

# Data Centric Smart Restaurant Management System

Utkarsh Ravekar<sup>1</sup>, Shashank Singh<sup>2</sup>

<sup>1,2</sup>Student, Department of Computer Science & Engineering, G.H. Raisoni Academy of Engineering & Technology, Nagpur, India

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**Abstract** - Bringing the power of data analysis and digitization to the restaurant business will not only empower the business owners to better serve their customers but also allow them to be able to provide a streamlined and personalized service to each customer. The primary objective of this project is to create a system that will enable any restaurant to serve as a data-centric service provider for its customers and also automate the process of ordering the food items. Every customer who enters the restaurant needs to have the restaurant's app installed on their phone which can be downloaded by scanning a QR code in the restaurant. The user needs to sign up or sign in to the app and connect to the restaurant Wi-Fi. The entire menu will be available on the app of the user from which the users can select the dishes they'd like to order. The ordered food items will be displayed to the kitchen staff over on a kitchen screen which can also serve as the local server (host). The food ordered by each customer can be tracked through live status along with a live video feed of the kitchen so that the users can get real-time updates about their orders. Also, each order will be recorded per customer which will help the restaurant owner to directly predict the kind of food each user might order and also provide similar recommendations to the customers based on their tastes and choices. On average there, our target restaurant gets anywhere between 1500 to 2200 customers per month and this number increases to around 3000 during festive seasons. Thus, being able to predict the customer's orders beforehand and providing a recommendation to them so as to help them decide on their orders sooner will not only save time but also help the restaurant serve more customers in less time.

**Key Words:** Restaurant automation, Recommender System, Predictor System, Food ordering app.

## 1. INTRODUCTION

With the rise in the number of people who opt to eat out regularly, the restaurant business is on the rise. Though it's a good thing for both the business owners and the customers, the restaurant owners find themselves in a situation where they need to serve all their customers as fast as possible while ensuring that the quality of the food and service remains of top quality. But this requires more human labor to accomplish which in turn requires more capital. Thus there is a need for a system that can help fulfill these requirements while keeping the cost low. Our proposed system tries to reduce part of this burden by digitizing some common aspects of every restaurant business.

The main objective of our project is to automate the task of selecting and ordering food thus eliminating the need of any waiter to take the orders. Once customers enter the restaurant, they can log in to their app or download and sign up into the app if it's their first time. The app will display an interactive menu from which the users can select/deselect their desired item and place the order. Customers can also write special instructions with their orders for the chef to follow such as using special oil or using less spice, etc.

Once the order is placed, the order will be immediately displayed on a screen inside the kitchen. The kitchen staff who decides to attend to this order will select the order under his/her name. Upon the assignment of the order to particular staff, the customer will get a confirmation update about the chef's name and order status along with the option to view their order getting prepared through the kitchen cameras.

Once the order has been prepared, based on the restaurant's policy, the customers can either have it picked up from the serving window (if it's a self-service restaurant) or a waiter can serve it to the customers.

Another interesting feature of our system is that based on all the data from the past, it can learn to recommend food items to the customers based on their previous orders or based on their calories counts to provide a balanced and nutritious diet. The customers can also enter their budget to ensure that the recommendations do not cross their budget. The aim of providing recommendations to the customers is that it will encourage the customers to try new dishes while also helping them make their decisions faster. The recommendations can be classified into deserts, main course, starters, etc.

Along with the recommendations, the system will also try to predict the immediate future orders of the customers so that the kitchen staff can be prepared for the upcoming orders. After finishing their meals, e-bill will be displayed on the app. The customers will have the option to pay it at the counter or through mobile payments.

## 2. LITERATURE SURVEY

Khairunnisa K. [1] proposed the application of wireless food ordering system. This work presented in-depth on the technical operation of PDA based Wireless Ordering System (WOS) including systems architecture, function, limitations, and recommendations.

N. M. Z. Hashim [2] presented an approach to develop a system by introducing the integration of Bluetooth technology as the communication medium and Peripheral Interface Controller (PIC) as the hardware which implemented faster ordering system.

K. A. Wadile [4] developed a control system for autonomous mobile robots used in Hotel management. Mobile robot having minimal centralized control was developed. The work focused on the development of two basic motion control algorithms, namely a GOTO algorithm and a FOLLOW algorithm, for use in a master-slave system. These robot motion control algorithms would have wide applicability in hotel operations.

The system proposed in paper [5] was a basic dynamic database utility system, which fetches all information from a centralized database. The tablet at the customer table contains the android application with all the restaurant and menu details.

Kiran Kumar Reddy, B. Naresh [8] employed a combination of Bluetooth technology along with the android phone. An android application was designed containing food item details in a restaurant. The input device was a Smartphone or tablet and output section was PC. Cloud-based server for storing the database was used which made it inexpensive & secure.

Asan, N. Badariah in the research paper [9] introduced Smart Ordering System, which was also a fast way to order food at a restaurant. The system used a small keypad to place orders and the order made by inserting the code on the keypad menu. These codes came along with the menu. The signal would be delivered to the order by the Zigbee technology, and it would automatically be displayed on the screen in the kitchen.

