AUGMENTED REALITY – ORDERING APPLICATION (AURORA)

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A Special Project

presented to

the Faculty of the College of Information Technology and Engineering

De La Salle Lipa

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In partial fulfillment

of the requirements for the course

INTRODUCTION TO HUMAN COMPUTER INTERACTION

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INTRODUCTION

Today, there's a vast of fast food chains and restaurants across the Philippines and they have one thing in common, it is getting the orders of the customers manually, limiting the capability of Persons with Disabilities (PWDs) to order and let their customers wait and unentertained. One of the realization of the proponents is to change that kind of way and instead, adapt the modern and innovative way of it. Introducing Augmented Reality – Ordering Application also known as AURORA, it is a mobile application wherein users can order food in a different way. Using Augmented Reality as one of the key factor to its development, users can choose various possible food items that is "swak" to their budget. PWDs specifically the Deaf/ Mute people can experience the idea of ordering food through one of the feature of the application which is the 'text-to-voice' technology and vice versa as means of communication.

With AURORA, customers can be entertained thru two games that is built-in within the application. It is applied to interact and give the customers an idea that there's more upon waiting and using the application. These customers can obtain promos/discounts by just playing the games. AURORA is not just a mobile application that is dedicated to assist people in terms of ordering, but also gives a glimpse that Philippines can be globally competitive on marketing and innovative technological solutions.

Background of the Project

In the Human Computer Interaction, there is a debacle in escaping the confinement of user experience within a screen and that's when Augmented Reality is born. Augmented reality is the integration of digital information with the user's environment in real time (TechTarget, 2016). Unlike the Virtual Reality which features an artificial environment and artificial data, Augmented Reality make use of our existing environment – the Earth and put an artificial data on top of it. Different mobile application in areas of entertainment, gaming, medicine and education are now integrating AR and the current technologies to lessen the gap between the human-computer interaction.

Augmented reality is changing the way people view the world or at least the way its users see the world (Bonsor & Kevin, 2015). This technology is proving that the world is taking one step at a time in bringing advanced technology we've seen in Sci-Fi movies into reality.

The most recent example of this AR integration is the Pokémon Go which feature a real word experience of catching a Pokémon with just a tap. The said mobile app also integrates AR with the Global Positioning System - GPS which allows the users all over the world to determine the location of a pokémon animal. The Pokémon Go create a great change with the gaming experience in mobile applications. Another successful use of AR in mobile technology is the

Amazon’s 3D Feature in iOS shopping app which allows the shoppers to see different items like kitchenware, furniture and home décor in its real size, color and shape. Through the use of this app, the shopper will not have any confusion with the items real specifications. Amazon’s use of this app bring a great increase with the company’s revenue. While, different AR technology advances in surgery, engineering and even military are also now in research and experimenting process.

Statement of the Opportunities

- AURORA makes budgeting easy. Budgeting in terms of providing assistance to the possible list of food items that they can buy with their money. For instance, they only have P100 in their hands, then they can buy 1 cheeseburger, 1 regular soft drink and French fries. These food items are shown through Augmented Reality.
- AURORA allows them to remove the limitations and the boundaries that hinders the deaf/mute in terms of communication. AURORA gives an opportunity to other people specifically the deaf/mute who has difficulty in communicating properly to do ordering transactions like how the non-disabled does.
- AURORA has a ‘text to voice’ that converts the text that the users input to an audio output. It also has a ‘voice to text’, wherein it translates the voice to a readable text. The voice to text allows the user to understand what

the other people is saying. This gives the opportunity for disabled to remove the limitations that hinder them from communicating with other people.

- Since the deaf/mute does not have the ability to hear notifications, AURORA allows the users to be aware about notifications through ‘vibration and lights notification’.
- AURORA provides a new way of attracting customers or marketing through the use of this interactive technology, Augmented Reality. In this essence, technology is the new way because today it plays a vital role when it comes to marketing. Businesses are coping up with or using all possible techniques to satisfy their customers and Augmented reality is one of the key tools to have a modernized way of doing business. It attracts customers because it is uncommon to see an app that uses AR in ordering which in this scenario gives the market a chance to try this kind of technology.
- AURORA provides entertainment through built – in games (Chicken ‘n Fries Bucket and Stack that Burger) wherein the customers can play the games while they wait for their orders to be done and also show them that this app is not a waste of time because they can also receive rewards such as promos and discounts after gaining high points on playing the game. Moreover, this whole idea leads to a good marketing strategy to improve the sales of a food industry business.

- AURORA will help the Philippines which is a third world country to be technologically competitive and not be left behind. Augmented Reality provides efficient ordering, wherein it gives more accurate result of orders.

Objectives

The proponents have the objectives of:

- Transforming the user experience in ordering technology in line with creating more reliable, accessible and efficient ordering application.
- Integrating augmented reality with the current technology in the aim of creating a more easy and natural way of ordering mechanism.
- Giving a platform usable by all kinds as well as equal experience with the normal users and the PWDs, specifically Deaf/Mute people.

Scope and Limitations of the Project

SCOPE:

Budgeting food is the most challenging thing when it comes to saving money. AURORA will solve the problem by providing assistance to the user to budget their money. AURORA will help the user when ordering in a restaurant by scanning the money and presents a list of combination of food that the user can choose through augmented reality. The scanning of money and choosing of different combination of orders can be done anywhere even outside the restaurant. The list of combination will give a first-hand look of what food items you can get from your money.

AURORA also provides assistance to the people with disabilities specifically those who are deaf/mute. AURORA uses a program that allows the

user to convert an input text to an audio file, it also applies a voice that can be converted into a readable text.

LIMITATIONS:

AURORA can be used only on mobile phone both android and IOS. The application does not fully support people with disability and only focus on people who are deaf/mute. AURORA supports only one restaurant for now, because of the need of knowing all the details about the items and the foods that can be order from a specific location thus the use of Global Positioning System (GPS) is not applicable for now. AURORA also only supports for now the currency which is Philippine Peso. The application can be understand easily by teenagers and adult or specifically the millennials of this generation as they already have experienced in using the different technology.

Chapter 2

METHODOLOGY

AURORA does not only exist for the use of people with disability. AURORA is made for everybody in order to have a more convenient way of ordering. But the success of this will not be possible without the successful interaction between the human and computer and usability of design principles. In this Chapter, it will consist of explanations regarding on how to attain a successful interaction between AURORA and its intended users. This includes the implementation of the ten heuristics in AURORA.

Design Methodology

Designing is probably the vital thing when it comes in developing systems, devices or applications. It is one of the key factors that shows glimpse of how humans and computers interact with each other. Through design, a user can identify how the machine works or even understand the objects implied on the system, devices or applications. It needs to walk through different process before achieving a unified output. Processes like referrals from design guidelines or principles. With this, AURORA will be using and following various design guidelines and principles in order to attain the expected output. Here are the following design guidelines that were considered:

- The application must be user – friendly in terms of using the application that is easy to remember and easy to use.

- The elements of design such as colors, typography, grids, use of imagery, scale, surface and movement are key tools to convey how objects in the application interact and exist. These elements do far more than please the eye rather creates hierarchy, meaning and focus.
- Implementation of visual language that synthesizes mixture of classic and modern principles of good design.
- Developing a single underlying application that allows for unified and real time experience across platforms and device sizes.
- Mobile precepts are basically fundamental however all input methods should be first-class in order to improve speed of using the application.
- The use of familiar tactile attributes and interaction design rules helps the users quickly understand affordances. These includes the textboxes, links, option buttons and etc.
- Integration of consistency principle to the mobile application because having it provides visual structure to achieve a unified design. Theme of the application is one example to emphasize consistency.

Usability Heuristics

Rules	Description
Visibility of system status	For normal users, there will be a notification that will appear in the screen. This notification is connected to the mobile phone system. Aside from that there is an option where the user can look on how they can be notified even the phone is on idle. It also supports deaf/mute people wherein the user can choose from lights and vibration whenever there is an update about the food promos and other confirmations.
Match between system and the real world	The default language that will be used by the system is English but the user can change it to Filipino. It also follows the custom terms that the user will easily understand.
User control and freedom	Using augmented reality, the users can remove and add another order once they've included it to their order list. They can also use the undo button in the screen if they wish to bring back the foods they want.
Consistency and standards	It follows the same words used in online ordering system such as "order", "remove order" and add another order". The application uses consistency of color on each page. (Moderate Red, Black, White will be the common color that will be seen)
Error prevention	If the money is insufficient, the system will respond with a dialog box message that shows that the user cannot order with just the money he/she scanned. The flow of the system is simple so the user can easily understand it and will prevent errors. The application will also provide confirmation message if the user really wants to remove something.
Recognition rather than recall	The flow of the system can be easily understand because the system will automatically bring the user to the next procedure/process. Also, the number of process is not that much and can be easily remembered whenever it is being used. The process works by scanning the money and augmented reality comes out, from there the user will choose their orders.
Flexibility and efficiency of use	The use of this application will be flexible and efficient in terms of time to choose of what to order that is "swak" to a user's budget because the application will provide the user the first-hand look on what he/she can order with the amount of money he/she have through the use of Augmented Reality foods.

Rules	Description
Aesthetic and minimalist design	There's a pop-up dialog box in every process that can be controlled by the user. The design of this pop-up dialog box is just simple and can easily be seen by the user with its only function, to provide the user a choice of what to do. This is to avoid competition between the dialogue and the system itself. The users also can play games through the application (Chicken 'n Fries Bucket and Stack That Burger) which has an aesthetic and minimalist design, in which will entertain the user while waiting for the order to be done. Also, the application provides promos or discounts that can be use on the next order.
Help users recognize, diagnose, and recover from errors	Pop-up errors will show and cover the screen so the user can see where/what error happened. As such, there is an error message like the "username does not exist", "Failed to login. Password is incorrect", "Oops! The amount of money you have is short for the available menu. Scan Again." and other more.
Help and documentation	If there is a question or the user did not understand how the application works, there is a part in a system where the users can ask thru feedback which is the leave a reply section of the application, Contact Us or even "Help" that can be found on the menu section. This is where Frequently Ask Questions (FAQs) are shown that can somehow help the user on how the application works.

