WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A Research Paper on Smart Menu Ordering System

Aditya Chikhale[1], Shriti Dari[2], Gaurav Deora[3], Kaustubh Mali [4], Asst. Prof. Ruchi Chauhan[5]

[1,2,3,4] B.E Student, Department of Electronics and Telecommunication, Atharva College Of Engineering, Mumbai, India

[5]Assistant Professor, Department of Electronics and Telecommunication, Atharva College Of Engineering, Mumbai, India

ABSTRACT

The Smart Restaurant Menu Ordering System is a cutting-edge solution designed to enhance the guest experience and streamline food ordering processes within hotels. Leveraging TFT LCD technology and ESP32 microcontrollers, this system allows guests to place food orders conveniently through an interactive touch screen interface. Meanwhile, a dedicated web application is exclusively accessible to hotel staff for order management and coordination. The core innovation lies in the incorporation of machine learning algorithms to predict and display estimated waiting times on the TFT LCD screen. This predictive capability is based on various factors, including kitchen workload, current order queue, and historical data. It ensures that guests are informed about the expected time it will take for their orders to be ready, optimizing their experience and minimizing wait times. Overall, the Smart Restaurant Menu Ordering System not only simplifies the ordering process but also enhances the overall efficiency of food service within the hotel, resulting in improved customer satisfaction and operational excellence. This innovative integration of hardware, software, and machine learning technology represents a significant step forward in the hospitality industry.

Keywords: Smart Ordering, TFT LCD technology, ESP32, hospitality industry.

INTRODUCTION

In the ever-evolving landscape of the hospitality industry, technology has become a pivotal tool in enhancing guest experiences and streamlining operational efficiency. One remarkable innovation that has been transforming the way hotels cater to their guests is the Smart Hotel Ordering System. This sophisticated system combines the power of TFT LCD displays, ESP32 microcontrollers, and cutting-edge machine learning algorithms to revolutionize food ordering and service within hotels.

Picture this scenario: you're a guest at a luxury hotel, and you're craving a delectable meal from the hotel's restaurant. Instead of having to pick up the phone or go to a crowded dining area, you can now conveniently place your order via a sleek TFT LCD touchscreen interface. This intuitive and interactive system provides guests with an easy and seamless way to select their desired items, customize their orders, and even specify delivery preferences.

It not only simplifies the ordering process but also empowers guests to make informed choices with visual menus and detailed descriptions. Behind the scenes, a dedicated web application is exclusively accessible to hotel staff, such as chefs, kitchen staff, and waitstaff. This webapp serves as the central hub for order management, ensuring that orders are transmitted efficiently to the appropriate departments for preparation and delivery.

The system optimizes the entire food service process, minimizing errors and delays. One of the most groundbreaking aspects of the Smart Hotel Ordering System is its use of machine learning. The TFT LCD display, prominently placed for guests to view, incorporates predictive algorithms that leverage real-time data, historical order information, and the current workload in the kitchen. This intelligent system calculates and displays estimated waiting times for each order.

This means that guests can not only place their orders with ease but can also stay informed about how long it will take for their meal to be ready, thus reducing uncertainty and minimizing wait times. In this introduction to the Smart Hotel Ordering System, we embark on a journey that represents the intersection of hospitality and technology, promising an enhanced, efficient, and satisfying guest experience.

The integration of TFT LCD displays, ESP32 microcontrollers, and machine learning is a testament to the hotel industry's commitment to innovation, making dining at your favorite hotel an experience that is not only delicious but also delightfully convenient.

LITERATURE REVIEW

[1]` In most of the eatery dinner inquiring is depending on the interaction with servers to put coordinate into the kitchen. In energetic hours of coffee shop this coordination is a challenge result in un-satisfaction to the client. To realize this, Cleverly Burger joint is organized. This Burger joint employments cutting edge advancement such as multi-touch module, RF module, Supper Serving Robot and database to make strides quality of

Organizations of Coffee shop and to overhaul customers' eating encounter. A dinner serving robot is a line taking after robot which is organized utilizing sensor to track the dim line way foreordained for serving. Android Application - PayPal is utilized for online payment.

