Bilkent University

Department of Computer Engineering

Senior Design Project

QRDER

Project Specifications Report

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This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfillment of the requirements of the Senior Design Project course CS491/2.

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1 Introduction

Autonomous systems are one of the popular topics of 21th century. A wide range of operations have become autonomous after improvements in computer science. As one of the last steps of this period, mobile applications took place to make social life processes autonomous. Nowadays, there are a lot of applications to maintain usual tasks of daily life. Usage of mobile applications in different industries has become a significant focus for companies due to potential of availability for customers and clients. It is also an area that is able to be integrated with marketing and advertising concepts. These aspects of the mobile application development are the reasons that got our interest for this project. Therefore, we decided to work in the food industry which is one of the industries that use mobile applications. For the last 20 years in the food industry, delivery systems became autonomous and their growth got the interests of investors in a lot of countries. Usage and investment rates growed and resulted in occurence of a remarkable popularity[1]. Therefore, growth in food delivery systems show us outcomes and impacts of implementing autonomous systems in the food industry.The survey of 267 restaurant owners and managers has results as nearly 93% of

restaurants have at least some wait-time periods, and 30% percent of the restaurants report that waits are getting longer[2]. According to study,the average wait per party is 23 minutes, but nearly a third of all parties are waiting more than 30 minutes. Eight percent wait longer than 40 minutes[2]. Some interviews with New York restaurant owners show that wait time in restaurants vary between 30-60 minutes depending on people density in place [3]. It can be said that there is almost a 15 minutes time waste in restaurants just to be initiated with a waitress and to order meals, and this time period can be shortened by making it autonomous. Therefore, our project aims to provide an autonomous system to ease and improve the meal order process via implementation of a mobile application. It is planned to construct such a system with QR codes which are encrypted image codes to store data efficiently[4]. In practice, QR codes often contain data for a locator, identifier, or tracker that points to a website or application[4]. In our project, identifier data will be used for mapping the tables and locator data will be used to notify users for special offers.

1.1 Description

Our project is an application to provide an interface between customers and food premises. Focus of this interface is to make the order system autonomous. Requirement for this system is mapping each table with relevant unique table information and encrypting it with restaurant information to a QR sticker. This encrypted QR info is also required to be placed on the table. These requirements provide a mapping for each order in a restaurant. Our project expects customers to scan this QR sticker

when they want to order a meal. Once the QR sticker is scanned, the system provides a restaurant menu by using encrypted information. With such a system, our expectations are providing extra flexibility,reliability and time efficiency for the meal order process. Another expected outcome is to improve marketing and advertising options by usage of mobile application.

Main focus of this system is to make the order system autonomous with an interface via mobile application, but there are also a lot of side aspects. One of them is easier meal list modification. For example, if a meal runs out, restaurant can drop it from the list instantaneously. Another one is an improvable interface to introduce meals. Our project provides an opportunity to introduce meals with their preparation video, nutritional values. Our project also notifies users with surrounding special offers and restaurants with location information. Interactive usability with diet applications is also another option that is provided by our project.

1.2 Constraints

1.2.1 Implementation Constraints

- Platform of the project is planned to be Android and Desktop. Users will use an Android app and employees of restaurants will use a Desktop program.
- Git and GitHub will be used as a version controller system. GitHub will also be used to create a Kanban style board for project management.

- React Native framework will be used to create an Android app.
- Firebase Crashlytics library in Android app will be used for real-time detailed crash reports.
- QR Reader library for Android will be implemented by own based on react-native-camera library.
- Electron framework will be used to create a Desktop app.
- NodeJS environment and ExpressJS library will be used to create an API service for the Android and Desktop apps. Representational State Transfer API, a.k.a. RESTful API, concept will be applied to this service.
- JavaScript programming language will be used in the implementation stage.
- Object Oriented Programming (OOP) will be followed. Therefore, TypeScript programming language could be used. In JavaScript, OOP will be provided with libraries that allow checking prop types.
- MySQL will be used as the main database system. In addition, MongoDB, Firebase or DynamoDB, which are a NoSQL database system, will be used to store the menu of restaurants.
- Amazon Web Services (AWS) could be used for DynamoDB. AWS could be used for DocumentDB that provides management for documents like a restaurant menu.
- Amazon S3 could be used for storing images in the menus.