Chapter 3

SYSTEM DESIGN

This chapter will provide the user interface designs of AURORA and the processes found on the application, starting from simple login or signing up of account up to the ordering system of AURORA up to successfully ordering foods. This includes every fields, images, typography, icons, buttons, controls that can be seen in the application. Also, it includes entertainments and feedback messages after a process or transaction. Additionally, this chapter will provide on what is the requirement for the application to work and where it is compatible.

User Interface Design

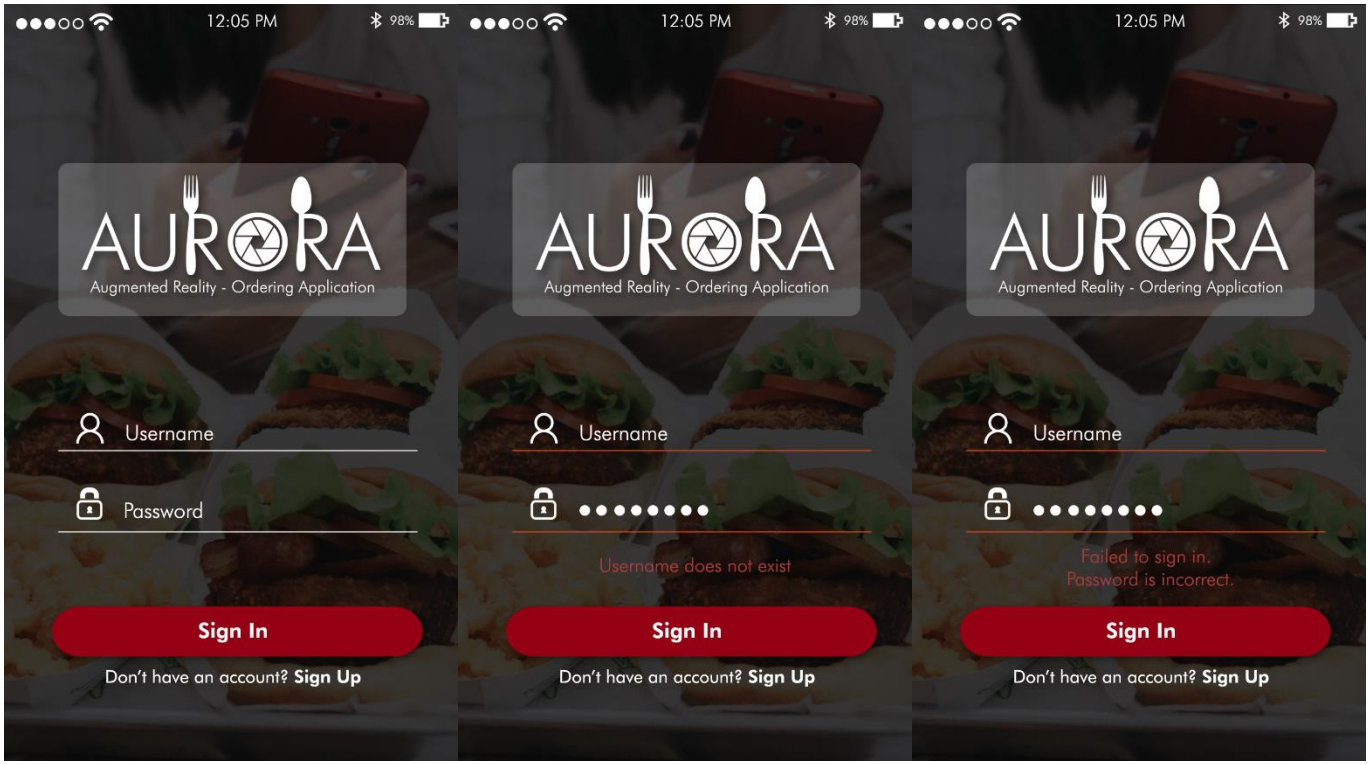

Figure 1. Sign-in Form Figure 1.1 Invalid Username Figure 1.2 Incorrect Password

Figure 1 shows the sign-in form where the user is required to input a valid username and password. On figure 1.1, if the user entered an invalid username, an error message will be shown, “Username does not exist” and on figure 1.2, if there is a wrong password, “Failed to sign in. Password is incorrect” will display. Now, once both Username and password is valid, it will be redirected to the Home Page.

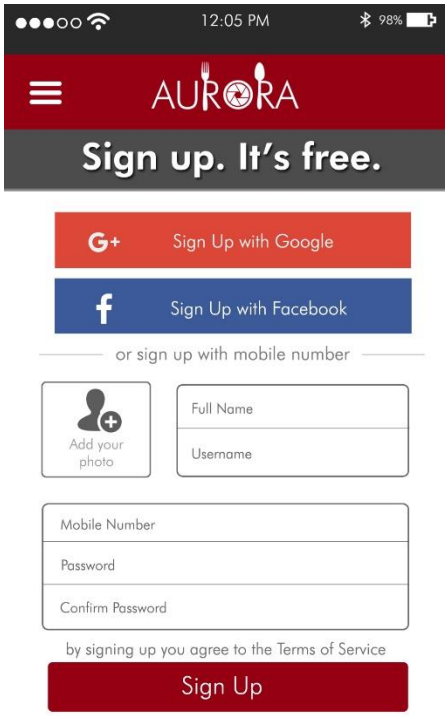

Figure 2: Sign Up Page

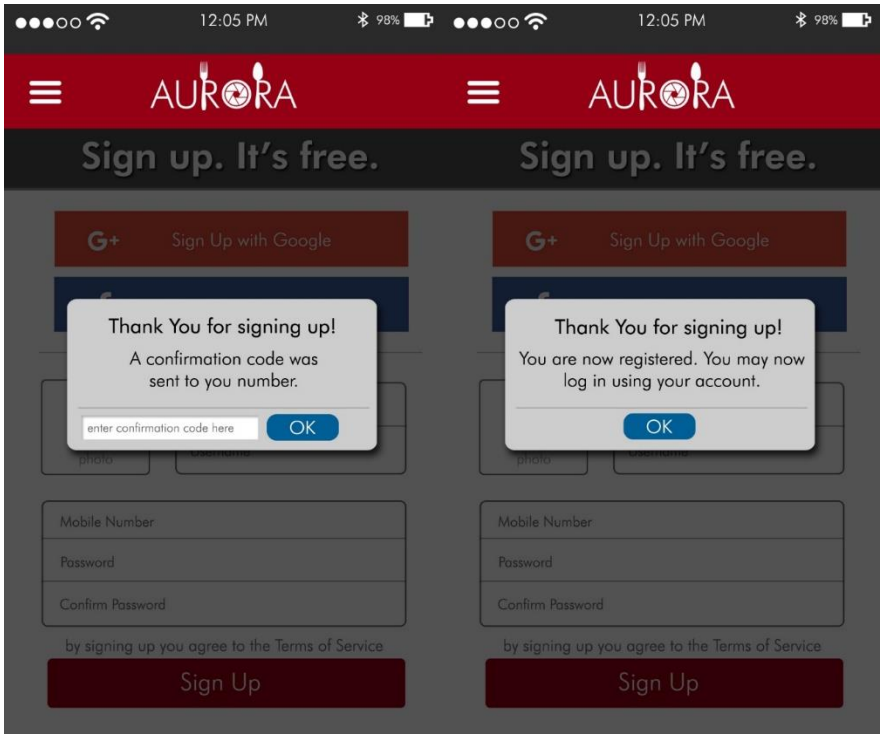

Figure 2.1: Confirmation Code

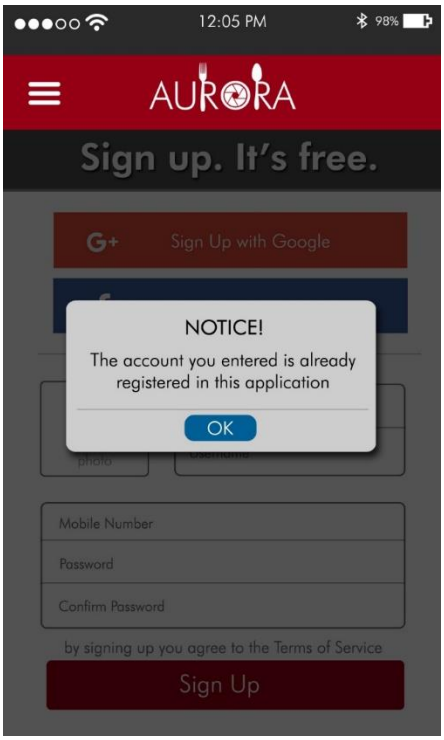

Figure 2.2: Account Error Notice

Figure 2 which is the Sign Up page allows the unregistered user to sign up using their Google or Facebook account, as well as their mobile number. Every entered data is checked by the application if it is already existing. If it is already existing, it will show a dialog box that says “NOTICE! The account is already registered in this application” (see figure 2.2). Else, it will confirm that the process of signing up is successful. Signing up using the user’s mobile phone makes it easier for them to receive the confirmation code (see figure 2.1). Instead of asking for their email in order to send the confirmation code, the application will ask for the user’s mobile number in order for the application to send the confirmation code on the mobile number entered by the us

Figure 3: Home Page

Figure 3 shows the Home Page of AURORA which serves as the overview of the application. This includes various images and information about the restaurant's food menu and the application itself. Another thing that can be found here is the feedback section (Leave a Reply) and the Contact us section, if the user wants to communicate.

Figure 3.1: About the App

Figure 3.1 shows a brief description and information about the function of the application, AURORA. By clicking Read More, the user can see additional information about AURORA. They can also collapse if the user wants to return it to just the basic description. The Black button with an arrow pointing up functions as the shortcut button to scroll up without the user scrolling up using one of his/her fingers.

Figure 3.2: Leave a Reply

This figure 3.2 provides the user a chance to give feedbacks upon using the application. With just inputting the necessary details, the user can send his/her personal opinions or comments.

