

Digital Dining System using Android

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Abstract— Technology's influence on the restaurant industry over the years has caused traditional dining experience to steadily evolve. In existing systems, patrons can only order food online. Through this research work, we aim to design and implement an Android application in which customer can place order and book tables in advance by selecting desired table from a canvas. Additionally, diet-conscious customers can customize their menu and play games in order to win exciting prizes and offers. We have created a website for restaurant managers. Android platform being one of the most widely used operating systems has been chosen to build this application.

Keywords— Technological revolution; mobile technology; digital dining; Android application; canvas; digitized menu; table booking; gaming.

INTRODUCTION

Technological revolution in the late nineteenth century has caused a prodigious shift in human consumption and the restaurant industry. The food and restaurant industry is one of the most important industries in the world today [1]. Everyone needs food for survival, and most of us live to eat rather than eat to live. Technology has always affected every part of our lives and with the emergence of smart phones making more of an impact than ever, people are looking out for simplification of tasks in almost every field. The changing face of mobile technology has played a vital role in the development of the restaurant industry [2]. These advances have made an impact everywhere, and one of the places where more and more technology is seen is in the food and restaurant industry [3]. Between the arrivals of mobile devices on the table, online reservations, and new payment methods, technology has surreptitiously penetrated the food and restaurant industry like never before. These advances will serve to improve the experience — both for the industry and for the patron. Nowadays, savvy restaurant operators are turning to software to streamline operations and deliver a better customer experience [1].

Certainly, while dining out, some inconveniences are faced by patrons. Some of these inconveniences include waiting in hunger, discordance in the order, inconsistent bill generation and many more. All this technology impregnating the restaurant industry has sparked the idea for an application that could potentially decrease waiting times at restaurants. Many a times, when restaurants do not accept reservations, customers arrive, write their names on a list, and wait for an agonizingly long time for a table. Thus, there is an indigence to build an android application that incorporates correctness, ease and efficiency.

We have divided this project in to two parts – one for the patron, which is an Android application and the other for the restaurateur, which is a web-based application. The Android application on patron's mobile device allows the patron to search for restaurants, select menu and place order, and book table. The manager of a particular restaurant is in-charge of all the transactions and activities happening with respect to his restaurant. Duties of a restaurant manager are to send confirmation to customer upon receiving payment; updating table arrangement in his restaurant whenever there is a change.

We have used a canvas to show two dimensional view of the arrangement of tables in a restaurant. Customer can choose a table simply by clicking on it. Different color codes have been used to represent available, reserved and selected tables. Available tables are shown green in color, reserved tables are shown red in color and selected tables are shown yellow in color. This provides the customers a very interactive and easy experience with the application.

EXISTING SYSTEMS

Existing systems like Zomato and Food Panda only allow patrons to view details of restaurants, trending food items, and order food online. Zomato allows users to search for restaurants according to a particular area, and particular food item. It lets users to write reviews about a restaurant and its food [4]. In Food Panda, users can search for restaurants and also order food online [5].

These systems are most widely used today but there is a necessity of new features like table booking and tailored order, which we aim to provide through this research work.

PROPOSED SYSTEM

A. System Overview

The Android application on customer's mobile device enables patrons to search for restaurants based on trending food, trending restaurants, new arrivals, nearby locations, price ranges and discounts. Patrons can then choose desired restaurant from the list appeared, place order by selecting items from a digital menu, select a table from a canvas and make requisite payment. After receiving payment, the manager of that restaurant sends a confirmation message to the customer by means of e-mail or SMS. Once a table has been booked, it is marked 'red' till the time it is freed. Based on the arrival time of the customer, the kitchen staff can prepare the menu and serve the patron's food hot as soon as he arrives, decreasing the waiting time to a large extent.

In this application, patrons can also play games in order to win exciting prices, discounts and offers. Customer's location is traced and if the location of the customer is within the restaurant, the 'game' mode in the customer's mobile device is turned on and upon victory, customer is offered prices and/or discounts. The manager of that restaurant is in-charge of deciding the price and/or discount to be offered to the patron.

