Project Design Phase 1

Proposed Solution

Date	06 May 2023
Team ID	NM2023TMID14254
Project Name	Go No Queue-Rush Estimator for Corporate Cafeteria

Proposed Solution

The proposed solution is the implementation of Go No Queue-Rush Estimator for Corporate Cafeteria that utilizes computer vision, cloud technology, and a mobile application to address the challenges faced by corporate office cafeterias.

1. Problem solution

Corporate office cafeterias often face challenges related to food shortage and crowd management. These challenges can impact employee satisfaction and productivity. The current methods of managing these issues are often manual and inefficient.

The problem statement aims to address the following key challenges:

Food Shortage: During peak hours, cafeterias experience a rush of visitors, leading to food shortages. The limited supply of food fails to meet the demand, causing inconvenience and dissatisfaction among employees.

Inefficient Resource Allocation: Without accurate crowd estimation, cafeteria authorities struggle to allocate resources effectively. They may either overprepare food, resulting in wastage, or underprepare, leading to shortages and dissatisfaction among employees.

Lack of Real-time Information: The absence of real-time crowd information makes it challenging for cafeteria authorities to respond promptly to changing demands.

They cannot proactively manage crowd levels or make informed decisions regarding food preparation and resource allocation.

Inconsistent Customer Experience: Inconsistent crowd management and food shortages create a negative dining experience for employees. Long waiting times, overcrowding, and limited food choices contribute to dissatisfaction and reduced productivity.

2. Idea / Solution Description

The system utilizes computer vision techniques, cloud storage, and a mobile application to provide an efficient and data-driven approach to cafeteria management.

Entry and Exit Monitoring: The system will be equipped with computer vision devices at the entrance and exit of the cafeteria. These devices will use cameras to detect and track individuals entering and exiting the cafeteria, capturing real-time data.

Crowd Estimation: Using the data from the entry and exit monitoring devices, the system will employ computer vision algorithms to estimate the number of people present in the cafeteria at any given time. This estimation will be continuously updated to provide accurate and real-time crowd information.

Cloud Storage: The collected data, including entry and exit timestamps and crowd estimations, will be securely stored in the cloud. Cloud storage enables centralized access, data integrity, and scalability for multiple cafeterias within an organization.

Mobile Application for Authorities: The cafeteria authorities will have access to a dedicated mobile application that provides a user-friendly interface. Through the application, authorities can view real-time crowd estimations, historical data, and

analytics related to cafeteria usage. This information empowers them to make informed decisions regarding food preparation, menu planning, and resource allocation.

Notifications and Alerts: The system will be capable of generating notifications and alerts to cafeteria authorities based on predefined thresholds or unusual crowd patterns. This ensures that authorities are promptly informed when crowd levels reach critical levels or when anomalies are detected.

Data Analytics: The historical data stored in the cloud can be analysed to identify usage patterns, peak hours, popular food items, and other insights. This data-driven approach enables cafeteria authorities to optimize food preparation, minimize wastage, and improve overall operational efficiency.

3. Novelty / Uniqueness

The Smart Cafeteria Management System offers several novel and unique features compared to traditional cafeteria management approaches. Here are some aspects of its novelty and uniqueness:

Computer Vision for Crowd Estimation: The utilization of computer vision technology sets the system apart. By using cameras and advanced algorithms, it can accurately estimate the number of people present in the cafeteria. This automated and real-time crowd estimation eliminates the need for manual counting or reliance on subjective estimates, enhancing accuracy and efficiency.

Cloud Storage and Accessibility: The system leverages cloud storage, enabling secure and centralized data storage. This cloud-based approach offers several advantages, including easy accessibility, scalability, and data integrity. It allows cafeteria authorities to access real-time information and historical data from anywhere through a mobile application, streamlining management processes.

Mobile Application for Authorities: The dedicated mobile application provided to cafeteria authorities adds a unique aspect to the solution. It offers a user-friendly

interface tailored for cafeteria management, enabling authorities to monitor crowd levels, access analytics, and make informed decisions on the go. The mobile application enhances convenience, accessibility, and real-time responsiveness.

Real-time Notifications and Alerts: The system's capability to generate real-time notifications and alerts based on predefined thresholds or crowd patterns is a unique feature. This proactive approach allows authorities to take immediate action when crowd levels reach critical points or unusual activities are detected, ensuring efficient crowd management and resource allocation.

Data Analytics and Insights: The system's focus on data analytics provides a unique advantage. By analysing the collected data, cafeteria authorities can gain valuable insights into usage patterns, peak hours, popular food items, and more. This datadriven approach empowers them to make informed decisions, optimize operations, and enhance the overall cafeteria management.

Integration and Scalability: The system is designed to integrate with existing cafeteria management systems or other relevant applications. This flexibility allows for seamless implementation and integration within the organization's infrastructure. Additionally, the system can be easily scaled up to accommodate multiple cafeterias within an organization, making it suitable for large-scale deployments

4.Social Impact/Understanding

The Smart Cafeteria Management System has the potential to have a positive social impact by addressing several key aspects related to cafeteria management and employee well-being.

Improved Employee Satisfaction: By effectively managing food shortages and reducing waiting times, the system enhances the overall dining experience for employees. Employees will have access to a variety of food choices, reduced crowding, and a smoother cafeteria experience. This, in turn, can contribute to increased job satisfaction and overall employee well-being.

