



Engineering Design
GNG1103[A]

Deliverable G: Prototype II and Customer Feedback

Team A15

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Abstract

A prototype is a way engineers can develop a test design of their project. There are many different types of prototypes that can be created including but not limited to analytical, mathematical, experimental and numerical. Prototypes are used to analyse and visualize the ideas created by the design team. It is used to evaluate different aspects of the project and is a way to weed out flaws and technical issues for the next prototype. Prototypes are created repeatedly until a refined final product is produced. The more prototypes that are produced, the more sophisticated they become.

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1.0 Introduction

In this report the changes between Prototypes I and II are discussed; along with this, our test plan will be discussed in relation to Prototype I. The actual reasoning behind each of the differences between the two Prototypes will be explained along with the new features that have been implemented. Prototype II will also undergo testing similar to that of the first one, where feasibility of features, critical subsystems and their integration will be rigorously tested. Feedback the team received based on Prototype I is analyzed and used to determine needs more development and improvement, and what does not, according to the stopping criteria.

2.0 Analysis of critical components or system integration

The website consists of many equally important components, including a user signup and member login page, an interactive Google Maps, a functional cart into which food items can be added and tallied up, etc. In this prototype, a database of user credentials has been created and linked to the website, using the free database service, Caspio: new users can create an account on the website, using their email addresses and creating a password; they, along with existing users, can use their email addresses and passwords to log in. After they log in, they can order in two ways: selecting a nearby restaurant on the interactive Google Maps, or order by cuisine; either way, they will be directed to a restaurant page, where they can order specific food items. After picking food items, sizes and quantities, they can proceed to check out, where they can input their electronic payment method and consent to pay the amount as displayed. Lastly, after the users consent to certain terms and conditions, the drone will be sent to the address, showing the estimated time of arrival of the drone.

Stopping criteria vary depending on the component. The login page is functional, so no stopping criteria is needed. The Google Maps is partially functional, and development on it will stop when there is a successful linkage to a restaurant page when an actual restaurant on the map is selected. The restaurant pages are largely esthetic in nature, since there are already a few sample food items in each of our sample restaurants; it will continue to be developed, but will remain on the backlog of the project.

3.0 Justification, reasoning and explanation of tests

Prototype II is very important to the team, and the main goal is to have a mostly functional website with successful integration of multiple critical subsystems with some aesthetics. Some testing criteria will be discussed below; others are also found in Table 1.0 as well.

Firstly, all of the pages must have functional buttons that lead to the correct pages; this is quite simple for most linkages, but is more complicated with pages like the signup and login page powered by Caspio, the cart, etc. The stopping criterion was that all buttons are functional; development on this feature has ended.

Second, the login and signup pages must be functional. The database system, powered by Caspio, allows a signup page to be integrated directly with the website; any information that is recorded is only accessible by team members. The login credentials can be used to log into the website, only after which customers can the customer start ordering. The login system uses cookies to remember whether a user has already logged in or not: note that “Prevent cross-site tracking” must be turned off in Safari for this feature to function properly. The stopping criteria are that the signup information is stored correctly on the Caspio database, that the credentials can be used to log in

successfully, that incorrect credentials are denied, and that the user only needs to log in once; development on this feature is ongoing.

Third, the cart must be able to accept any items that the user adds to it, and to calculate the total amount. The stopping criteria are that the cart is functional and the checkout process is functional and intuitive; development on this feature is ongoing.

Fourth, some sample restaurants and cuisine must be included in the website. The stopping criteria were there were at least four sample cuisines, where each cuisine has at least one sample restaurant, which must have a sample name, photo and three sample food items; development on this feature has ended, however, it is a backlog task that may continue to be expanded for esthetics and completeness.

Fifth, the website must only work when local weather permits. When the weather is rainy, windy, or otherwise dangerous to the drone and/or the food, the website automatically blocks users from using the delivery service, and instead displays a weather error message. The stopping criterion is that the website does not provide service whenever the weather is bad; development on this feature is ongoing.

Lastly, the website must correctly determine the location of the user and display an ETA of the drone. The data is calculated from the haversine formula; see section 4.0 Model. The stopping criterion is that the website shows a correct ETA based on the distance between the delivery address and the current drone location; development on this feature is ongoing.

