Waiter Vehicle and Ordering System For Restaurants

Komal Khakal[1] , Rachana Korde[2], Ankita Phad[3]
[1, 2, 3] Dept of E&TC
[1, 2, 3]MITCOE, Maharashtra,India.

Abstract- *Waiter Vehicle and ordering system for restaurants is used to order food in restaurants by using Zigbee module for transmitting and receiveing the orders placed by the customers using TFTLCD from table to the kitchen and then the order is delivered by the waiter vehicle to the respective table.*

Keywords- 2.4''TFT LCD, Arduino, color sensor, IR sensor, ultrasonic sensor, Zigbee module

I. INTRODUCTION

This project gives the design and development of a waiter vehicle and ordering system from table, which is considered as a possible solution to restaurant automation. Replacing manual work at fast. In classical cafe, restaurants and hotels, the customers and owners face lot of problems due to unavailability of waiters and due to manual order processing. These shortcomings can be handled by using a restaurant automation system where "Waiter Vehicle" are used for ordering or receiving food and beverages.

A.OBJECTIVES:

The desired order is transmitted on wireless network to the kitchen via menu bar. The menu bar is displayed on the LCD. The order is placed by the customer using Keypad. This order is sent to the kitchen and reception using communication network. The waiter vehicle then transfers food from the kitchen to the customer's table as per given instructions from kitchen and customers. So there is less probability in misplacing the order.

II. LITERATURE SURVEY

According to survey we know that from many years in restaurants owners hire waiters to accept and deliver orders from table to table. Waiters resolve each and every issue related to orders and try to resolve them. But sometime waiters fail to deliver food to right table or forget the order given by the customer. And this human error cannot be avoided.

There are many techniques adopted by the restaurants for avoiding this human errors. Some restaurants take a manual hand written notes of the orders and some restaurants started taking orders on tabs which are sent directly in the kitchen to make the orders ready. But this has an disadvantage of man power again plus the extra expense of the tabs and manual writing efforts. This is going on from years which affects the income of the owners and also privacy of the customers.

The system we have designed solves most of the problems of the customers and the owners and helps them to increase the profit and give more facilities to the customers. Because of this there will be decrease in the cost of dishes as there are no waiters to give salary of.

There are many systems which have been developed to reduce the man power but still because of technical issues or management these systems have drawbacks in them. Still in many restaurants there are a lot of waiters working to serve the customers.

III. SYSTEM DESIGN

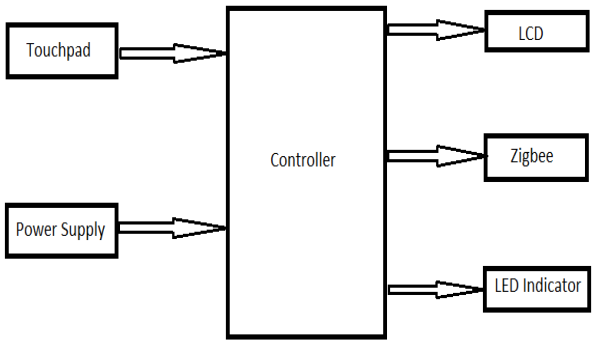

Fig 1.Transmitter

A.ATMEGA328P

ATMEGA328P is an 8-bit microcontroller. It is based on AVR RISC architecture. It has high performance and low power controller from Microchip. It is the most popular of all AVR controllers as it is used in Arduino boards.

ATMEGA328P is a 28 pin chip as shown in pin diagram above. Many pins of the chip have more than one function.

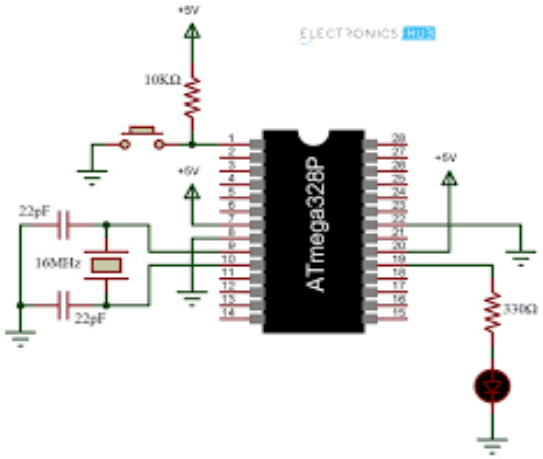

Fig 2.Atmega 328p

B.ZIGBEE

ZigBee protocol is based on IEEE(Institute for Electrical and Electronics Engineers) 802.15.4 standards with additional routing and networking functionality. It is used to create Personal Area Network(PAN) using radios.