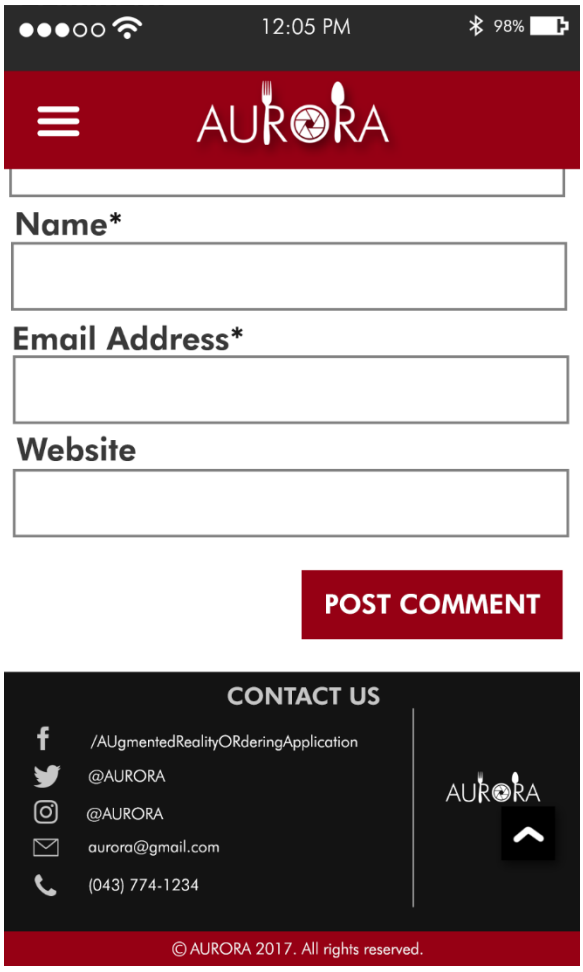

Figure 3.3: Contact Us

Figure 3.3 shows the contact us section wherein all social media accounts and contact information of AURORA can be found. Once clicked, the user will be redirected to the social media accounts of AURORA.

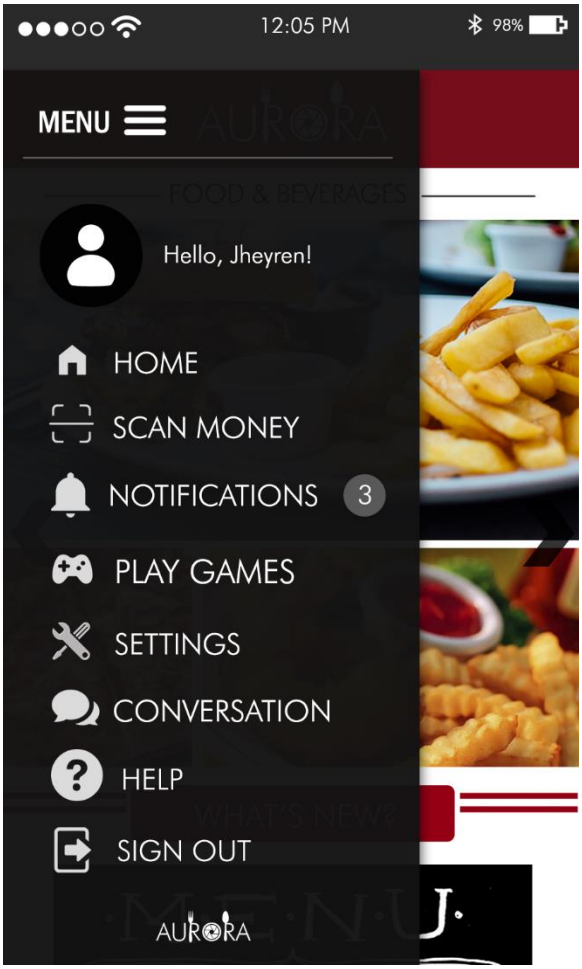

Figure 4: Menu Bar

Figure 4 shows the menu bar which includes the following options: Home, Scan Money, Notifications, Play Games, Settings, Conversation, Help and Sign out. The user will be redirected to a certain page or process when one the choices are selected.

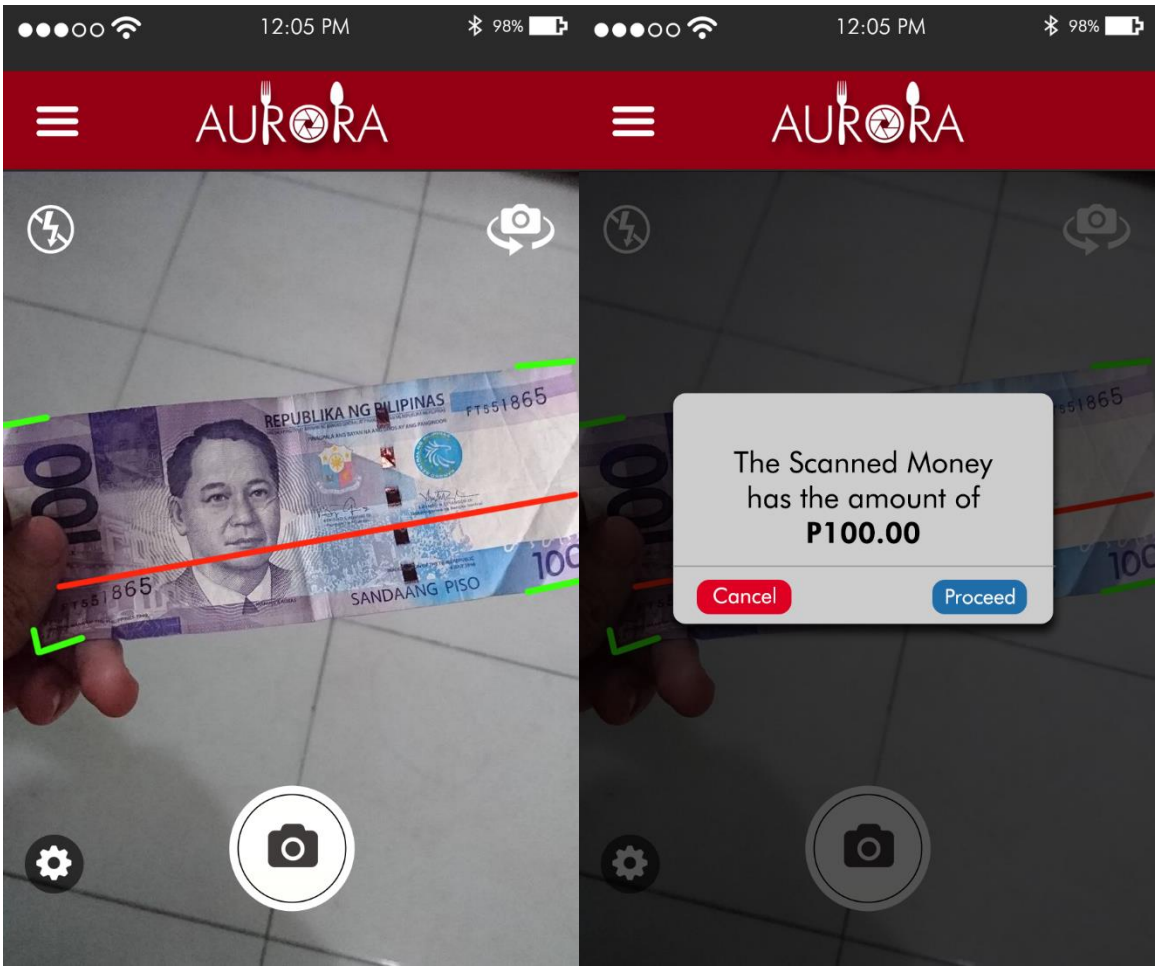

Figure 5: Scan Money

Figure 5 shows how the scanning of money works through the use of the camera of the mobile phone. With the bill/coins on-hand, the application can accurately identify the amount of money that the user have. A dialog box will appear to inform the user that the scanned money has the amount of, in this instance, P100.00. The user can scan again by just tapping cancel or if he/she want to go to the next process, the user must tap proceed whereas he/she will be redirected to the Augmented Reality part of the application.

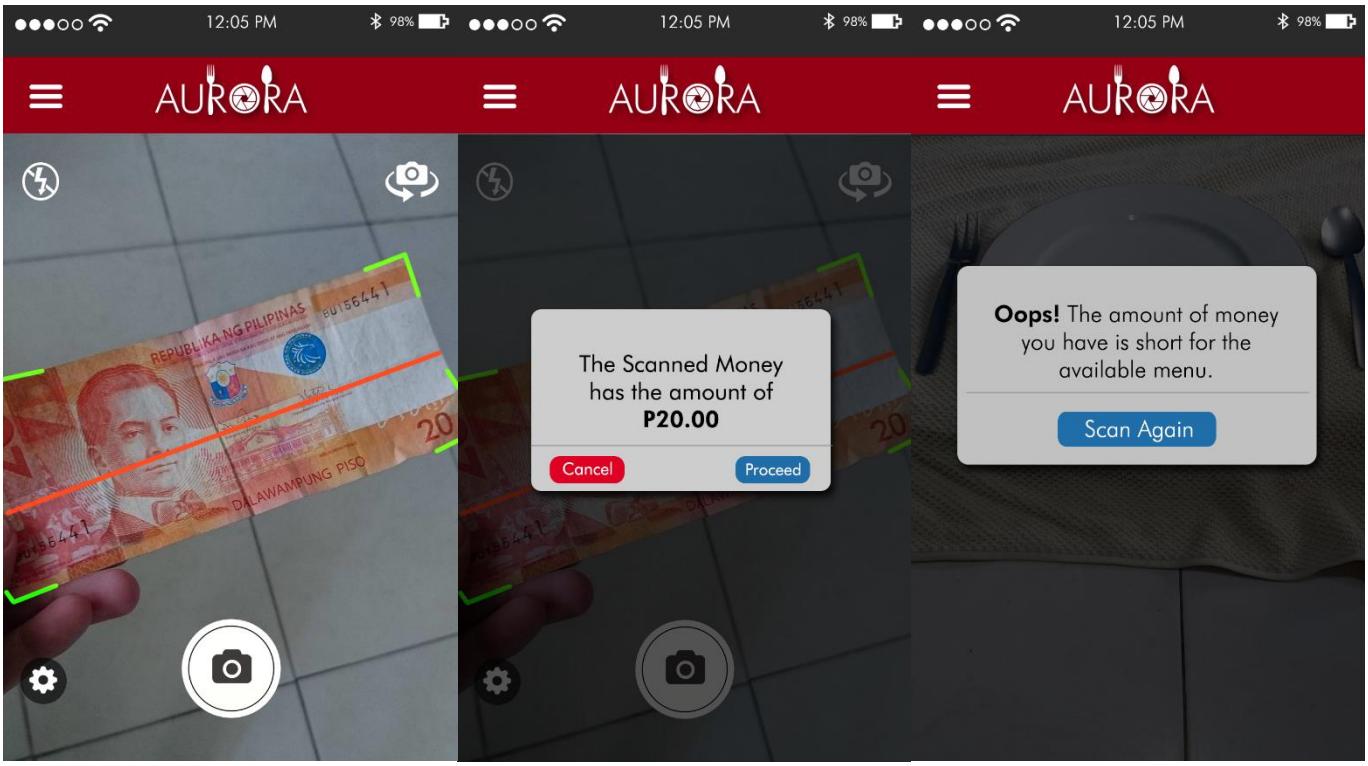

Figure 5.1: Scan Insufficient Money

Figure 5.1 shows what will happen if the money scanned is not enough or insufficient. In this instance, a dialog box displayed to inform the user that the money on hand is short therefore the user must scan other money again. 5 pieces of P20.00 can still be accepted, but 1 piece of P20.00 bill will not be accepted.