Optimal Resource Allocation: The system's ability to accurately estimate crowd levels and provide real-time information allows cafeteria authorities to allocate resources efficiently. They can plan food preparation, staff allocation, and inventory management based on the current demand, minimizing wastage and ensuring adequate availability of food items. This leads to more sustainable resource utilization.

Enhanced Productivity: With improved cafeteria management, employees can save time and have a more seamless dining experience. Reduced waiting times and a wellmanaged cafeteria environment enable employees to have more time for breaks and interactions with colleagues. This can foster a positive work culture, encourage collaboration, and potentially boost overall productivity in the workplace.

Reduced Food Wastage: Accurate crowd estimation and data-driven insights enable cafeteria authorities to optimize food preparation and minimize food wastage. By aligning food quantities with actual demand, the system contributes to reducing food waste, which has environmental benefits and aligns with sustainability goals.

Data-Driven Decision Making: The system's data analytics capabilities provide cafeteria authorities with valuable insights into cafeteria usage patterns, peak hours, and popular food items. This data-driven decision-making approach allows them to make informed choices regarding menu planning, food offerings, and resource allocation, optimizing operations and improving overall efficiency.

Enhanced Cafeteria Management Practices: The implementation of the Smart Cafeteria Management System promotes the adoption of innovative technologies and modern management practices in corporate office cafeterias. This can set a positive example for other organizations and encourage the integration of technology for improved efficiency and customer satisfaction.

5.Business Model

The business model for the Smart Cafeteria Management System can be based on a

combination of revenue streams and value propositions. Here is a potential business model for the system:

System Implementation and Integration: The initial revenue stream can come from system implementation and integration. This involves setting up the computer vision devices at the entry and exit points of the cafeteria, configuring the cloud storage infrastructure, and integrating the system with existing cafeteria management systems or other relevant applications. The revenue can be generated through one-time installation fees or implementation contracts.

Subscription or Licensing Fees: The Smart Cafeteria Management System can operate on a subscription or licensing model. Cafeteria authorities would pay a recurring fee or licensing fee to access and utilize the system, including the cloud storage, data analytics, and mobile application functionalities. The fee can be based on the number of users, the size of the cafeteria, or other relevant factors.

Data Analytics and Insights: The system's data analytics capabilities can be monetized separately by offering additional analytics packages or insights reports to cafeteria authorities. These packages can provide in-depth analysis of cafeteria usage patterns, peak hours, popular food items, and other relevant metrics. Cafeteria authorities can subscribe to these packages to gain valuable insights for optimizing operations and decision-making. This can be offered as an add-on service with a separate pricing structure.

Maintenance and Support Services: Ongoing maintenance and technical support services can be offered to ensure the smooth operation of the system. This can include regular updates, troubleshooting, and customer support. Cafeteria authorities can pay a monthly or annual fee to access these services, ensuring continuous system functionality and support.

Customization and Integration Services: Additional revenue can be generated through customization and integration services. Some organizations may require specific modifications or integrations with their existing infrastructure or management systems. By offering customization and integration services, the solution provider can cater to the unique needs of each organization, generating additional revenue.

Upselling and Cross-selling Opportunities: The Smart Cafeteria Management System can serve as a platform to upsell and cross-sell other products or services.

For example, the system can integrate with online ordering platforms or loyalty programs, providing opportunities for partnerships with food vendors or technology providers. These partnerships can generate revenue through referral fees or revenue sharing models.

6.Scalability of the Solution

The Smart Cafeteria Management System is designed to be scalable, allowing it to accommodate various sizes and types of cafeterias within an organization. Here are some aspects of its scalability:

Multiple Cafeteria Support: The system can be deployed and scaled to manage multiple cafeterias within an organization. Whether an organization has one cafeteria or multiple locations, the system can handle the data collection, crowd estimation, and management of each cafeteria separately, providing a centralized view of all cafeterias through the mobile application.

Cloud Storage and Infrastructure: The system utilizes cloud storage, which offers scalability and flexibility. Cloud infrastructure can easily accommodate increased data storage requirements as the number of cafeterias or the volume of data grows. The system can handle large amounts of data without compromising performance or storage limitations.

Hardware and Sensor Expansion: As the system scales, additional computer vision devices and sensors can be added to support the monitoring of multiple entry and exit points within each cafeteria. This ensures accurate crowd estimation and data collection across all areas, even in larger cafeterias or facilities with multiple entrances.

Mobile Application Access: The mobile application provided to cafeteria authorities can seamlessly handle multiple cafeterias. It can provide a consolidated view of crowd estimations, historical data, and analytics for each cafeteria, allowing authorities to efficiently manage multiple locations from a single interface.

Analytics and Insights: The data analytics capabilities of the system can scale to handle increasing data volumes. The system can analyze data from multiple cafeterias, providing aggregated insights and trends across the organization. The analytics algorithms can adapt to larger datasets and provide valuable insights to support decision-making for all cafeterias.

Integration with Existing Systems: The solution can be integrated with existing cafeteria management systems or other relevant applications. This allows for smooth integration with an organization's infrastructure and facilitates scalability without disrupting existing processes.

Flexibility for Customization: The system is designed to be flexible and customizable to meet the specific needs of different organizations and cafeterias. Customization options allow for tailoring the solution to accommodate varying requirements, such as specific workflows, reporting needs, or integration with other systems