[2]` The space of progression is gathered to be the time of these days. As a way to move forward the eating up encounter, coffee shop proprietors have made critical meanders in data and communication advancements such as PDAs, more distant LANs, and high-end multi-touch screens. In this article, a hologram-based menu card is proposed as a way to change the patron's encounter. This structure passes on a menu card indigital shape that will propose nourishments. Table-side contraptions show up the menu, which is accessible to all clients. The kitchen will be taught after the clients have chosen their favored supper. The contraption will be displayed in the client amplify, same as it is in the kitchen. The dishes are at that point spared in a cloud capacity framework for future reference. Since it as it were requires the buy of a single contraption, this advancement is less extraordinary than prior robotized dinner inquiring systems.

[3]` The parcel of eateries, canteens, other shapes of coffee shop and nourishment advantage outlets are getting to be particularly immense allocate of most economies at unmistakable levels. Be that as it may progress in client affiliation in spite of the fact that making orders plays a particularly fundamental parcel in having a smooth and productive menu inquiring arrange. This article presents a novel cross breed approach that handles the challenges related with menu inquiring particularly in the post-covid time; both from program and equip centers of see. To begin with, a web-application - fueled by ReactJS and GraphQL, which locks in coordinate ask wherever at any time was made. In expansion, is the utilization of equipment with compactness highlight on trips to the eatery utilizing two Arduino microcontrollers (transmitter and recipient). The result licenses the client to browse through a catalogue, check-in and out on a Thin-Film-Transistor (TFT) liquid-crystal show up (LCD) and deliver a dependable encounter to the customer.

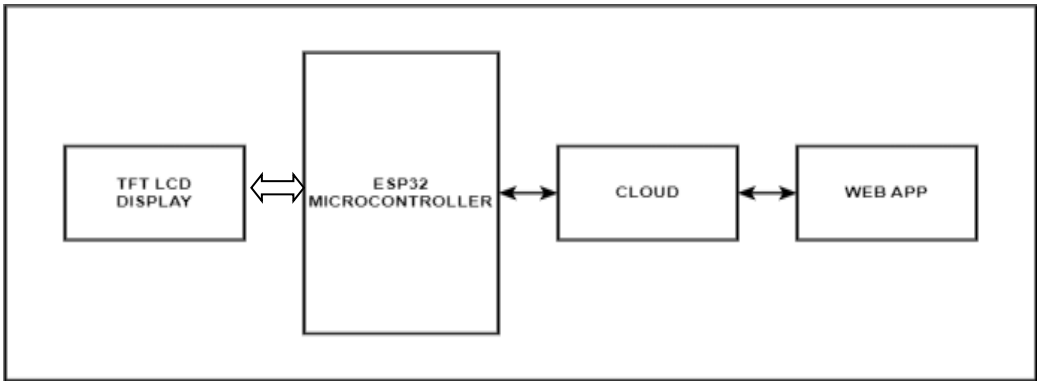
[4] When clients enter the eatery, clients frequently must hold up for the server when it comes to requesting nourishment. In the routine strategy, if the eatery is as well swarmed, they will be depleted, on edge almost the benefit. This framework idealizes the arrangement, "An Effective Advanced Requesting Framework for Restaurant" gives fetched & time proficiency benefits simple for administration and the client. Each table contains the QR Code stand where client needs to check the QR Code utilizing their portable phones and they can see the menu. In trough side we have made web application which is associated to the switch to oversee entirety functionalities of the eatery. The framework works on an intranet environment which gives extra security. With our eatery requesting framework, it makes a difference us adjust the computerized period and eatery exercises more viably and efficiently.