In this application, patrons have a profile of their own, where the patron can edit/update his/her personal details, contact details, and health details; view his/her current orders, previous orders, and favorites. By updating health details, customers can customize their menu; for example, by turning less oil content on, all the items in the selected menu will have less oil content. Similarly, customer can ask for sugar free deserts; low, medium, or high spice level and/or calorie content. To develop the manager website, we have used HTML5, JavaScript and PHP Laravel.

B. System Specification

1. Digitized Menu:

Each item in the menu of a restaurant is associated with a checkbox and a button to select quantity of that item. Patron can choose as many items as desired by simply clicking on the checkboxes and the selected items will be added. Some items may also be removed from the list if desired. This saves time and makes the application interactive.

2. Table Selection:

Patrons can view the arrangement of tables in a particular restaurant and select desired table from a canvas which provides a two-dimensional view. Available tables are shown green, reserved tables in red and selected table in white. This is another feature that makes the application interactive.

3. Gaming:

Patrons can play games to win exciting prices and offers. These offers and prices are decided by restauranters themselves and if a particular restaurant agrees to offer such prices and discounts, customer can play games for that restaurant.

C. Mathematical Model

Mathematical model of Digital Dining System using Android is shown in Figure 1. It is a state machine diagram that illustrates the flow of the application. There are 7 states, each representing an activity performed by patron and/or restaurant manager. The 7 states are represented as S0, S1, S2, S3, S4, S5, and S7.

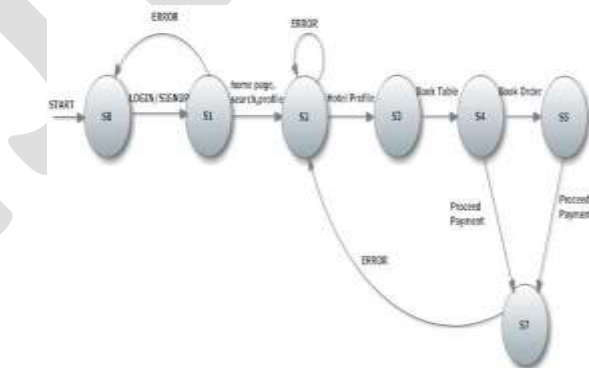


Fig 1. Mathematical Model

D. System Architecture

System architecture of Digital Dining System using Android is shown in Figure 2. There are three modules in this system and they are as follows:

1. Android application for the patron
2. Web-based application for restaurant manager and
3. Application for admin to control all the activities.

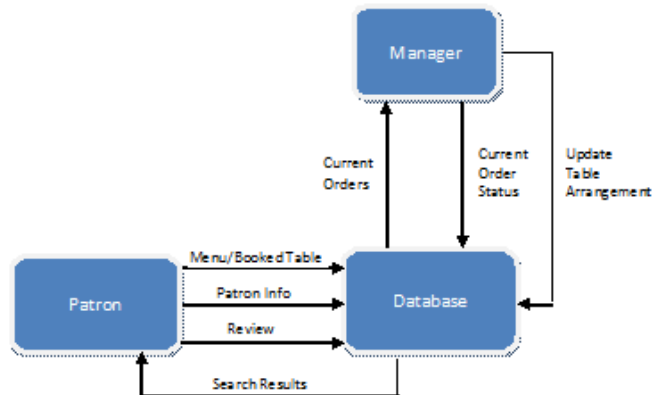


Fig 2. Architecture Diagram

E. Canvas

In this application, we have used a canvas to two-dimensionally represent the arrangement of tables in a restaurant so that patrons can select desired tables. This makes the application easy to use and interactive for patrons. On the other hand, restaurant manager can view the arrangement of tables and selected ones; also, manager can update the arrangement of tables in his restaurant whenever there is a change. A canvas is an element that can be used to draw graphics with the help of scripting in JavaScript, in case of HTML and is represented as <canvas>. The canvas can be used to draw graphs, make photo compositions, create animations or do real-time video processing or rendering [6]. The <canvas> element is also used by WebGL to do hardware-accelerated 3D graphics on web pages. It was originally introduced by Apple for the OS X Dashboard and Safari. Internet Explorer supports <canvas> from version 9 onwards. Google Chrome and Opera 9 also support <canvas>. Mozilla applications also support <canvas> starting with Gecko 1.8 [7].

