



Research Article

Volume-04|Issue-03|2024

Virtudine - Discover Flavors Through Pixels Using Augmented Reality

Rajgopal K T¹, Adarsh Shenoy², Divya D Shet³, Kshama Bhaktha*⁴, Nagaraja Thamankar⁵¹Assistant Professor, Computer Science and Engineering, Canara Engineering College, Mangalore, Karnataka, India,^{2,3,4,5}Student, Computer Science and Engineering, Canara Engineering College, Mangalore, Karnataka, India.

Article History

Received: 20.05.2024

Accepted: 05.06.2024

Published: 30.06.2024

Citation

Rajgopal, K. T., Shenoy, A., Shet, D. D., Bhaktha, K., & Thamankar, N. (2024). Virtudine - Discover Flavors Through Pixels Using Augmented Reality. *Indiana Journal of Multidisciplinary Research*, 4(3), 131-135.

Abstract: The VirtuDine application revolutionizes the dining experience by leveraging augmented reality (AR) technology to bring restaurant menus to life. Diners can use their smartphones or AR-enabled devices to witness dishes come to life enhancing the anticipation and selection process. VirtuDine focuses on visualizing food, creating an extraordinary dining experience that captured essence of culinary creativity. By offering visually captivating and interactive menu exploration, VirtuDine helps restaurants differentiate themselves and provides diners with a memorable and engaging experience. Through seamless integration of AR Technology, VirtuDine transforms the traditional dining experience by simplifying the process of exploring menu options, allowing users to make informed decisions based on visual representations of dishes, thereby enhancing overall satisfaction and enjoyment.

Keywords: VirtuDine, Augmented Reality, dining experience, menu visualization, immersive experience.

Copyright © 2024 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0).

INTRODUCTION

In the ever-evolving food industry, where competition is fierce, restaurants are continuously seeking innovative ways to stand out. However, the reliance on conventional methods like verbal descriptions from waitstaff often falls short of meeting evolving customer expectations. To address this challenge, our project draws inspiration from a diverse range of research papers, including seminal works like to propose a transformative solution: cross-platform application integrating Augmented Reality technology into restaurant menus [2]. Informed by insights that proves our pioneering approach to enable diners visually explore menu items through AR-enhanced models, accessible via a Cuisine selection drop-down list [1]. This innovative initiative aims to redefine the dining experience by providing patrons with an immersive and informative visualization of dishes, ultimately enhancing customer satisfaction, boosting sales and fostering long-term restaurant loyalty. Additionally, this initiative sets a new standard for innovation in food industry, positioning the restaurant as a leader in culinary excellence. Our project's inception is deeply rooted in research findings, as in studies mentioned in [3], which emphasizes the significant impact of AR menus on consumer behavior. Building upon insights from these scholarly works, our cross-platform application seeks to enhance the dining

experience by offering patrons a visually captivating means of menu exploration. Aligned with research on the implantation of AR systems in the food industry [8], our initiative aims to harness the transformative potential of AR technology to reshape culinary experiences. Through seamless integration of AR-enhanced food models, our application bridges the gap between traditional menu descriptions and immersive visualizations, helping customers understand better and get excited about the dishes on the menu. Furthermore, our project extends its reach beyond traditional dining establishments to encompass culinary education and exploration. Drawing on insights from influential studies such as those referenced in [5] and [10], our application serves as a dynamic platform for discovering new recipes and simplifying culinary processes.

MATERIALS AND METHODS

Google ARCore:

Our research leverages the ARCore kit, a powerful augmented reality platform developed by Google as a fundamental component of our project implementation. ARCore provides essential functionalities and tools for creating immersive AR experiences on Android devices, enabling us to seamlessly integrate virtual elements into the real-world environment. By harnessing the capabilities of ARCore.