[5]` Signature verification is the most rudimentary method for identity validation. Signatures can be verified in many ways however the Machine Learning algorithms provide the best method for verifying a signature whilst comparing it to the original signature of the person in question. Criminal acts of forging a signature on financial documents, checks, exam papers, consent forms, etc., are not uncommon and are a detriment to an organization. Signatures carry many traits and quirks unique to the individual creator. Character/alphabet spacing, dots, curves, and many other such parameters can be determined with Neutral networks, allowing for a threshold to be created for comparison of original signatures to the ones in objection. The proposed work is a Signature Verification algorithm hosted as a web application that uses Convolution Neural network and Siamese Neural Networks in conjunction. Our objective is to produce a system with high accuracy and for user convenience make the UI with the best possible

[6]` Smart homes are homes with technologically advanced systems to enable domestic task automation, easier communication, and higher security. As an enabler of health and well-being enhancement, smart homes have been geared to accommodate people with special needs, especially elder people. This paper examines the concept of "smart home" in a technologically driven society and its multi-functional contribution to the enhancement of elder people's lives. Elderly, handicapped patients, and people with disabilities who have problems with locomotion difficulty can benefit from proposed smart home to totally operate, with high performance, all appliances and devices from anywhere in the house. The smart home will be necessary in modern era. Smart home is the digital connectivity among different appliances. Here we show the potential of ZigBee through the design and implementation of smart home system. It provides remote access to the user for the monitoring and controlling purpose. With remote access we provide gesture based control for home appliances.

[7]` IoT is a new technology which is finding its presence in many domains which includes industry, home appliances, and automobile sector etc. One of the foremost aims of IoT devices is to capture data and exchange the same seamlessly into information network. Vulnerability of IoT network to many attacks leads to major concern of security in IoT devices. One such attack is Denial of service attack which blocks the authentic user from accessing network and makes network resources unavailable for an uncertain period of time. To extenuate Dos, attack some technique is required which can sense the attack and prevent it from damaging the network. This paper aims to review different methods and techniques and suggest the use of AI, ML and trust- based mechanism to attenuate DoS attack on IoT.

BLOCK DIAGRAM



Circuit Components:

1. ESP32 Module: You'll need an ESP32 development board.

2. 3.5" TFT LCD Display: Ensure its compatible with the ESP32 and provides a touch screen interface.

3. Connection Wires: Jumper wires to connect the components.

Circuit Connections:

1. Power Supply:

   - Connect the 3.3V output from the ESP32 to the display's 3.3V pin.

   - Connect the ESP32's GND to the display's GND pin.

2. SPI Communication:

   - Connect the ESP32's SPI pins (SCK, MOSI, MISO) to the corresponding pins on the TFT display.

   - Some TFT displays might also have a Data/Command (D/C) pin, which should be connected to a GPIO pin on the ESP32.

3. Touch screen:

   - If your display has a touch screen, it may use additional pins for touch input. Connect these pins to the ESP32's GPIO pins.

4. Backlight:

   - If the display has an LED backlight, connect it to a GPIO pin on the ESP32 to control backlight brightness.

OBJECTIVES

The objectives of the Smart Restaurant Menu Ordering System are as follows:

1. Streamline Ordering Process: To simplify and expedite the food ordering process for hotel guests through the utilization of TFT LCD touch screens and ESP32 microcontrollers.
2. Improve User Experience: Enhance the guest experience by providing an intuitive and interactive interface for order placement, enabling them to make choices conveniently and efficiently.
3. Optimize Order Management: Develop a web application exclusively for hotel staff to efficiently manage orders, reducing errors and improving order coordination.
4. Real-time Order Updates: Implement machine learning algorithms to provide accurate and real-time estimations of waiting times on the TFT display, ensuring guests are informed about when their food will be ready.
5. Minimize Wait Times: Decrease the uncertainty associated with wait times by utilizing predictive algorithms based on kitchen workload and historical data.
6. Enhance Operational Efficiency: Improve the efficiency of kitchen operations by optimizing staff allocation based on real-time order data.
7. Reduce Errors: Minimize errors in order communication by establishing a centralized system for order management and preparation.

