Review paper on - Design of Intelligent Restaurant with a Touch Screen Based Menu Ordering System.

Ashwini Bankar[1], Mamta Mahajan[2]

[1]*(Electronics, GHRIETW/ RTMNU, India)*
[2]*(Electronics, GHRIETW/ RTMNU, India)*

Abstract: *In today's restaurant Digital multi-touch menu cards and other forms of digital facility are replacing old fashioned services like- waiters can take order from customer and serve them. Intelligent Restaurant system delivering almost infinite flexibility in promoting meal and snack options. Intelligent Restaurant system uses technologies innovatively in a modern restaurant such as multi-touch LCD with Arduino mega, RF module, database & line following Robot to enhance quality of services and to enrich customers' dining experience. A line following robot is designed using sensor operated motors to keep track the line path predetermined for meal serving. PayPal is used for online payment.*
Keywords: *Line following robot, Multi-touchable module, RF module, PayPal, Database.*

I. Introduction

Restaurant is a place where people pay to sit and eat meals that are cooked and served on the premises. In traditional restaurant system orders are taken by a waiter and they bring the food when it is ready. After eating the food customers will pay the bill. This system relies on large numbers of manpower to handle customer reservation, inquiry about them, ordering food, placing order on table, reminding dishes of customer. Therefore, how to effectively improve the service quality for customers by using advanced technologies has received much attention in recent years. "Intelligent Restaurant"—it's all about getting all of your different touch-points working together—connected, sharing information, personalizing experiences and speeding processes. This paper replacing pen-paper which is used by waiter to take an order. In this Intelligent Restaurant a Graphical User Interface (GUI) programmed by embedded c is used as a food ordering system. It is requiring customer to order via touch screen device that placed on each table in the restaurant. Customers view the menu, price and make an order directly using this touch screen system. Then, their order will be sent to the database in cash counter computer and also viewed on the computer screen at the kitchen for food preparation. HTML used for the designing web pages of restaurant. A line follower robot follows a path that is predetermined in the restaurant.

II. Literature Survey

Intelligent Restaurant is designed to reduce the work load of waiter and to increase the efficiency. In the paper by Sakari Pieska, Juhana Jauhiainen, Markus Liuska, Antti Auno [1] has propose that the customer's application works on an Android tablet. This application is connected to the database and download real-time restaurant's menu. The customer can browse the menu and order it. Using the software, customer can call the waiter by pressing a button. The waiter comes to confirm the order and count the bill. This menu can be displayed in the kitchen's display. When this food items are ready then the kitchen staff can mark them as done. And this food items are visible in the cashier and also in waiter application so that they deliver them to customer.

Another paper by Tan-Hsu Tan, Ching-Su Chang, and Yung-Fu Chen [2] has proposed an intelligent e-restaurant for customer-centric service. This system provides an online menu ordering and reservation-making process, and also personal menu recommendation service. With the help of RFID-based membership cards, waiters can immediately identify customers according to their consumption records. The waiter uses a PDA to take orders from the customer and with the use of WLAN order is send to the kitchen. Then chefs prepare the menu and waiter can deliver it to customer. When the customer has finished the meal, the cashier uses RFID-based PDA to identify the membership ID to calculate the bill.

Another paper by Sun Guiling, SongQingqing [3] has proposed self-service ordering information system based on ZigBee wireless technology. This system uses FFD (Full Function Device) and RFD (Reduced Function Device). FFD is network coordinator that can communicate with other device; RFD is used in star topology network, which can communicate with the FFD.

III. Proposed Work

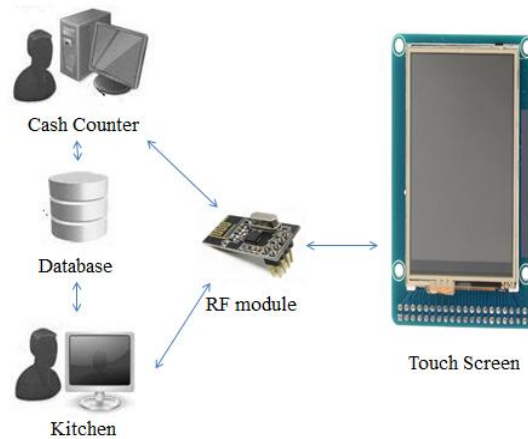## 1.1. The generalized block diagram of proposed work is given is fig1.

Fig 1: Restaurant functional correlation.

In Intelligent Restaurant system customer place order through touch screen module. On tapping on touchscreen, welcome screen will be appearing. After that menu page will appear. This page contains the information of the menu and price of it. Then, customers tap on the '+' or '_' sign for quantity of menu and then place an order. Customers can add and remove their menu and the total cost is automatically counted. The Restaurant functional correlation as shown in Fig 1. The communication between customers and server is through RF module for a better connection. This order can be viewed by cash counter database and kitchen database for the food preparation.