Example:

HTML

```
<canvas id="canvas"></canvas>
```

JavaScript

```
var canvas = document.getElementById("canvas");  
var ctx = canvas.getContext("2d");  
ctx.fillStyle = "red";  
ctx.fillRect(5, 5, 100, 100);  
ctx.strokeRect(0, 0, 400, 200);
```

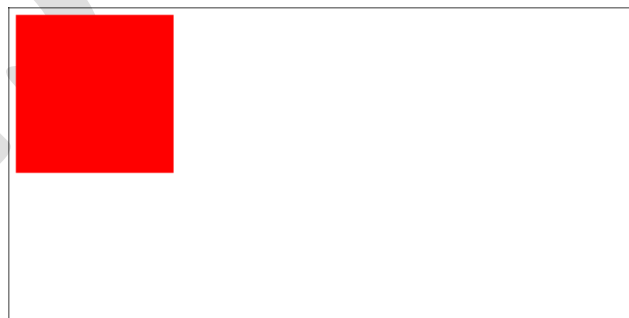


Fig 3. Example of Canvas

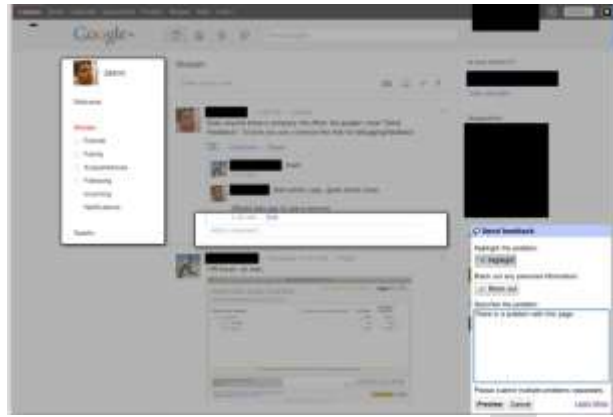


Fig 4. Usage of Canvas in a Sample Application

F. Assumptions

The proposed system has been designed by keeping in mind some assumptions, as listed below:

- Patrons should use smart phones and tablets running Android OS.
- Network should always be connected.
- Security of server is maintained.

G. Risks

The proposed system is associated with risks and some of them are listed below:

- Loss of network connection during payment may cause inconsistency in bill payment.
- Technology at the time of building the application may become out-dated. New smart phones get introduced in the market every now and then.
- Reaching peak limit of server bandwidth.
- No internet access on Wi-Fi network.
- Malicious activities such as activity monitoring, data retrieval, unauthorised payments, and system modification may occur.

RESULTS

We have made use of a canvas to display the arrangement of tables in a restaurant and let patrons select desired table from that arrangement. Given below are the screenshots of the canvas as viewed by the restaurant manager. To describe the arrangement of tables in his restaurant, a restaurant manager can simply drag and drop required tables onto the canvas as shown. There are three types of tables used – tables with 2 chairs, 4 chairs and 8 chairs. The arrangement described by the restaurant will only be shown to the patron so that the patron can choose desired table.



Fig 5. Usage of Canvas in a Manager Website

In Figure 6 and Figure 7, restaurant manager can add items to his restaurant's menu so that patrons can view those items and select desired items from their respective devices.



Fig 6. Selection of Categories to Add Items to Menu



Fig 7. Manager Adding Items to Restaurant's Menu

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CONCLUSION

Thus, we present a digital dining system where patrons can place order before visiting a restaurant along with new features such as digitized menu, digitized table booking, and gaming. This system is consistent, accurate, and efficient thereby providing customer satisfaction. This system would cater to the needs of a variety of customers, attract potential customers and ultimately improve a restaurant's business.

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