8. Data-driven Decision Making: Utilize data collected through the system for informed decision-making, menu adjustments, and resource allocation.
9. Customer Satisfaction: Enhance overall guest satisfaction by providing a smoother and more transparent food ordering experience, resulting in positive reviews and repeat business.
10. Cost Efficiency: Optimize resource utilization in the kitchen, reducing food wastage and operational costs while increasing revenue through improved customer satisfaction.

COMPONENTS USED

1. 3.5 INCH TFT LCD DISPLAY:

This TFT display is big bright and colorful! 480×320 pixels with individual RGB pixel control, this has way more resolution than a black and white 128×64 display. As a bonus, this display has a resistive touch screen attached to it already, so you can detect finger presses anywhere on the screen. This display has a controller built into it with RAM buffering so that almost no work is done by the microcontroller. This 3.5-inch SPI Touch Screen Module is wrapped up into an easy-to-use breakout board, with SPI connections on one end. If you're going with SPI mode, you can also take advantage of the onboard MicroSD card socket to display images.

SPECIFICATIONS

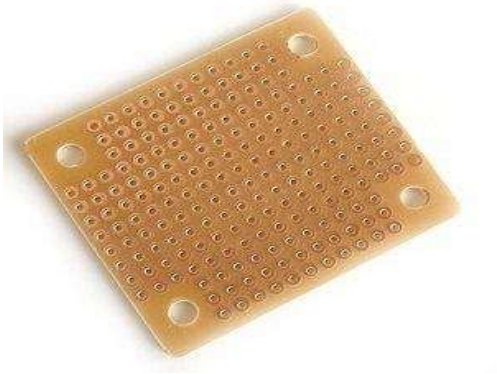
Display Color	:	RGB 65K color
Screen Size	:	3.5(inch)
Driver IC	:	ILI9488
Resolution	:	480*320 (Pixel)
Module Interface	:	4-wire SPI interface
VCC power voltage	:	3.3V~5V
Logic IO port voltage	:	3.3V (TTL)
Power Consumption	:	TBD

2. ESP32 MICROCONTROLLER Board:

ESP32 is a series of low-cost, low-power system on a chip microcontroller with integrated Wi-Fi and dual-mode Bluetooth.ESP32 is created and developed by Espressif Systems, a Shanghai-based Chinese company, and is manufactured by TSMC.ESP32 can perform as a complete standalone system

or as a slave device to a host MCU, reducing communication stack overhead on the main application processor. ESP32 can interface with other systems to provide Wi-Fi and Bluetooth functionality through its SPI / SDIO or I2C / UART interfaces.

3. Zero PCB

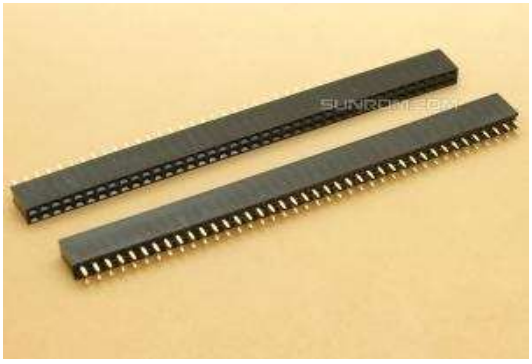


Perfboard is a material for prototyping electronic circuits (also called DOT PCB). It is a thin, rigid sheet with holes pre-drilled at standard intervals across a grid, usually a square grid of 0.1 inches (2.54 mm) spacing. These holes are ringed by round or square copper pads, though bare boards are also available. Inexpensive perfboard may have pads on only one side of the board, while better quality perfboard can have pads on both sides (plate-through holes). Since each pad is electrically isolated, the builder makes all connections with either wire wrap or miniature point to point wiring techniques. Discrete components are soldered to the prototype board such as resistors, capacitors, and integrated circuits. The substrate is typically made of paper laminated with phenolic resin (such as FR-2) or a fiberglass-reinforced epoxy laminate (FR-4).