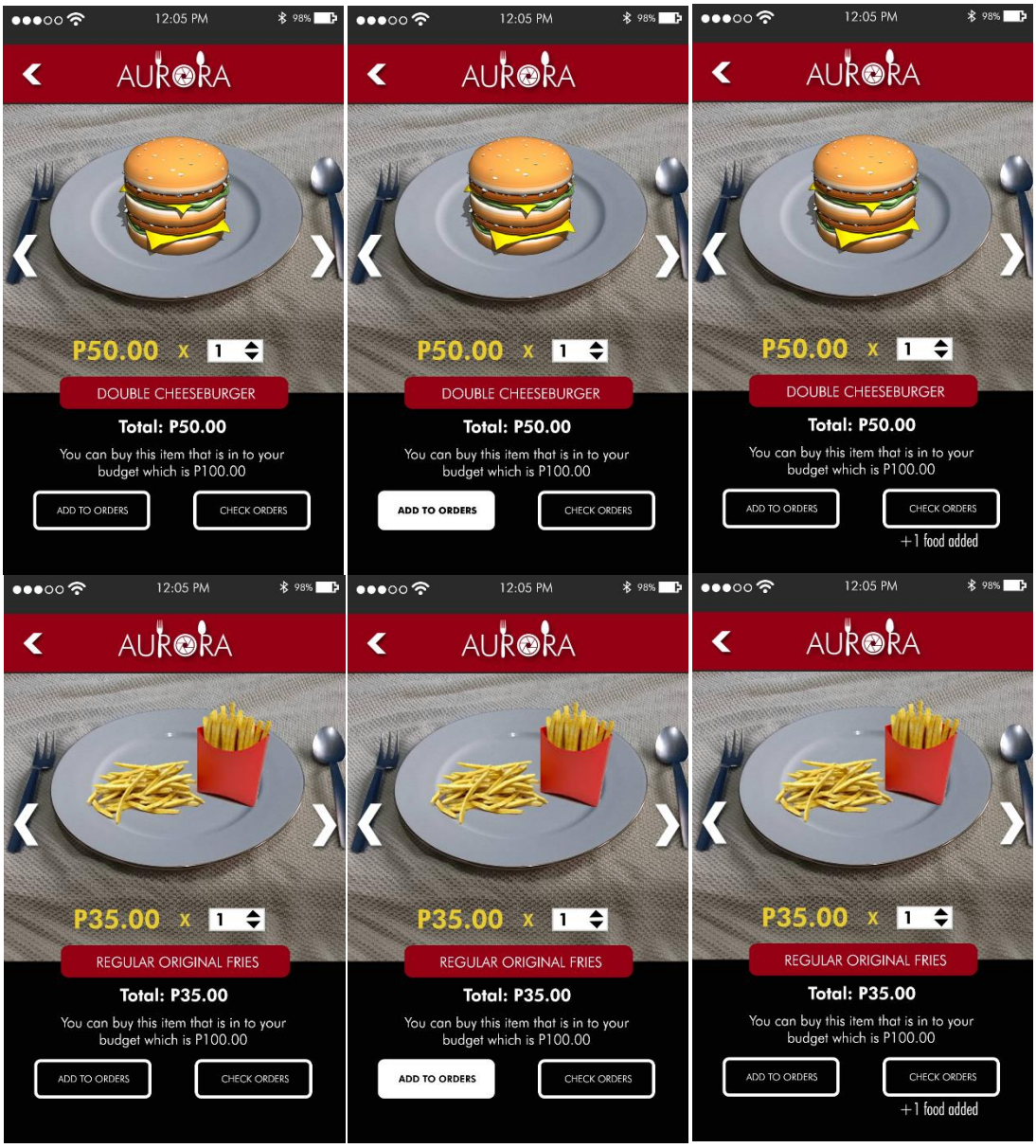

Figure 6: Ordering through Augmented Reality Food

Figure 6 shows the main part of the application which is the ordering through the use of Augmented Reality. Users can increase and decrease the number of food they want and it will automatically compute the total amount of money that user must pay. Users can add and check the chosen food to his/her order.

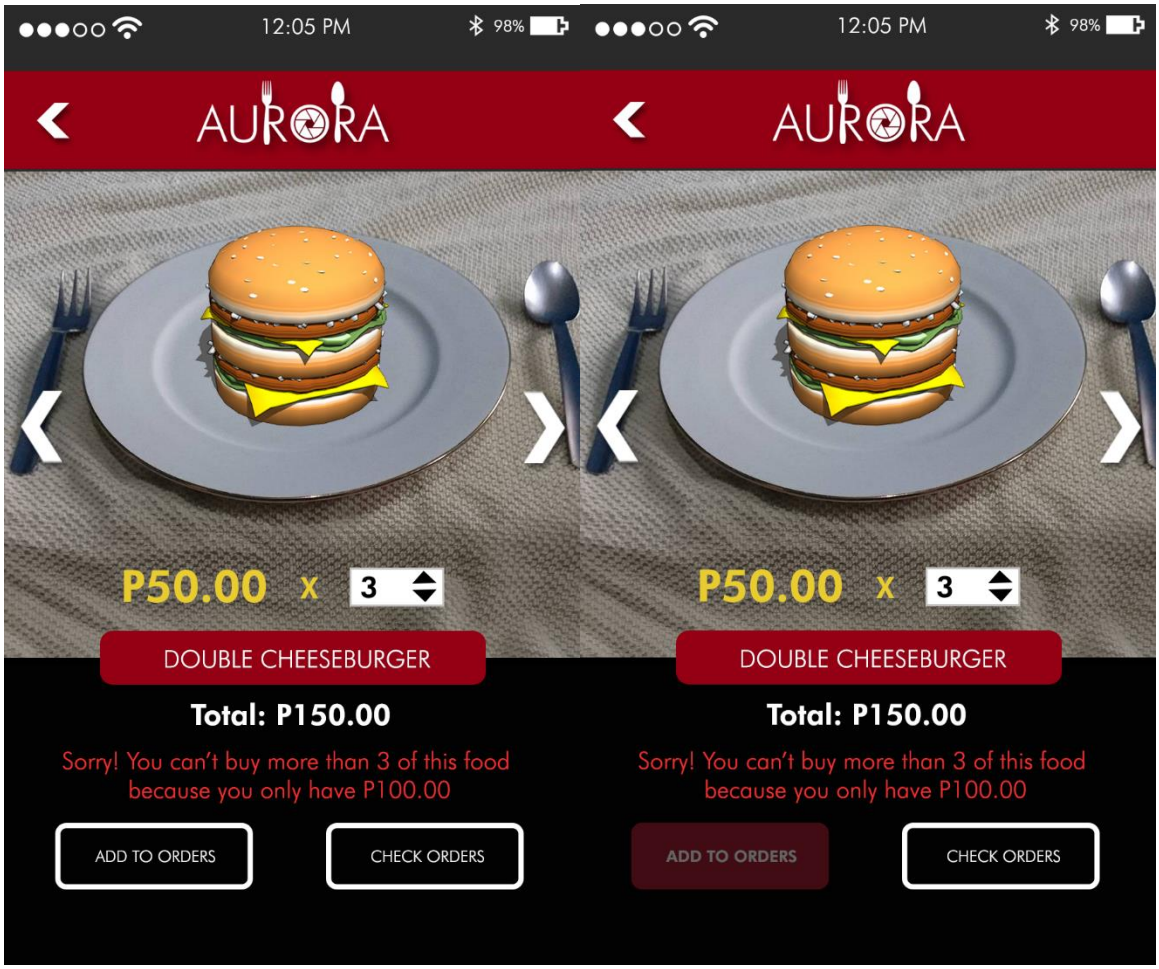

Figure 6.1: Order Exceeds

In this figure, a user cannot order because he/she have exceeded to the number of food that is only fit to the money that the user have on hand. The user can't tap the "add to orders button" because the money of the user was not enough thus adding of the chosen food was disregarded.