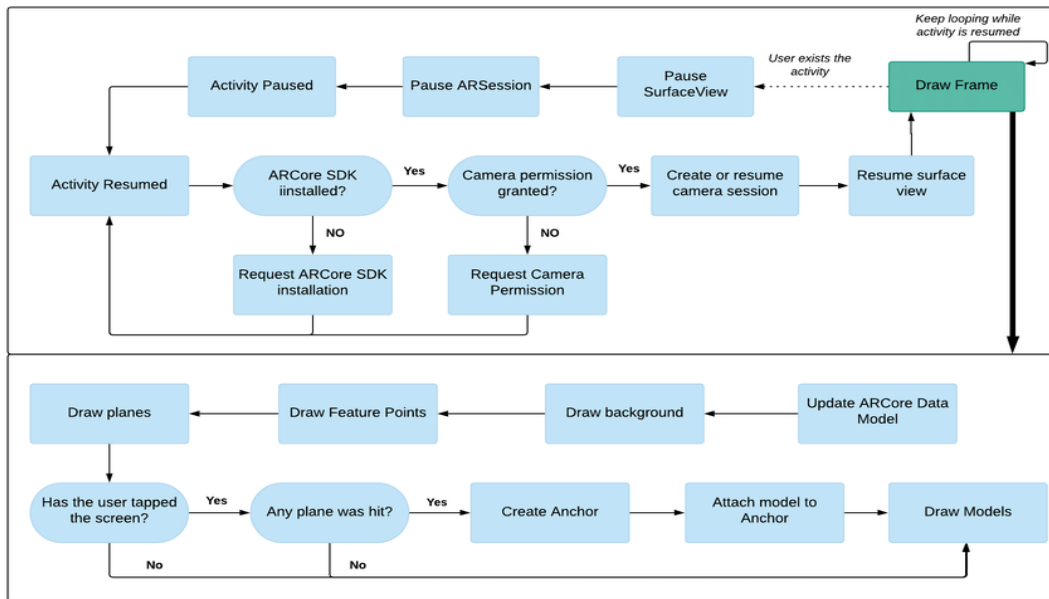


Figure 1: Google ARCore

Food models: Through the utilization of ARCore's advanced computer vision algorithms, our project facilitated accurate alignment of virtual 3D food models within the restaurant environment. Although not in real-time, users accessed our dedicated application to select a restaurant and menu items. Once selected, they were presented with detailed 2D representations of the food, including ingredients, alongside immersive 3D models. This feature enriched users' experience by providing a comprehensive visual representation of the menu items, enhancing their decision-making process and overall dining experience.

User Interaction: The intuitive interaction mechanisms offered by ARCore empowered restaurant patrons to engage effortlessly with the augmented 3D food models. This interaction enriched their dining experience by enabling them to visualize menu items in 3D, explore different angles, and even customize their virtual orders, fostering deeper immersion and satisfaction.

By leveraging the capabilities of the ARCore kit, our research extends the boundaries of augmented reality technology in the culinary domain, offering innovative solutions for restaurant owners to enhance their customers' dining experiences.

User Interface Flow Design

The user interface flow design for VirtuDine outlines a coherent and intuitive pathway for users to navigate through the platform's features seamlessly. Beginning with a welcoming and informative landing page, users are guided to key sections such as restaurant selection, menu browsing, and augmented reality visualization. Clear navigation menus, prominently placed call-to-action buttons, and logical grouping of related functionalities facilitate effortless exploration and interaction. Transition animations and visual cues further enhance the user experience, providing feedback and guidance at each step. Whether accessing the platform via web or mobile, the interface flow design ensures consistency and accessibility, enabling users to effortlessly accomplish their tasks and engage with VirtuDine's immersive dining experience.

Web Application

The web application enables restaurant registration and provides a dashboard for managing menu items, including deletion and search options. Restaurants can effortlessly add new menu items with details such as item name, nutrient value / ingredients, a 2D image and a 3D model.

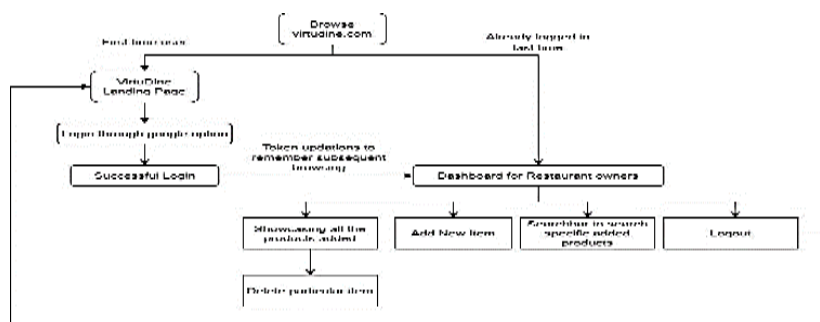


Figure 2: Web Application

User’s Space

The mobile application features a splash screen for user welcome and restaurant data retrieval, while the main screen offers a list of restaurants with search functionality. Users can explore each restaurant’s menu items and access nutritional information on the food item page. Additionally, the app provides an augmented reality feature for interactive experiences with selected food items.

