and MAC OS.

B. C++

C++ is a high-level programming language and is an extension of C language. This is a general-purpose programming language, and it has object-oriented programming features. It is the most popular programming language for graphical applications that runs on Windows, Linux, and MAC OS. C++, being a language that directly builds off C, is compatible with almost all C language code. C++ is used to write the code for different sensors in Arduino IDE software.

RF transmitter/receiver module and TFT display require specific libraries to be included, which are available online. A working code should be uploaded to transmitter section Arduino to display the menu and to transmit the data. Similarly, receiver Arduino also needs to be uploaded with a working code such that the receiver module can collect messages, display the message on the LCD module, and make a beep sound through the buzzer.

IV. IMPLEMENTATION

The Arduino is powered by the AC supply using an AC-DC adaptor. RF transmitter and TFT LCD touch shield are connected to the Arduino in the transmitter section. RF receiver, LCD Display, buzzer, and I2C module are connected to the Arduino in the receiver section. Input is given to the Arduino using the TFT LCD touch shield display. RF transmitter communicates this data to the receiver section. The data received is collected by the RF receiver and feeds this data as input to the Arduino in the receiver section. Then, this received data is debugged using the I2C module and displays it on LCD and buzzers the sound to alert the ordering department

V. CONCLUSION

The main purpose of this system is to enhance customer service and provide touchless ordering systems for any business. This product transmits data from customers to the concerned department over Wi-Fi or GSM. Based on user requirements, industry, and application, the wireless module can be changed and product features can be enhanced. The range can vary by up to 500 meters. The primary use of this product is in pharmacy, hotels, auto service, and customer care. Due to the flexibility in its range of transmission, it can be useful for other businesses as well. Based on the large transmission capacity of this product, we can use it for long-distance applications too. In view of the COVID-19 pandemic, the need for touchless shopping and social distance is more, systems like this are key to ensure pharmacy, clinics, restaurants, auto service, and customer care centers, conduct business with limited human intervention.

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