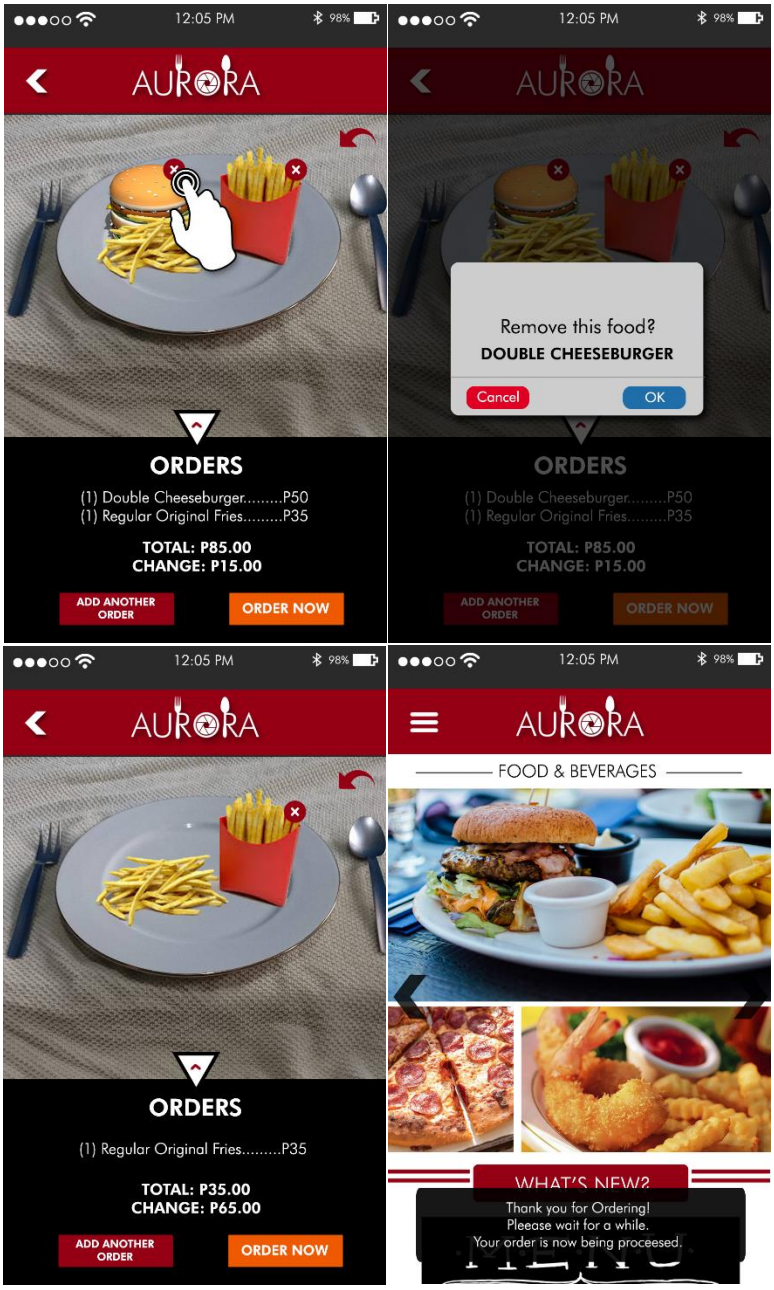

Figure 7: Check Order List

In this figure, the user can have the capability to add or remove food items on his/her list. With the affordance icons present in this user interface, the user can easily interpret what's the use of it on the application. Once the "Order now" button is tapped, a message will pop-up on the home page.

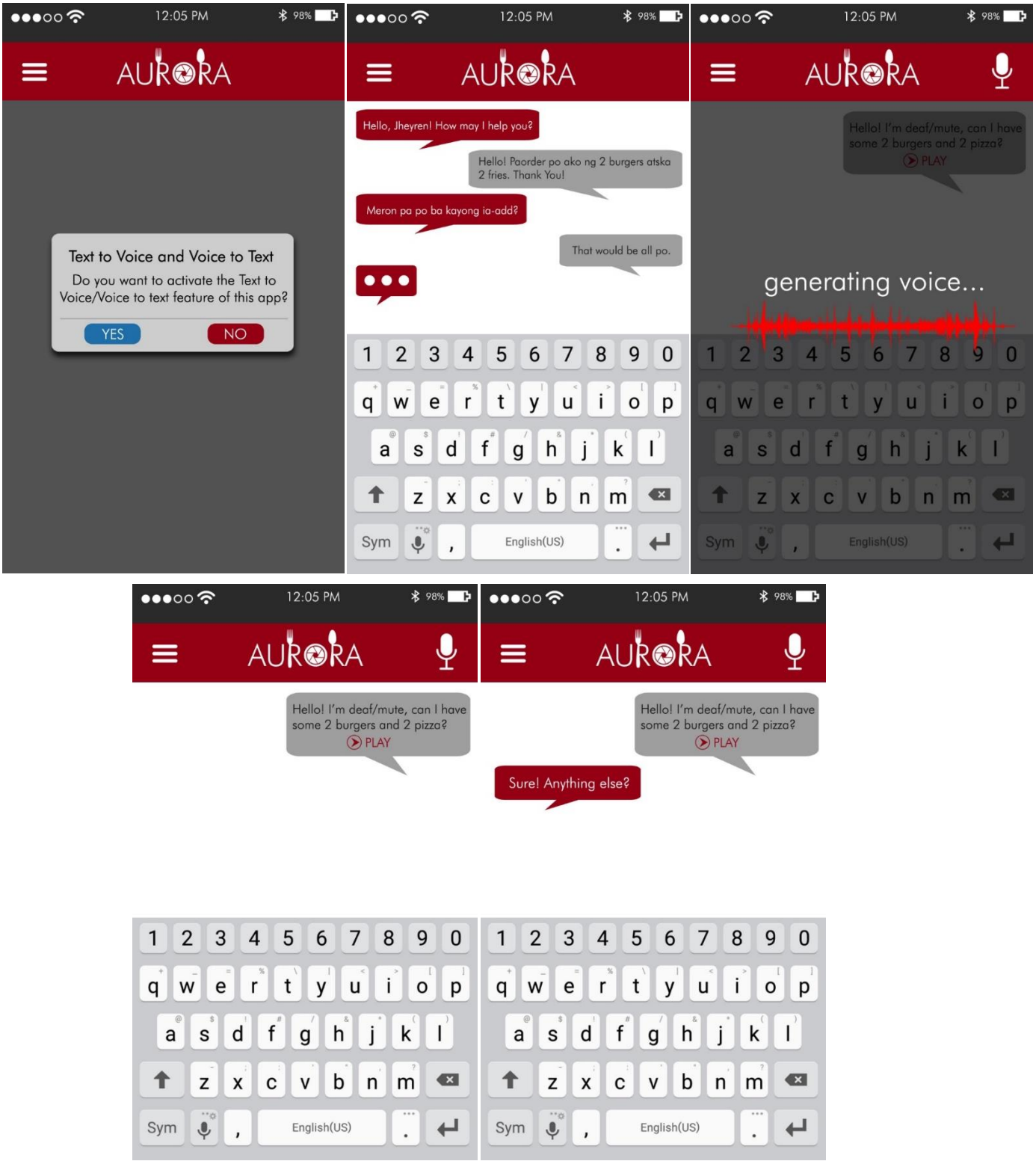

Figure 8: Conversation/Chat Box

The Chat box of AURORA does not only work for normal users. This allows the deaf/mute to do ordering transactions physically. Upon accessing the chat box, a dialog box will appear. It will ask the user if he/she would like to activate the Text to Voice/Voice to text feature of the application. If the user chooses “no”, then a normal chat box will appear. If the user chooses “yes”, the user can record the voice of the people around him/her, which is called the Voice to Text. The user can also write a message and the application will convert it into voice. In order for the user to convert the text into voice, in every chat icon of the user, there is a play button under the message. While, the voice to text feature can be done if the user pressed the microphone icon on the upper right side of the screen.