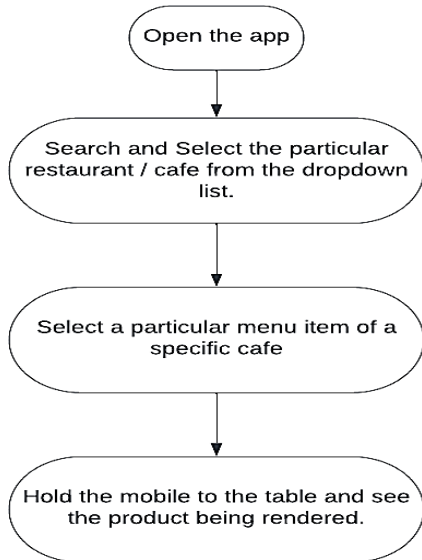


Figure 3: User’s Space

RESULTS

Web App for Restaurant owner



Figure 4: Sign in page of Web platform for Restaurant Owners

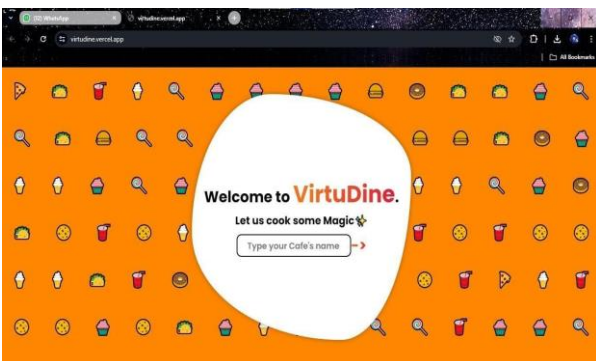


Figure 5: Landing Page of Web Application

A dashboard is shown to every registered Restaurant owners to view their Menu. It also provides an option to update their menu items. It also provides an option to logout of the session. Figure 6 shows the UI of the dashboard.



Figure 6: Dashboard for Restaurant owners

The Web platform allows Restaurant users to add a new Menu item. Figure 6 shows the UI of the page that allows Restaurant owners to add new Menu item. As you can see in Figure 7, a Restaurant owner can add name of the item, a 3D file, a 2D thumbnail and the ingredients list.



Figure 7: Page to add new Menu item by Restaurant Owners

Mobile App for User



Figure 8: List of Restaurants shown in VirtuDine Mobile application.

We also provide a search-bar for users to find a Particular Restaurant from a large list of Restaurants like in Figure 8. Once the restaurant is selected, the app will display all the Menu items available in that particular restaurant. A user needs to select a particular Item by clicking on the shown option. Figure 9, shows the UI that user looks at to select a particular food item.

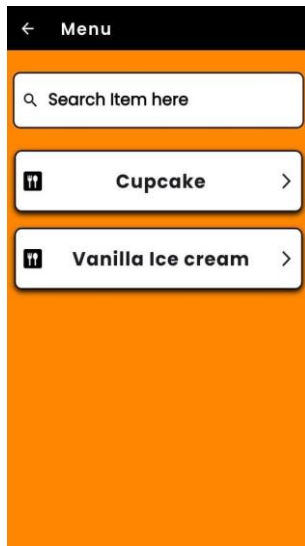


Figure 9: List of Food items in a Particular Restaurant in VirtuDine Mobile application.

Once the user selects a particular food item, the app will then navigate to the page where the details of particular food item is expanded. Figure 10 shows the 2D thumbnail, ingredients used and an icon to enter into Augmented Environment.



Figure 10: Details of Particular food item in VirtuDine Mobile application.

Once a user clicks on the Cube-kind of icon, the app takes them to Augmenting environment where users can interact with their food models in their own environment. One can rotate, move-around, zoom-in,

zoom-out, walk-around the food model and interact with it.



Figure 11: Interactive Food model in an Augmenting Environment in VirtuDine Mobile application.

Figure 11 shows how the Food model is shown in our surroundings. It feels like the Food item is actually present in front of us. This was the whole intention of our platform. We know that with the help of technology, not even sky is limit. The creativity and involvement is the only limit. Also we know that it is really difficult to grab and hold someone's attention for a long time. The concept is to let people interact with the application and make the dining experience more fun, more interactive.

DISCUSSION

Even in the 21st century, which is driven by technology, the conventional 2D menu system is still widely used. We recognised a chance to use modern technologies to enhance the immersiveness of the dining experience. We discovered that by applying our understanding in the field of augmented reality, we can enhance the fun and immersiveness of dining experiences.