2.2 We have demonstrated service robot i.e. line following robot as part of an intelligent restaurant system. It is a line follower robot that is basically designed to follow a path that is predetermined by the Restaurant management.
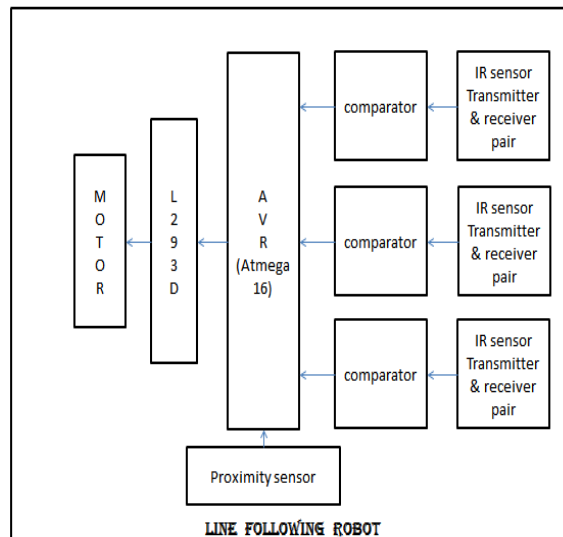

Fig 2: Line following robot

Fig.2. shows the block diagram of line following robot. The IR sensors are used to detect the black strip path on a white background surface. The IR sensor output is fed to the comparator. The IR sensor senses the light reflected from the surface and its output is given to the comparator. The comparator compares the analogue inputs from sensors with the fixed reference voltage. The reference voltage is adjusted by changing the value of the variable resistor. The output of comparator is fed to an AVR micro-controller, which takes the decision and gives appropriate command to motor driver IC L293D to move the motor accordingly. The AVR micro-controller is programmed to make the robot move backward, forward, right or left based on the input coming

from the comparator. The outputs of the micro-controller are given to the motor driver IC L293D. A proximity sensor is used to detect an obstacle.

IV. System Structure

4.1. Hardware subsystem

4.1.1 Arduino mega

The Arduino Mega is a microcontroller board based on the ATmega1280. It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs, a USB connection, a reset button, an ICSP header, a power jack and a 16 MHz crystal oscillator. It contains everything that is needed to support the microcontroller; simply connect it to a computer with the help of USB cable or power it with an AC-to-DC adapter or battery to get started.
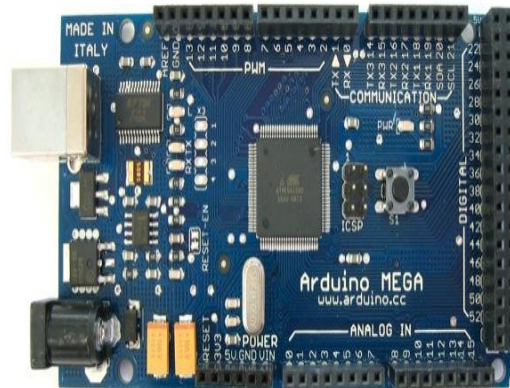

Fig 3. Arduino Mega kit

4.1.2 LCD -TFT 3.2 inch:

Fig 4. LCD -TFT 3.2 inch

TFT01_3.2WD is a TFT LCD Screen Module, 40 pins interface, also it include the Touch, SD card and Flash design.

Specification:
- Screen: 262K Colors
- Driver IC: HX8352, replace of ILI9327
- High Quality Complete LCD Touch screen Complete Module.
- LCD screen + Touch Screen, with LCD amp; Touch Screen Controller.
- 8051 / AVR / PIC low power controller can also drive this LCD easily.
- High portability! Increase development efficiency amp; lower development cost.7

4.1.3 Arduino TFT Shield (Driver board to drive LCD using Arduino Mega)
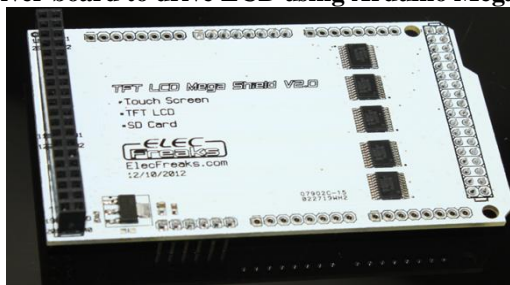

Fig 5. Arduino TFT Shield

This board has update to Rev2.0 and it is of a white color, it is more stable and the same use it. The TFT01 LCD module work in 3.3V volt and it's not compatible with Arduino MEGA pins, so we make a shield for an Arduino MEGA. Now user can directly plug the TFT01 LCD in the shield and stand on the Arduino MEGA board. The TFT01 MEGA shield V1.0 supports both the 16 bit mode. Because of Arduino Mega board have enough pins for using SD card and Touch function at the same time.