### 3. METHODOLOGY

Below shows the diagram for thread layout in multi-threaded local server:

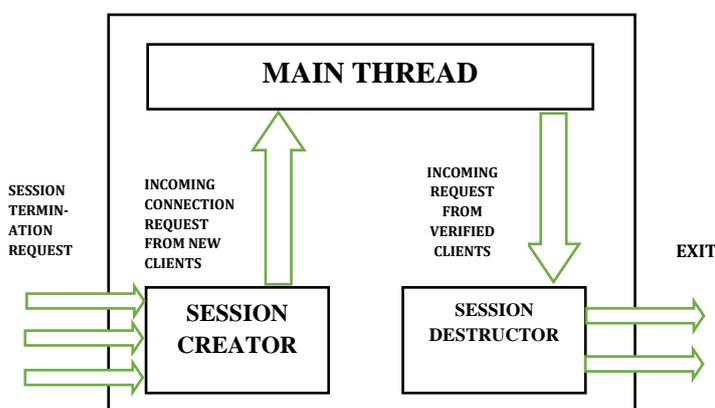


FIG:1 THREAD LAYOUT IN MULTI THREADED LOCAL SERVER

The restaurant holds a local server which contains the menu and other mechanisms to collect orders from the customers and display it to the kitchen staff. As soon as a customer connects to the restaurant Wi-Fi and clicks on login, the user app, client, sends a connection request to the local server. The local server looks for the entry in its database. If a match is found, it allocates a session to the client. Once the connection has been established, the main thread scans through the database of the previous orders of the customer and tries to predict the customer's future orders as well as recommended them new items to order.

A second thread constantly looks for new connection requests from a new client and if a connection request is found, the connection is established while the main thread keeps handling the already verified clients.

A third thread keeps track of user orders and at the end of the meal, it generates the bill for the users. And if the user wants to pay the bill online, this thread opens a payment gateway for the same.

The client-server architecture is as follows:

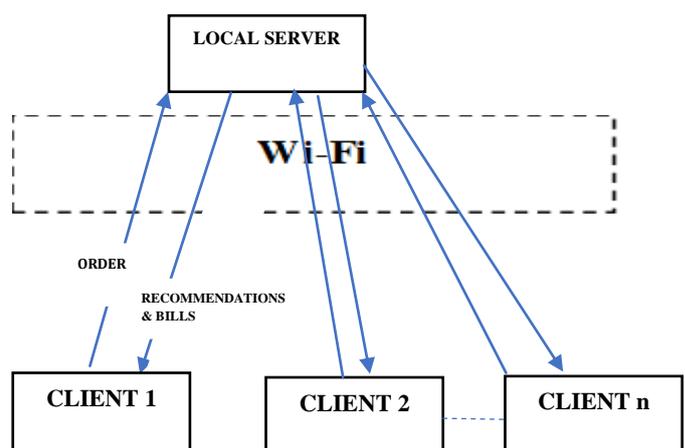


FIG:2 CLIENT-SERVER ARCHITECTURE

The working of the system includes steps as follows:

- 1] Enable the Wi-Fi on Smartphone/tablet on which the customer wishes to place the order and connect to the restaurant Wi-Fi network.
- 2] Login using the customer's account.
- 3] Browse through the menu and select the food items to order or reorder previous choices.
- 4] Collect the user orders and display it on the screen for the kitchen staff. And when **EXIT** elects to attend the order, send the relevant information back to the user.
- 5] If the user selects to view the live video feed, get video footage from the camera assigned to the staff who is attending the user order.

6] Keep predicting the user's next order and also provide recommendations to the users to help them place their orders quickly.

7] Once the meal has been completed, generate the bill and wait for the customer to select if the payment will be made online or offline. If online is selected, open the payment gateway else save the bill in the client's phone and also send a copy of it to the counter.

8] Terminate the connection once the user is beyond the Wi-Fi range or if the user has logged off.

#### 4. RESULT AND DISCUSSION

This system provides an efficient way of handling and managing a restaurant and its customers by providing

customized services to the users. Right from ordering the food to helping the customers decide what to order and from collecting the orders of each customer to predicting the upcoming orders, it aims to fulfill one primary goal of providing fast yet good service to its customers while reducing the cost of the restaurants. This system has the following features:

1) App-based service: Users log in to their apps and connect to the restaurant Wi-Fi for placing orders and getting other related information eliminates the need for waiters.

2) Live streaming: Live status updates and video stream from the kitchen allows users to get real-time updates about their orders and also check the hygiene and means of preparation.

3) Maintains a record of each visit of each user: Helps the restaurant in better understanding the individual need of its customers and also mine relevant information such as the average time spent on each customer, popular food items from the men, etc., about its customers and service.

4) Recommendation and Prediction System: Personalized food recommendations are provided to each customer and predicting each customer's next order for the kitchen staff.

#### 5. FUTURE SCOPE

Currently, this system is designed for individual restaurants only. In short, it won't be able to collectively serve the purpose of a chain of restaurants. Thus we intend to make it ready to be able to treat a group of hotels as a single entity if required.

Secondly, we intend it to be able to provide live seating status and reserving table capabilities for its users from home so that the users can plan their dinner/lunch easily and without any hassle of waiting for a table to get vacant.

The future of this system is to better analyze the needs of the customers, understand their requirements and provide more accurate predictions and recommendations about their likes.

#### 6. CONCLUSIONS

Our proposed framework thus aims to increase the efficiency of a restaurant by reducing the manual labor needed in taking the orders and at the same time providing personalized services to each customer.

Being able to provide real-time status updates about their orders to the customers ensures that they can check upon the quality and service of the restaurant at all times. Also recommending new food to the users based on their previous choices not only helps them try something new but also helps them decide quickly on what to order.

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