- Heroku or Amazon API Gateway will be used to deploy the API service to the web.
- Loggly, Loglevel or more efficient library will be used for a logging system to generate big data based on user's choices.

1.2.2 Economic Constraints

- Any Amazon services that will be used are free. Amazon S3 5GB is free for 12 months. Amazon DynomoDB 25GB is free. Amazon API Gateway 1 million / a mount is free for 12 months [5].
- Heroku is free for one project.
- Firebase Database and Crashlytics are free.

1.2.3 Sustainability Constraints

- System will be maintenanced periodically.
- Feedback system will be used to improve user experience.
- Any found bugs will be fixed in the next updates.
- Special offers for users will be used to increase customer happiness.

1.2.4 Language Constraints

- Both apps, Android and Desktop, will support English (EN) and Turkish (TR).
- Internationalization and localization (i18n) will be used to have flexible language support. i18n will provide an easy and reliable development for future supported languages.

1.2.5 Ethical Constraints

- Personal information will not be shared via any third-parties.
- Any personal information that is stored in our system will be protected.
- Online payment system will be provided by third-parties. Any information related to payment will not be stored in our system.

1.2.6 Social Constraints

- Abuse of the system may occur in food halls and self-service restaurants due to mechanism of QR code. QR code can be scanned from a photo or an image where the person that scans the code is at somewhere outside the restaurant. This type of abuse should be addressed by user terms and authorization process.
- System that allows to tip the waiters is weakened by our project due to paying procedure. Some kind of tip process should be integrated to our system.

1.3 Professional and Ethical Issues

1.3.1 Professional Issues

- Source code has to be kept private.
- Whole decisions will be determined by contribution of whole group members.
- There will be meetings about the project once a week.
- MVP paradigm will be used.

1.3.2 Ethical Issues

- We will keep user's information private and secure.
- In order to prevent abusing the program, term of usage will be determined to avoid victimization of employees.

2 Requirements

2.1 Functional Requirements

2.1.1 System Functionality

The system should:

- ask users to scan the qr code.
- find the corresponding restaurant.
- display the menu.
- display the special offers (if any).
- receive the order.
- inform the restaurant about the order.
- inform the user about the check.
- provide online payment.
- work interactively with the diet application.
- provide any interface about advertisements.

2.1.2 User Functionality

The user should/can:

- scan the qr code.
- choose the meal that he/she wants among the menu.
- pay the price by using the online payment option.
- look at any advertisement that system provides.
- make any change about the order.
- look and use for special offers.
- use diet program interactively.
- learn the nutrients of the meal.
- see the information about whole foods that are displayed on the menu.

2.2 Non-Functional Requirements

2.2.1 Extensibility

The system should:

- be easy to maintain
- be available on multiple platforms

2.2.2 Reliability

The system should:

- do not store any credit card information unless the user state otherwise.
- be prepared for any possible cyber attacks.
- ensure that the user’s data is safe.

2.2.3 Usability

The system should:

- be user-friendly.
- create options in terms of language and theme.
- provide exact pictures of food.
- work well with the diet program.

2.2.4 Accessibility

The system should:

- be downloadable for free.
- Be downloadable from the official website for the desktop versionç
- Be downloadable from the App Store or Google Play Store for the mobile version.

2.2.5 Portability

The system should:

- run in any OS.
- be able to work cross-platform.

2.2.6 Efficiency

The system should:

- not lag when communicating with the server especially when in the restaurant has many clients.
- be light.

3 References

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