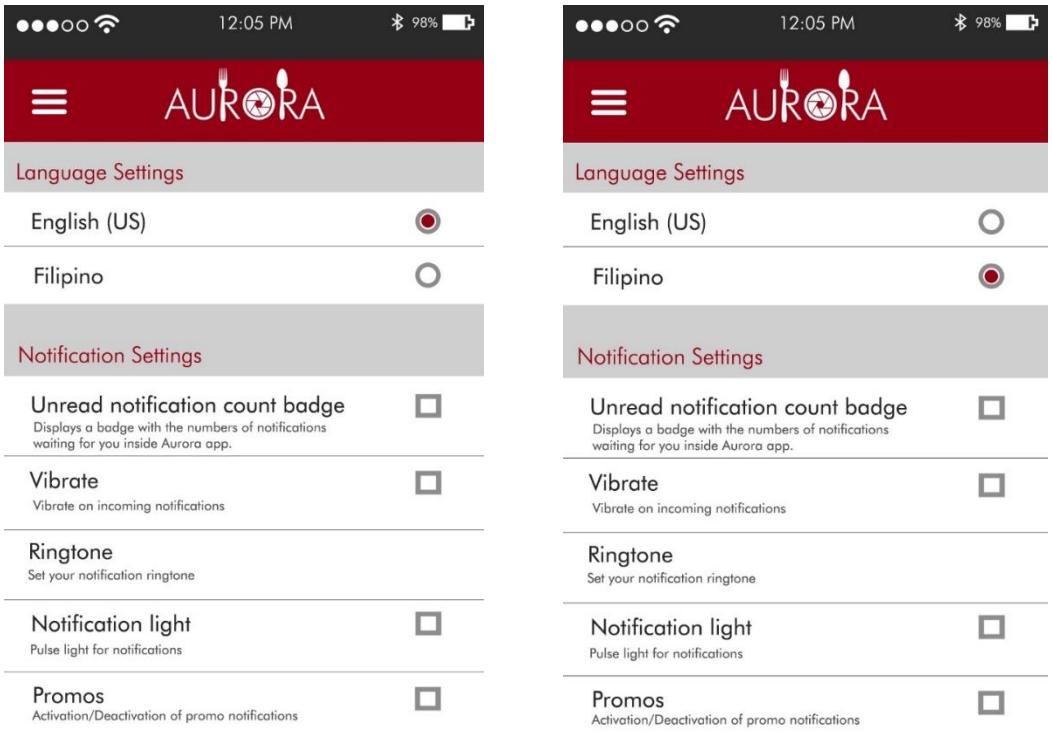

Figure 9: Settings

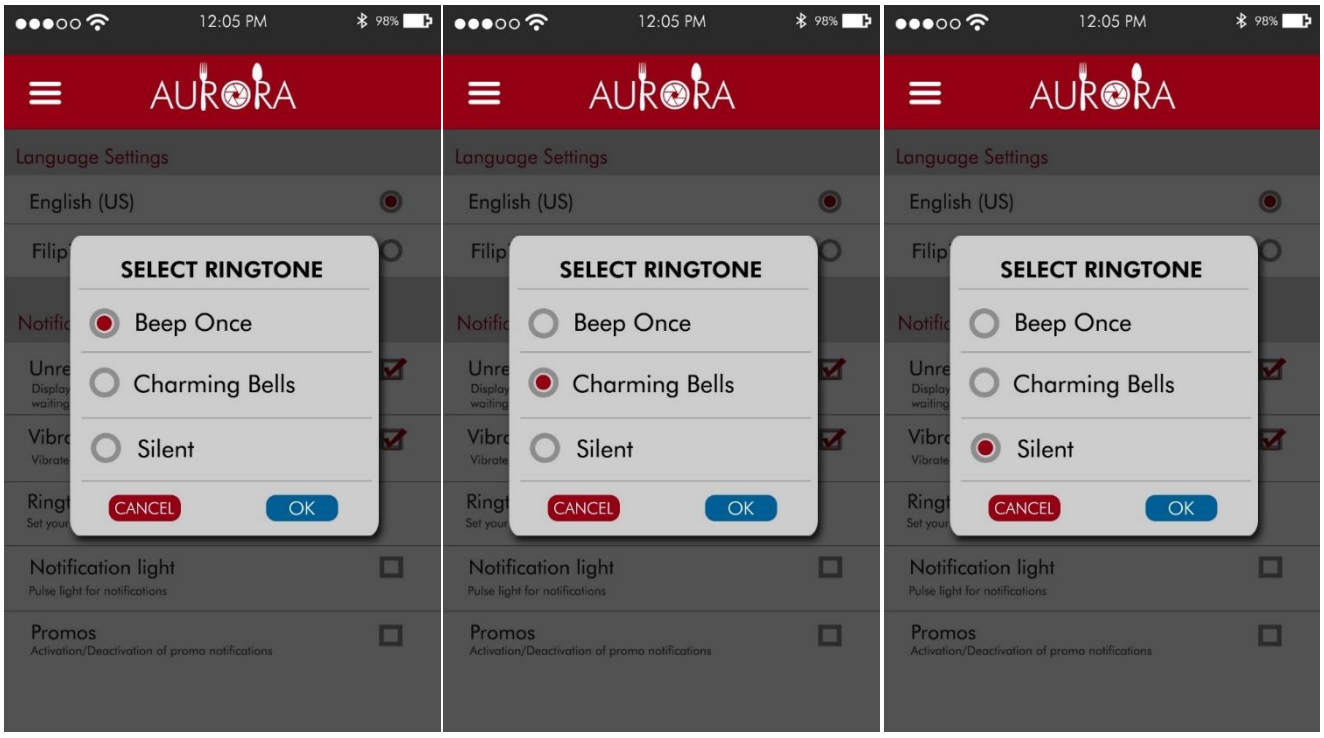

Figure 9.1: Select Ringtone

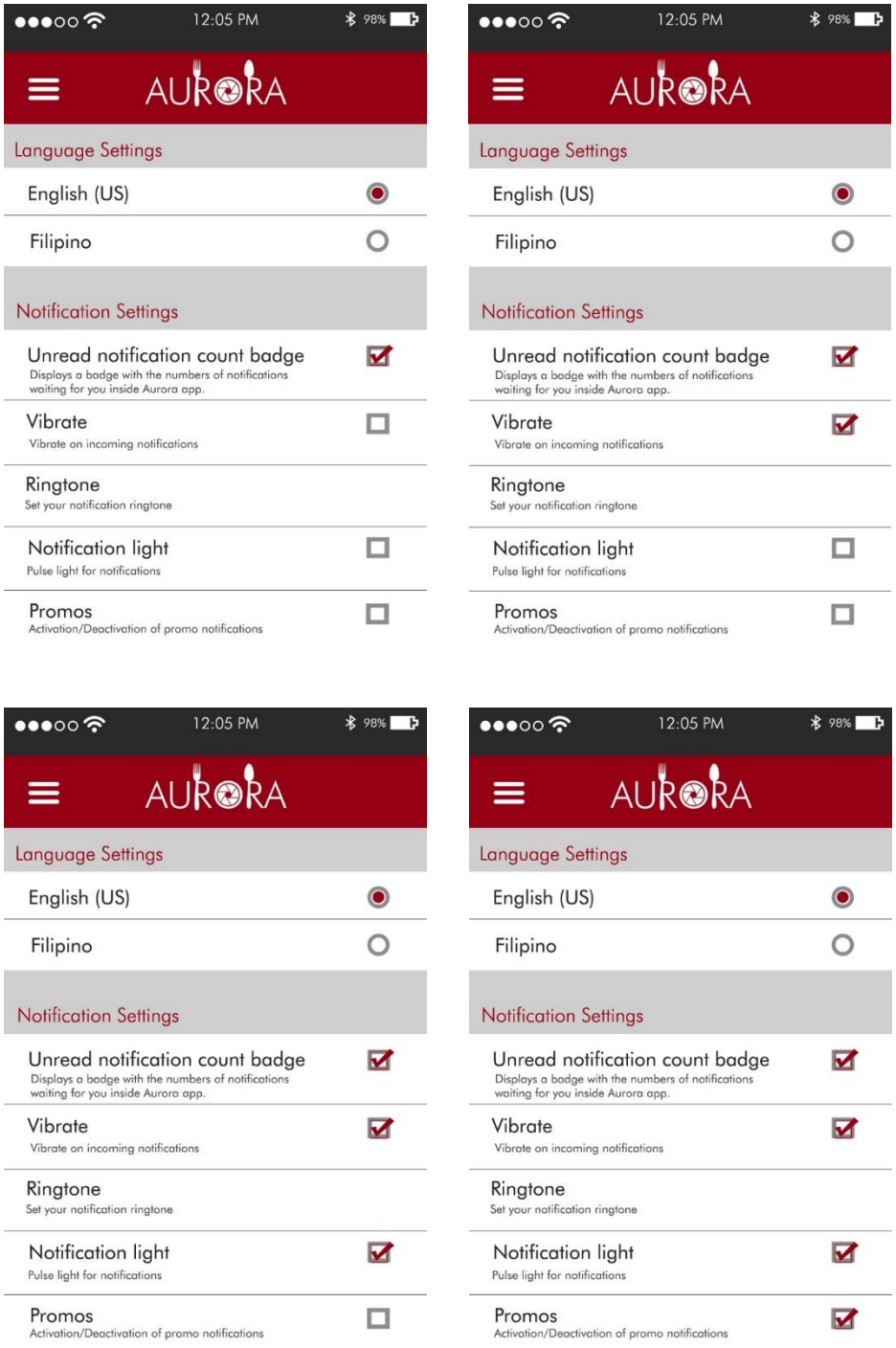

Figure 9.2: Notification Settings

Figures 9 shows the Settings wherein it allows the user to choose the language of the application. There are two languages available. Filipino and English. A radio button is used to help the user enter their choice, also because

the application only allows the user to choose one language. In the notification settings which is figure 9.2, a checkbox is placed to activate each features. The user can choose all of them or even none. The unread notification count badge will allows the application to display the number of notification that the user has not yet read. The vibration will make the phone vibration on incoming notifications. When the notification light is checked, it will activate the feature wherein, when there is an incoming notification, there will be a pulse light in order for the user to be notified. There is also an activation and deactivation of promo notifications. The user can freely choose to activate or deactivate their notifications regarding the promo offered by AURORA. The user can also choose ringtone for the notifications. A dialog box will appear once the ringtone is chosen (see figure 9.1).

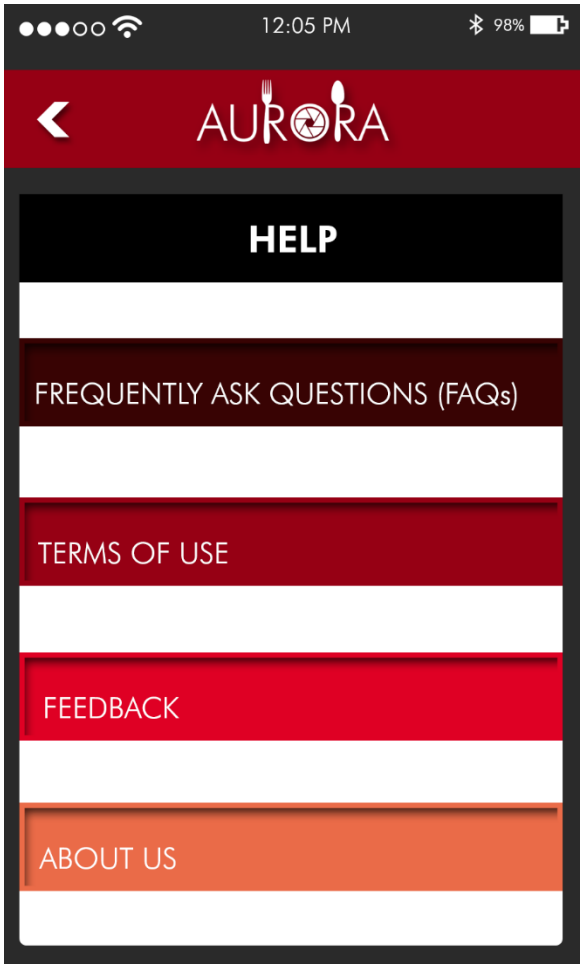

Figure 10: Help

Figure 10 shows the Help section which basically includes the FAQs, Terms of use, Feedback and About us. This section of the application will provide the user a guide or information about how AURORA works. Also, this section will prove the users the opportunity to give feedbacks and know more about the use of this application.

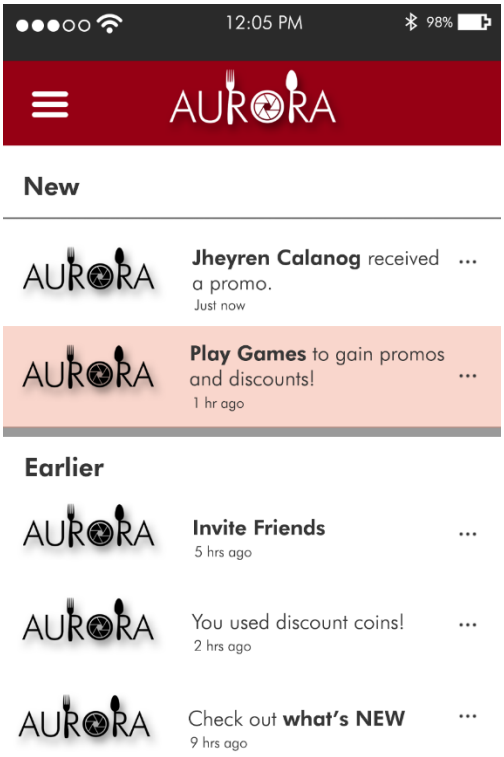

Figure 11: Notification

Figure 11 shows that there is a notification from the application that inform the user about a promo or update he/she received. This notification settings is basically connected to the mobile phone system itself thus a user can be notified if his/her mobile phone is not in use.