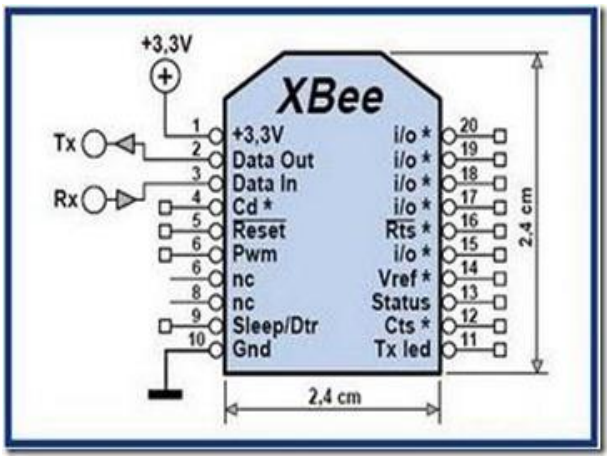

Fig 3.Zigbee

Zigbee has mesh networking function. Mesh networking is used where distance between two radios is beyond their ranges. In such condition, intermediate radio is used that will forward incoming messages to the destination and accomplish the communication between long distance radios.

C.2.4TFT LCD

2.4TFT LCD module consists of a bright backlight and a Colourfull 240 X 320 pixels display. It also have RGB pixel control giving a much better resolution than the black and white display. It has resistive touch screen which can detect your finger pressed anywhere on the screen.

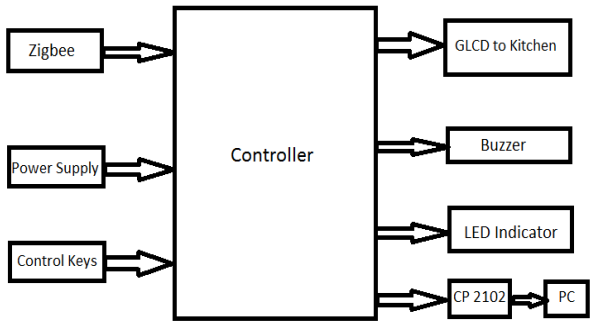

Fig 4. Receiver

D. .KEYPAD

A 4X4 Keypad will have eight terminals. In them four are rows of matrix and four are columns of matrix. These 8 pins are driven out from 16 buttons present in the module. Those 16 alphanumeric digits on the module surface are the 16 buttons arranged in matrix formation.The internal structure of 4X4 keypad module is shown below.

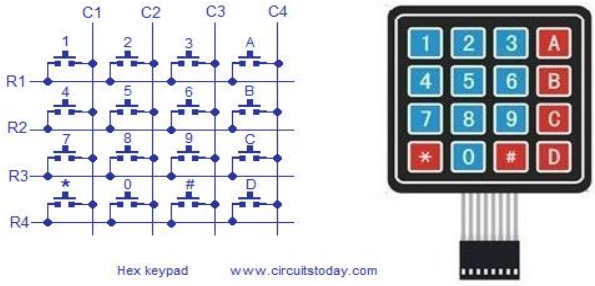

Fig 5. 4*4 Keypad

E. BUZZER

Fig 6. Piezo Buzzer

The piezo buzzer produces sound based on reverse of the piezoelectric effect. The generation of pressure variation or strain by the application of electric potential across a piezoelectric material is the underlying principle. These buzzers can be used alert a user of an event corresponding to a

switching action, counter signal or sensor input. They are also used in alarm circuits.

The buzzer produces a same noisy sound irrespective of the voltage variation applied to it. It consists of piezo crystals between two conductors. When a potential is applied across these crystals, they push on one conductor and pull on the other. This, push and pull action, results in a sound wave. Most buzzers produce sound in the range of 2 to 4 kHz.

F. WAITER VEHICLE

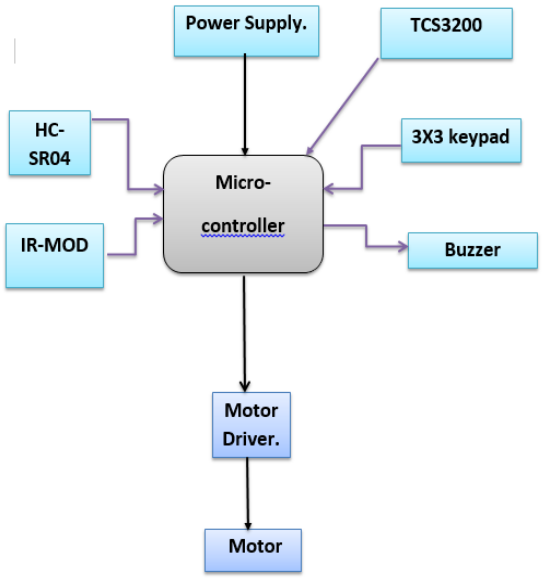

Fig 7. Vehicle Block Diagram

G. TCS3200 COLOR SENSOR

The TCS3200 color sensor – shown in the figure below – uses a TAOS TCS3200 RGB sensor chip to detect color. It also contains four white LEDs that light up the object in front of it.