4. Jumper Wires

Jumper wires allow an electrical current to travel from one point on a circuit to another because electricity needs a medium through which it can move. Most of the jumper wires are made up of copper or aluminum. Copper is cheap and good conductivity. Instead of the copper, we can also use silver which has high conductivity but it is too costly to use.

5. Headers



A pin header (often abbreviated as PH, or simply header) is a form of electrical connector. It consists of one or more rows of male pins typically spaced 2.54 millimeters (0.1 in) apart, but common sizes also include 5.08 millimeters (0.2 in), 5.00 millimeters (0.197 in), 3.96 millimeters (0.156 in), 2.00 millimeters (0.079 in), 1.27 millimeters (0.05 in) and 1.00 millimeter (0.04 in). The distance between pins is commonly referred as pitch in the electronic community.

6. USB

USB stands for Universal Serial Bus. It is used as a data cable for programming as well as for supplying power.

METHODOLOGY

The proposed methodology for implementing the Smart Hotel Ordering System with TFT LCD, ESP32, and machine learning-based waiting time predictions consists of several key steps:

- Requirement Analysis: Identify the specific requirements of the hotel, including menu items, guest interfaces, kitchen resources, and staff roles.
- Hardware Setup: Procure and set up TFT LCD displays in guest areas and ESP32 microcontrollers for order processing and communication.
- Web Application Development: Develop a dedicated web application for hotel staff to manage orders, integrating with the ESP32 devices for real-time order updates.
- Machine Learning Model Development: Develop machine learning models to predict waiting times based on variables like order complexity, kitchen load, and historical data.
- Data Collection: Collect historical data on order processing times, menu popularity, and kitchen workloads.
- Training and Validation: Train and validate the machine learning models using the collected data to ensure accurate waiting time predictions.
- Integration: Integrate the machine learning models with the ESP32 devices and TFT displays to show real-time waiting time estimates.
- User Interface Design: Design an intuitive and user-friendly interface on the TFT displays for guest order placement, customization, and order tracking.
- Testing and Quality Assurance: Conduct extensive testing to ensure the system's functionality, usability, and reliability.
- Deployment: Deploy the system in the hotel's dining areas and train staff on using the web application for order management.
- Data Monitoring and Refinement: Continuously monitor system performance, gather feedback, and refine the machine learning models to improve accuracy.
- Scaling and Expansion: Consider opportunities for scaling the system to other areas within the hotel or expanding its use to other hospitality settings.
- Maintenance and Support: Provide ongoing maintenance and support to ensure system reliability and address any issues that may arise.

FUTURE SCOPE

- Voice and Gesture Recognition: Future systems may incorporate voice and gesture recognition for hands-free menu navigation and ordering, making the dining experience more convenient.
- Multi-Language Support: Expanding the system to support multiple languages to cater to a diverse customer base, including tourists and non-native speakers.
- Health and Nutrition Information: Providing detailed nutritional information and dietary recommendations for menu items, catering to health-conscious customers.
- Data Analytics and Insights: Leveraging data collected from customer interactions to gain insights into preferences, peak dining times, and seasonal trends, helping restaurants optimize their menus and operations.

- Menu Gamification: Introducing gamification elements into the menu, where customers can earn rewards, discounts, or special dishes by achieving certain goals or challenges.

INITIAL RESULT

CONCLUSION

- The Smart Restaurant Menu Ordering System represents a significant leap forward in the hospitality industry, offering a seamless and efficient dining experience for hotel guests.
- By integrating TFT LCD displays, ESP32 microcontrollers, and machine learning, it addresses key challenges faced by both guests and hotel staff.
- For guests, the system simplifies the ordering process, making it more intuitive and convenient. The interactive touchscreen interface allows for customization and order placement, while real-time updates on order status and waiting times reduce uncertainty and enhance the overall dining experience.
- On the staff side, the dedicated web application streamlines order management and kitchen operations, minimizing errors and optimizing resource allocation. The machine learning-driven waiting time predictions ensure timely and efficient service.
- In conclusion, the Smart Restaurant Menu Ordering System not only elevates guest satisfaction but also enhances operational efficiency, leading to reduced costs and increased revenue. By embracing technology and data-driven decision-making, this system sets a new standard for the modern hotel dining experience.