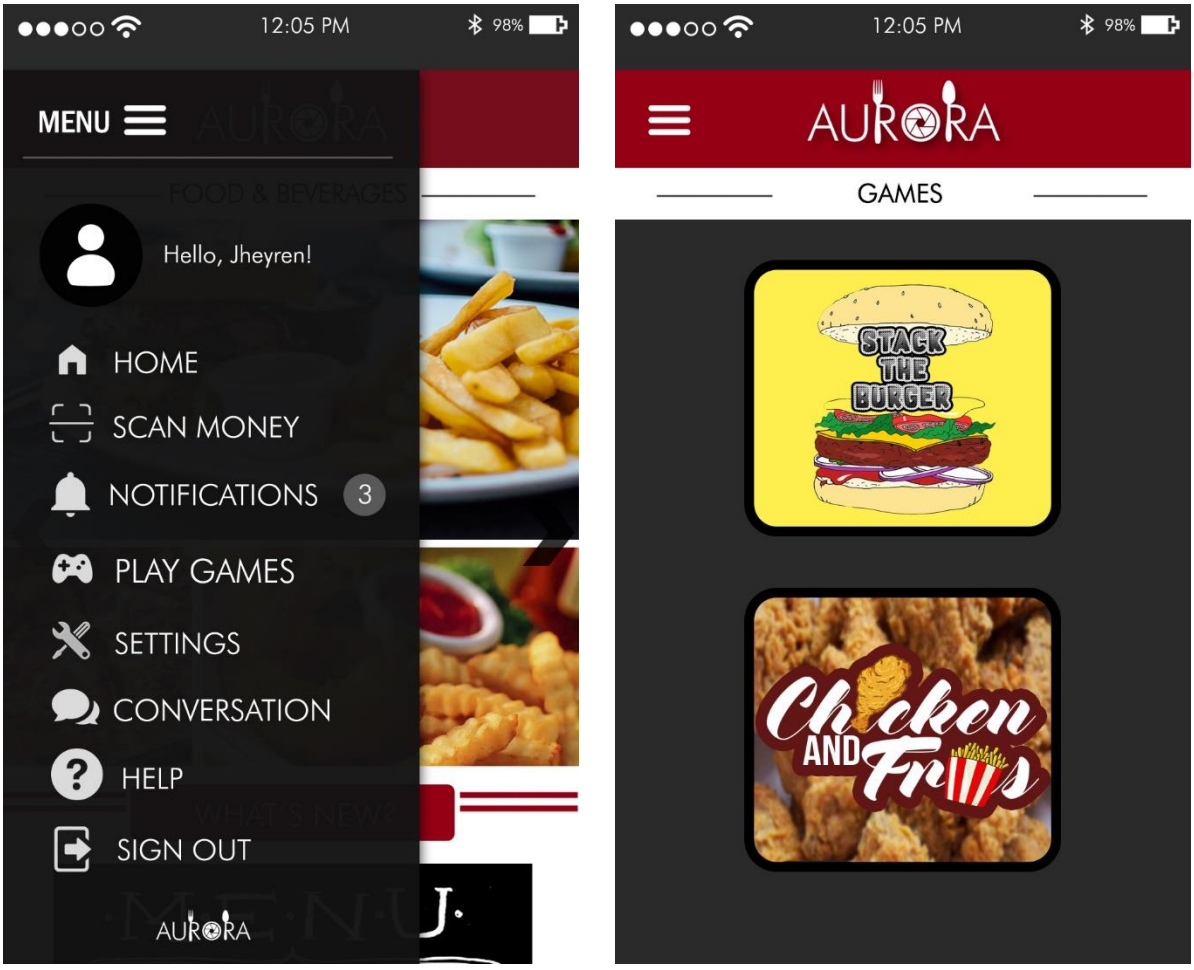

Figure 12: Game Page

In order to access the featured game of AURORA you need to click the play games tab and select to the button of the desired game. AURORA have two featured games – Stack the Burger and Chicken and Fries.

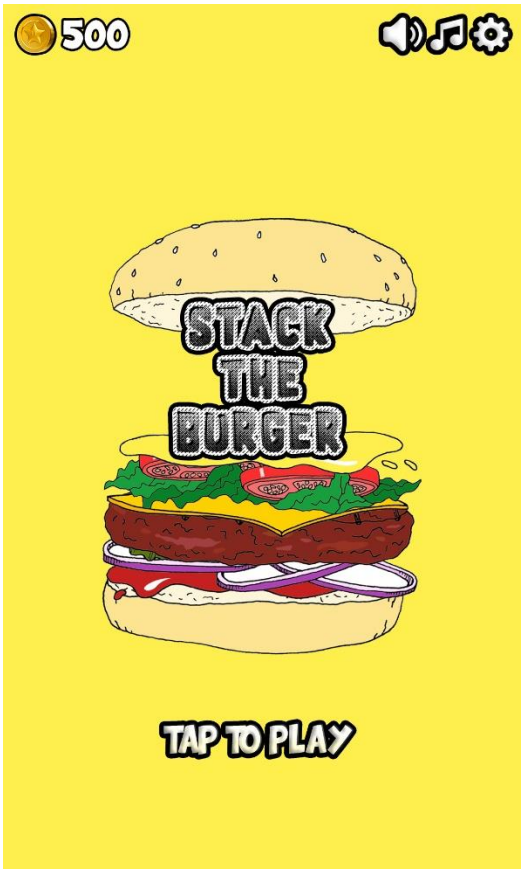

Figure 13: Stack the Burger Main Page

Stack the burger is one of the featured game of AURORA. The main page of the game, as well as the whole game, will use a color scheme of white, yellow, black and other colors for the burger design. In order to play, the users need to tap the screen. The game page will look as follows:

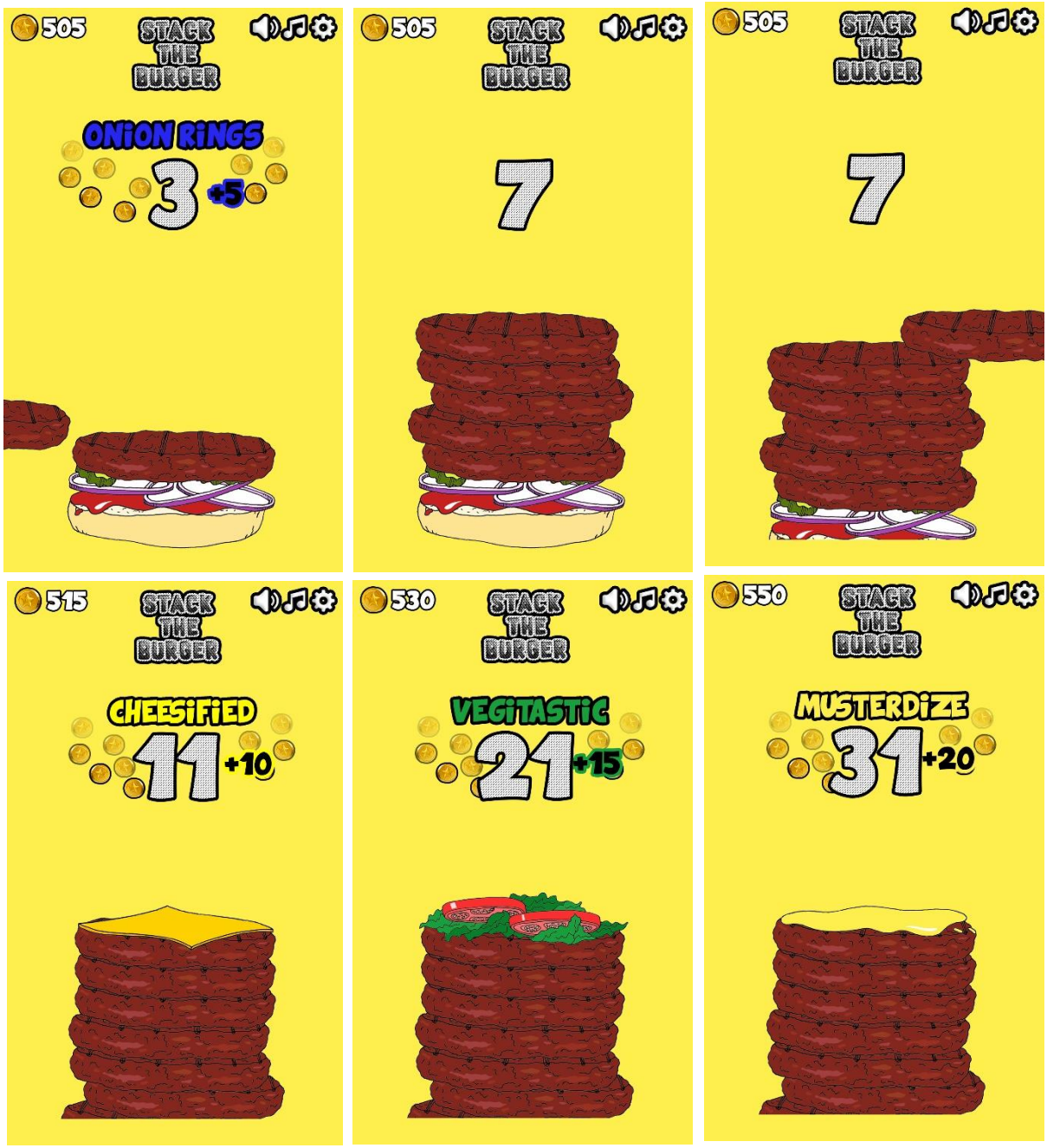

Figure 13.1: Stack the Burger Game Page

Stack the Burger featured four different bonus points – Onion Rings, Cheesified, Vegitastic and Musterdize. Onion Rings bonus points will appear every three consecutive perfect stack of burger. It will cost an additional of 3 coin points. The Cheesified bonus points cost ten additional coin points and will appear on every ten consecutive perfect stack of burger patties. Vegitastic will only appear on every twenty consecutive perfect stack of burger patties and will have an additional of 15 coin points. Lastly, the musterdize bonus points will appear on thirty consecutive perfect stcak of burger patties and will cost a 20 additional coin points.