4.2   Software Subsystem:
3.2. HyperText Markup Language (HTML):
HTML is a standard markup language which is used to create web pages. It is written in form of HTML elements consisting of tags enclosed in angle brackets. For designing Restaurant home page this language is used.

4.2.2   Embedded c:
Embedded C is a set of language extensions for the C programming language. Because of High level languages i.e. C in the embedded systems, various kinds of support tools like compilers & cross-compilers, ICE, etc. came up and all this facilitated development of embedded systems using C. Embedded c is used to programme Arduino mega.

4.2.3   PayPal:
PayPal is the world's largest online payment network. PayPal is the preferred method of online payment for auction sites such as eBay. PayPal allows guaranteed secure payment over the Internet with your credit card or bank account by taking your information ones and then using this information to make payment to other parties. Following steps a given to use PayPal:
- Sign up for an account. Choose from three PayPal account types—Personal, Premier, and Business—and enter an email address, password, and a few more details.
- Click the Send Money tab
- Enter an amount and recipient's email

V.   Conclusions

5.1 This project integrated HTML for restaurant menu page designing, embedded C for code of touch screen module, PayPal for online payment and a robot is implemented in intelligent restaurant to fulfill the requirement of customer. This system allows customers to order food by LCD module surface which is programmed by embedded c, which is wirelessly connected to the kitchen and the cash counter via RF module. A line following robot is used to carry meal from kitchen to customer. An android mobile is used in which PayPal is integrated for online payment.

5.2 Advantages:
1. Faster service
2. No more waiting to catch the waiter's eye.
3. As customers place their own orders, waiter's staff numbers can be reduced.
4. Create and modify food and drink menus.

References

[1]. Sakari Pieska, Markus Liuska, Juhana Jauhiainen, Antti Auno "Intelligent Restaurant System Smart- menu "4th IEEE International Conference on Cognitive Infocommunications . December 2–5, 2013 , Budapest, Hungary

[2]. Tan-Hsu Tan, Ching-Su Chang, and Yung-Fu Chen "Developing an Intelligent e-Restaurant With a Menu Recommender for Customer-Centric Service" IEEE Transactions on systems, man, and cybernetics-part c: Applications and   reviews, vol.42,no-5, September 2012.

[3]. Sun Guiling, SongQingqing "Design of the Restaurant Self-service Ordering System Based on ZigBee Technology" Communications and embedded system lab College of Information Technology and Science, Nankai University Tianjin, China.

[4]. M. Z. H. Noor, A. A. A. Rahman, M. F. Saaid, M. S. A. M. Ali, M. Zolkapli "The Development of Self-service Restaurant Ordering System (SROS)" 2012 IEEE Control and System Graduate Research Colloquium (ICSGRC 2012)

[5]. [5]Soon Nyean Cheong, May Hui Tze Yeong, Jia Jia Neoh, Chun Yee The, Wen Jiun Yap "Enriching Dining Experience with the Multi-Touchable Entertainment Applications" 2010 International Conference on Science and Social Research (CSSR 2010), December 5 - 7, 2010, Kuala Lumpur, Malaysia

[6]. YongChai Tan, BentFei Lew, KhimLeng Tan, KaeVin Goh, KienLoong Lee, ZhiChao KhoT "A New Automated Food Delivery System Using Autonomous Track" Proceedings of the 2010 IEEE Conference on Sustainable Utilization and Development in Engineering and Technology Universiti Tunku Abdul Rahman 20 & 21 November 2010, Faculty of Engineering, Kuala Lumpur, Malaysia

[7]. Ching-su Chang, Che-Chen Kung, Tan-Hsu Tan " Development and Implementation of an E-Restaurant Customer-Centric Service Using WLAN &RFID Technologies" Proceedings of the Seventh International Conference on Machine Learning and Cybernetics, Kunming, 12-15 July 2008

[8]. S. N. Cheong, et al., "Design and Development of Multi-Touchable E-Restaurant Management System" Faculty of Engineering Multimedia University, Malaysia, 2010.

[9]. M. H. A. Wahab, et al., "Implementation of Network-based Smart Order System" Faculty of Electrical and Electronic Engineering, Universiti Tun Hussein Onn, Malaysia, 2008.

[10]. XU Hongzhen, et al., "Wireless Food Ordering System Based on Web Services" Department of Computer Science and Technology, East China Institute of Technology Fuzhou, China, 2009.