Fig 8.Color sensor

H. IR SENSOR

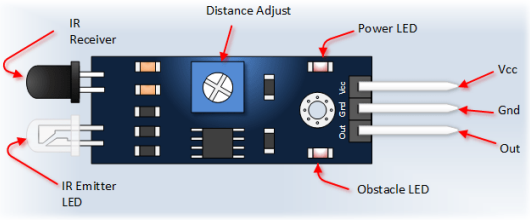

Fig 9. IR sensor

An IR sensor consists of an IR Receiver and an IR Emitter. IR emitter is an IR LED that continuously emits infrared radiations while power is supplied to it. IR receiver can be thought of as a transistor with its base current determined by the intensity of IR light received. Lower intensity of IR light causes higher resistance between collector-emitter terminals of transistors and limits current from collector to emitter. This change of resistance will further change the voltage at the output of voltage divider. In others words, the greater the intensity of IR light hitting IR receiver, the lower the resistance of IR receiver. Hence the output voltage of voltage divider will decrease

I. HC-SR04(ULTRASONIC SENSOR)

Fig 10. Ultrasonic Sensor

Ultrasonic sensors work by emitting sound waves at a frequency too high for humans to hear. They then wait for the sound to be reflected back, calculating distance based on the time required. This is similar to how radar measures the time it takes a radio wave to return after hitting an object.

If you need to measure the specific distance from your sensor, this can be calculated based on this formula:

$$\text{Distance} = \tfrac{1}{2} T \times C$$

(T = Time and C = the speed of sound)

At 20°C (68°F), the speed of sound is 343 meters/second (1125 feet/second), but this varies depending on temperature and humidity.

Specially adapted ultrasonic sensors can also be used underwater. The speed of sound, however, is 4.3 times as fast in water as in air, so this calculation must be adjusted significantly.

J. MOTOR

Fig 11. DC motor

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields.

Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current flow in part of the motor.

A DC motor's speed can be controlled over a wide range, using either a variable supply voltage or by changing the strength of current in its field winding.

Small DC motors are used in tools, toys, and appliances. The universal motor can operate on direct current but is a lightweight motor used for portable power tools and appliances.

Dual shaft DC motor with gear box which gives good torque and rpm at lower voltages. This motor can run at approximately 200rpm when driven by a dual Li-Ion cell battery at 6V and approximately at 300rpmwhen driven by 9V Li-Ion cell.

It is most suitable for light weight robot running on small voltage. Out of its two shafts one shaft can be connected to wheel, other can be connected to the position encoder.

K. MOTOR DRIVER

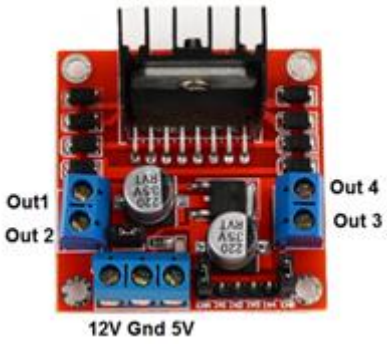

Fig 12.Motor Driver

The L298 is an integrated monolithic circuit in a 15-lead Multiwatt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. This module is based on the very popular L298 Dual H-Bridge Motor Driver Integrated Circuit. The circuit will allow you to easily and independently control two motors of up to 2A each in both direction and one stepper motor

It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor. It can also be interfaced with simple manual switches, TTL logic gates, relays, etc.

Two enable inputs are provided to enable or disable the device independently of the input signals.The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

IV. CONCLUSION

The waiter vehicle presented in this report is a part of restaurant automation system. The implemented system of restaurant menu ordering system and delivering order is modern and smart solution in any kind of restaurant. The system will reduce the manual efforts and will help to deliver order to the respective table and will also gives more accuracy in calculating the bill for each individual table and to extract details about tasks, orders on daily basis for managers or owners. It is also a low cost alternative to be used by middle and low level restaurants and the proposed system will help in reducing the number of staff used in the restaurant and also will help in considerably reducing cost and efficient service of restaurant management.

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