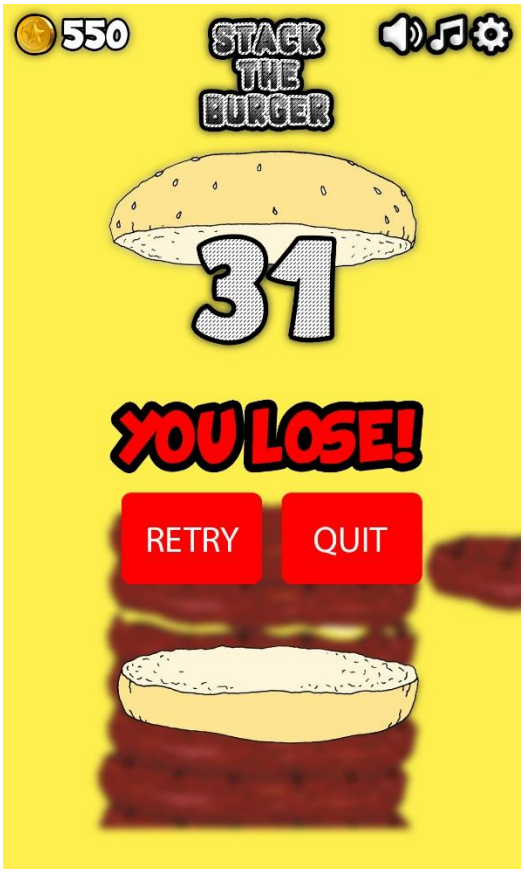

Figure 13.2: Stack the Burger Game Over Page

Once the player lose the game by misplacing the patties, this page same as illustrated above will be shown.

Figure 13.3: Stack the Burger Settings

Stack the Burger will have three main settings – Music, Sounds and Settings. Music and Sound buttons will allow the user to manipulate the background music and sound effects of the game respectively. The settings button will direct the user to a pop-up message box which will content three linked buttons – Use Discount Coins, Rate Us and Connect to Facebook. Connect to Facebook button will redirect the user to facebook authorize app access page. The rate us link will redirect the user to app store (foriOS) or google play store (for Android) rate form. Use discount coins button will direct the user to a page as shown below:

Figure 13.4: Stack The Burger Discount Page

The discount page will show a list of discount rates that the users can use. Discount coins can be acquire by playing the game and achieving the bonus points. Each amount of discount coins have a corresponding discount rate. Ones a discount rate is chosen, it will show the page as shown below:

Figure 13.5: Stack the Burger Message Boxes for Discount Page

The user will be ask to verify his/her choice once the user clicked a discount button. If the user have an insufficient discount coins it will display a “You have Insufficient Discount Coins” message box as hown above.

Figure 13.6: Stack the Burger QR Code for the Discount Points

Once the user verified his/her chosen discount rate and have a sufficient discount points, it will show a QR Code that will be scanned once the user pays for his/her orders.

Figure 14: Chicken and Fries Main Page

Chicken and Fries is the other featured game of the AURORA's mobile application. The game will use a color scheme of pale red, white and black as well as a blurry background of fried chickens. The game can be played by manipulating the bucker as shown above. The game page will look as follows:

Figure 14.1: Chicken and Fries Game Page

The bucket at the centre of the mobile interface can be swipe to left and right to catch the falling foods. Every ten consecutive catch, the game will give a two discount coins to the player. Once the player let the food fall to bottom, the game will be over. The game over page will look as follows:

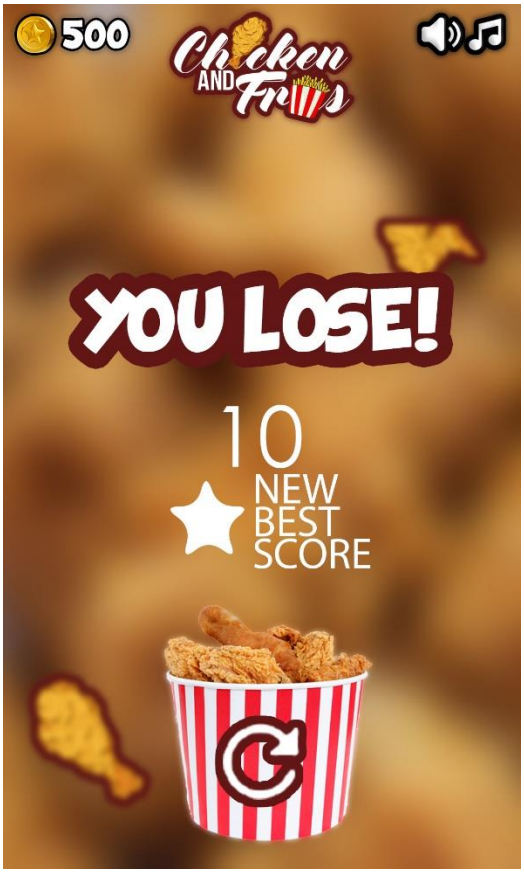

Figure 14.2: Chicken and Fries Game Over Page

In the game over page, the game will display the total score of the player in the said game as well as if the score is the new best score. Player can retry the play by tapping the bucket.

Figure 14.3: Chicken and Fries Settings

Same as the Stack the Burger Game, the Chicken and Fries have three settings with the same functions. Music and Sound buttons will allow the user to manipulate the background music and sound effects of the game respectively. The settings button will direct the user to a pop-up message box which will content three linked buttons – Use Discount Coins, Rate Us and Connect to Facebook. Different from the Stack the Burger, Settings can only be accessed at game main page. Connect to Facebook button will redirect the user to facebook authorize app access page. The rate us link will redirect the user to

app store (foriOS) or google play store (for Android) rate form. Use discount coins button will direct the user to a page as shown below:

Figure 14.4: Chicken and Fries Discount Page

The discount page will show a list of discount rates that the users can use. Discount coins can be acquire by playing the game and achieving the bonus points. Each amount of discount coins have a corresponding discount rate. Ones a discount rate is chosen, it will show the verify pop-up message as shown below:

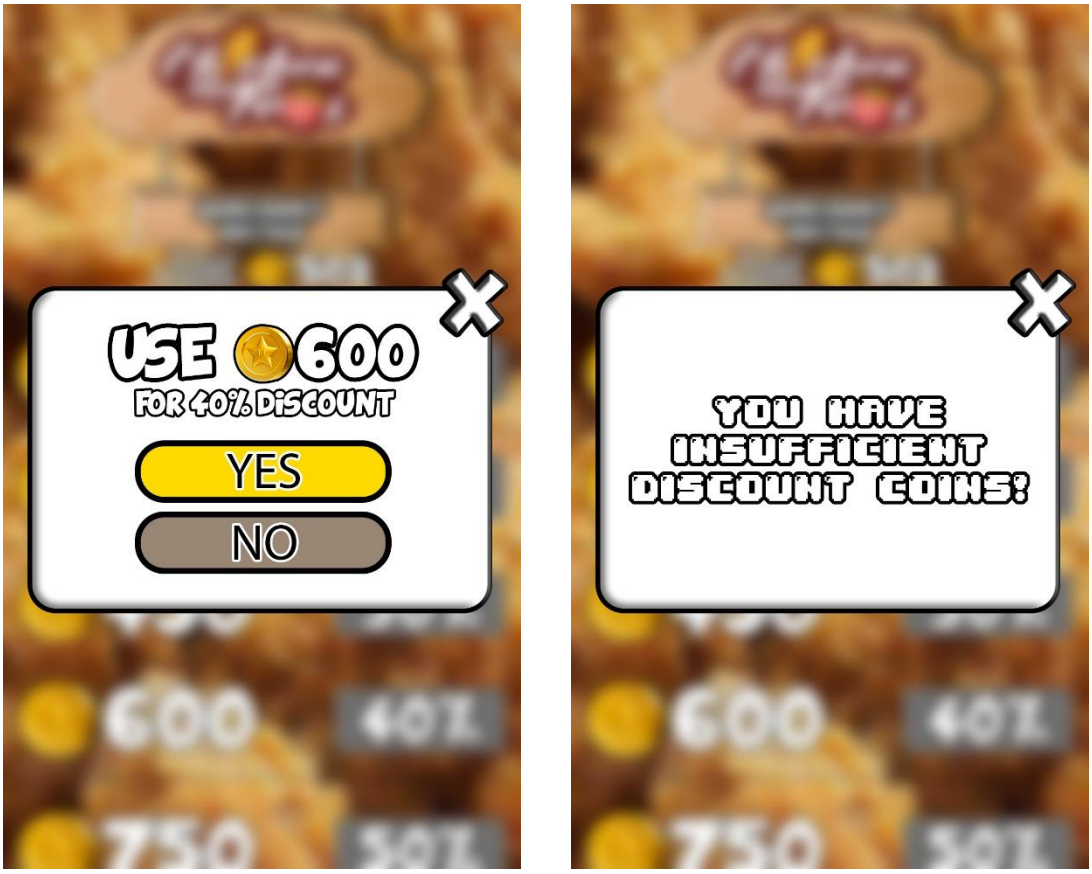

Figure 14.5: Chicken and Fries Message Boxes for Discount Page

The user will be ask to verify his/her choice once the user clicked a discount button. If the user have an insufficient discount coins it will display a “You have Insufficient Discount Coins” message box as hown above.

Figure 14.6: Chicken and Fries QR Code for the Discount Points

Once the user verified his/her chosen discount rate and have a sufficient discount points, it will show a QR Code that will be scanned once the user pays for his/her orders.

Hardware Requirements

For Android Users

- Android 4.4 to Android 6.0.1
- Preferred screen resolution of 720 x 1280 pixels
- Strong internet connection (Wi-Fi, 3G, or 4G)
- GPS and Location Services
- Intel CPU’s are not supported

For iOS users

- iPhone 5+
- iOS 8+
- Preferred screen resolution of 750 x 1334 pixels
- Strong internet connection (Wi-Fi, 3G, or 4G)
- GPS and Location Services
- Jailbroken devices are not supported