RFERENCES

1. Ashwini Bankar, Sheeja S. Suresh, “Intelligent Restaurant - Menu Ordering System” IOSR Journal of VLSI and Signal Processing (IOSR-JVSP) Volume 5, Issue 5, Ver. I (Sep - Oct. 2015).
2. V. Liyanage, A. Ekanayake, H. Premasiri, P. Munasinghe and S. Thelijjagoda, "Foody - Smart Restaurant Management and Ordering System," 2018 IEEE Region 10 Humanitarian Technology Conference (R10-HTC), Malambe, Sri Lanka, 2018, pp. 1-6, doi: 10.1109/R10-HTC.2018.8629835.
3. M. Kavitha, J. Venkatesh, S. K. Salma and S. R. Moosa, "Virtual Reality (Hologram) based Food Supply System in Smart Restaurant based Menu Ordering System," 2022 7th International Conference on Communication and Electronics Systems (ICCES), Coimbatore, India, 2022, pp. 449-454, doi: 10.1109/ICCES54183.2022.9835976.
4. Khadeejah ABDULSALAM A, John ADEBISI, Michael EMEZEIRINWUNE, Semilore Idowu TOFUNMI, “ARDUINO BASED RESTAURANT MENU ORDERING SYSTEM” Acta Marisiensis. SeriaTechnologica Vol. 20 (XXXVII) no. 1, 2023.
5. Ashwinikumar Sunil Jaiswal, Chinmay R. Kulkarni, Yashaswi Patil, Shrihari Ponde, Renuka Bhokarkar Vaidya, “Smart Food Ordering System For Restaurants” International Journal of Innovative Science and Research Technology Volume 8, Issue 2, February – 2023.
6. Ankit Prasad, Anuja Amrutkar, Tushar Gaikwad, Kalpesh Wani, “RESTO FOOD ORDERING SYSTEM” International Research Journal of Modernization in Engineering Technology and Science Volume:05/Issue:04/April-2023.
7. Anant Gupta, Amrita Singh, Dr. Ashish Baiswar, “ENHANCING EFFICIENCY AND REDUCING LABOR COSTS: A STUDY OF NO-STAFF INVOLVED ORDERING SYSTEMS IN RESTAURANTS” International Research Journal of Modernization in Engineering Technology and Science Volume:05/Issue:04/April-2023.

8. Shubham Desai, Ganesh Potdar, Shubham Jangle, Prof. V. J. Desai, "Smart Restaurant Menu Ordering System Using Arduino Uno" International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) Volume 6, Issue 1, June 2021.

9. Pragati Singh, Nimesh Tembhekar, Kunjal Gurve, Prof. Mrunmayee Rahate, "SMART FOOD ORDERING SYSTEM FOR RESTAURANT" INTERNATIONAL RESEARCH JOURNAL OF ENGINEERING AND TECHNOLOGY (IRJET) VOLUME: 07 ISSUE: 02 | FEB 2020.

10. M. Kousalya, E. Lakshi, R.K. Mukesh Kanna, G. Pravin, T. Prabhu, "Automatic Restaurant Food Ordering Menu Card" International research journal on advance science hub RSP science hub Volume 03 Issue 03S March 2021.

11. Rajdip Paul, Rohan R. Bhandopia, Deeksha R. Patil, Jishita D. Raut, Akhil D. Gotmare, "An Efficient Digital Ordering System for Restaurant In"ternational Journal of Research in Engineering, Science and Management Volume-3, Issue-3, March-2020.