Platforms for Users and Restaurants are offered by VirtuDine. For restaurant owners to manage their menu, we offer an online platform. Owners can upload ingredients and 3D models to it. Users can interact with this data that has been stored. To enable users to see and interact with 3D models, we have developed a cross-platform application. This is where the real magic takes place. Entering the restaurant, a user can choose the name of the Restaurant and then pick an item. After that, all that's left to do is aim the phone towards a level surface—like the table in front of him. The food model gets augmented on that surface. It allows the user to engage in a variety of ways, including walking around and zooming in and out. The food model being augmented in their own environment is what provides immersive experience.

CONCLUSION

In conclusion, VirtuDine represents an innovation in dining experiences, leveraging augmented reality (AR) technology to redefine how users interact with restaurant menus. By seamlessly integrating AR capabilities, VirtuDine enhances the anticipation and selection process, providing diners with a visually captivating and interactive way to explore culinary offerings. VirtuDine not only transforms restaurant experiences with its AR-enabled menus but also extends its impact to culinary education and exploration. By seamlessly integrating 2D and 3D images, along with interactive features, on both web and mobile platforms, VirtuDine offers users a visually captivating and engaging journey through culinary offerings. Whether it's discovering new dishes at restaurants or simplifying complex culinary processes at home, VirtuDine redefines the way we interact with food, setting a new standard for immersive and interactive dining experiences. Looking ahead, future enhancements could focus on expanding AR features for more immersive experiences, integrating with smart kitchen appliances for seamless recipe preparation, implementing personalization and recommendation systems, collaborating with culinary experts for curated content, and ensuring seamless integration across platforms. Additionally, incorporating an order item process within VirtuDine could streamline the dining experience further, allowing users to place orders directly through the application, enhancing convenience and efficiency. By addressing these areas, VirtuDine can continue to innovate and enhance the dining experience for users, offering unparalleled opportunities for interactive and engaging culinary exploration.

REFERENCES

1. Amin, Sadia Nur, Shivakumara, Palaiahnakote, Jun, Tang Xue, Chong, Kai Yang, Zan, D. L. L., & Rahavendra, R. (2022, October 10). An Augmented Reality-Based Approach for Designing Interactive Food Menu of Restaurant Using Android. *Artificial Intelligence and Applications*, 1(1), 26–34.
2. Balasubramanian, Kandappan & Konar, Rupam (2022). Moving Forward with Augmented Reality Menu: Changes in Food Consumption Behavior Patterns. *Asia-Pacific Journal of Innovation in Hospitality and Tourism (APJIHT)*, 11(3).
3. Fritz, William, Hadi, Rhonda, & Stephen, Andrew (2022, December 27). From tablet to table: How augmented reality influences food desirability. *Journal of the Academy of Marketing Science*, 51(3), 503–529.
4. Bullaiaha Tej, Maddimsetty & Bellam, Vamsi Krishna (2022). Augmented Reality Restaurant Menu. *International Journal of Computer Science Engineering and Information Technology Research (IJCEITR)*, 12(1).
5. Styliaras, Georgios D (2021). Augmented Reality in Food Promotion and Analysis: Review and Potentials. *Multidisciplinary Digital Publishing Institute*.
6. Rane, Prathmesh & Usmani, Ahmer (2021). Digital Food Menu Application for Restaurants Based on Augmented Reality. *International Research Journal of Engineering and Technology (IRJET)*, 08(03).
7. Malli, Chetana, Patil, Pramod, Mahajan, Sanket, & Pardeshi, Pranav (2021). Restaurant Menu Card by Using Augmented Reality. *International Journal of Research in Engineering and Science (IJRES)*, 09(12).
8. Jagtap, Sandeep, Saxena, Prateek, & Salinitis, Konstantinos (2021). Food 4.0: Implementation of the Augmented Reality Systems in the Food Industry. *Procedia, 54th CIRP Conference on Manufacturing Systems*, 104, 1137–1142.
9. Nowacki, Pawel & Woda, Marek (2020, January). Capabilities of ARCore and ARKit Platforms for AR/VR Applications. *International Journal of Research in Engineering and Science (IJRES)*.
10. Chaurasiya, Amitkumar, Mhatre, Sayali, Chaudhari, Ravina & Pawar, Pratiksha (2019). Smart Restaurant Menu Card By Using Augmented Reality. *JETIR Journal of Emerging Technologies and Innovative Research*, 6(3).