4.0 Model

In this project, numerical and analytical models cannot be used as no mathematical models or approximations can be made for the project ***as a whole*** (i.e. the website). As such, an experimental model was made for the project. This was in the creation of the website. However, ***certain elements of the website can*** be made using analytical methods. For instance, when calculating the distance between two locations (when given the coordinates of the drone and the user) a formula for the distance must be taken. In this case, the haversine formula was taken:

```
function getDistanceFromLatLonInKm(lat1,lon1,lat2,lon2) {
  var R = 6371; // Radius of the earth in km
  var dLat = deg2rad(lat2-lat1); // deg2rad below
  var dLon = deg2rad(lon2-lon1);
  var a =
    Math.sin(dLat/2) * Math.sin(dLat/2) +
    Math.cos(deg2rad(lat1)) * Math.cos(deg2rad(lat2)) *
    Math.sin(dLon/2) * Math.sin(dLon/2)
    ;
  var c = 2 * Math.atan2(Math.sqrt(a), Math.sqrt(1-a));
  var d = R * c; // Distance in km
  return d;
}

function deg2rad(deg) {
  return deg * (Math.PI/180)
}
```

A closed-form solution exists, and can be obtained with this formula. Briefly, the whole of the prototype is an experimental model, yet *certain aspects* (such as the ETA of the drone) can be described using analytical models.

5.0 Prototype II

In this prototype, new features were improved upon and incorporated into the website. First, the login page was made functional using Caspio (previously, the login did not work). Secondly, a working map that showed nearby restaurants using a maps API key was created (previously, only select restaurants were shown). Third, a sample code for the ETA was started (partially functioning, aimed to be functioning at prototype III). Finally, a template for the weather locations was created.

Table 1.0 Prototype II test plan and results description

ID	Test Objective (Why)	Description of Prototype Used and of Basic Test Method (What)	Description of Results to be Recorded and how these Results will be Used (How)	Estimated Test Duration and Planned Start Date (When)
1	To ensure that all buttons works and the links lead to the correct page	Page linkages	Record that all links lead to the desired page and there aren't any broken links	(1 Day duration)- Starting Nov 20th
2	To determine if registration/ login system functions correctly	Entering a sample user's info	Record if the data entered be the user is stored into the google sheet document,	(1 week duration)- Starting November 12th
3	Test functionalities of the cart and all of its features	Cart	Record if items can be added to the cart, the correct sum is displayed, and the user can proceed to payment/ checkout	(2 week duration)- Starting November 12th
4	To ensure that each cuisine type has at least one restaurant page, and that each restaurant page	Restaurant pages and menus	Record correct meals being shown under the correct restaurants	(3 week duration)- Starting November 12th

	has the basic elements, including menu items, name and photo			
5	To test that restaurants within the vicinity of service are shown on the map and that live tracking is available	Google Maps	Record if the maps are displayed correctly with the correct data	(3 week duration)- Starting November 15st
6	To ensure the aesthetics of the website are visually appealing to sample clients	Aesthetics	Receive feedback from different volunteers on their opinions of how the website actually looks (color palette, image size, image choice)	(2 week duration) - Starting November 12th
7	To ensure that the website only allows delivery service when the weather permits	Operating Weather Conditions	Ensure that the user is not able to order anything from the UI in the event that it is unsafe for the drones to operate due to weather conditions.	(3 week duration)- Starting November 14th
8	To ensure that all linkages to different cuisines concert to their specific restaurant lists and that all connections are valid	Order by cuisine	Make sure when you click on a cuisine there are no displayed errors and you can navigate cuisine options forwards and backwards	(1 week duration) - Starting November 12th
9	To ensure the users address is properly shown in relation to the longitude and latitude the is used to compute the ETA	Location services and ETA	Make sure that the locations tried are actually accurate, this will be collected from getting different people in different places to test this feature and compare it to their coordinates	(1 week duration) - Starting November 15th

10	To ensure there are terms and conditions that the user must agree to before delivery is received, and order confirmation notification.	Terms and Conditions forms	Keep track of every user that agrees to terms and conditions for possible legal issues. This can be done by adding it to the database with the user's information.	(1 week duration) - Starting November 17th
11	To ensure that the timer properly works for the ETA	Delivery timer	Make sure that once the terms and conditions have been accepted the timer runs for the correct duration in relation to location and drone speed	(1 week duration) - Starting November 15th

Table 1 shows the test objectives, a description of the prototypes used and basic method test, a description of results and an estimation of the duration of the task to be performed. The team plans on performing these tests in an efficient and timely manner before design due. The team will ensure that testing is done by this time to ensure that our final product is fully functional.

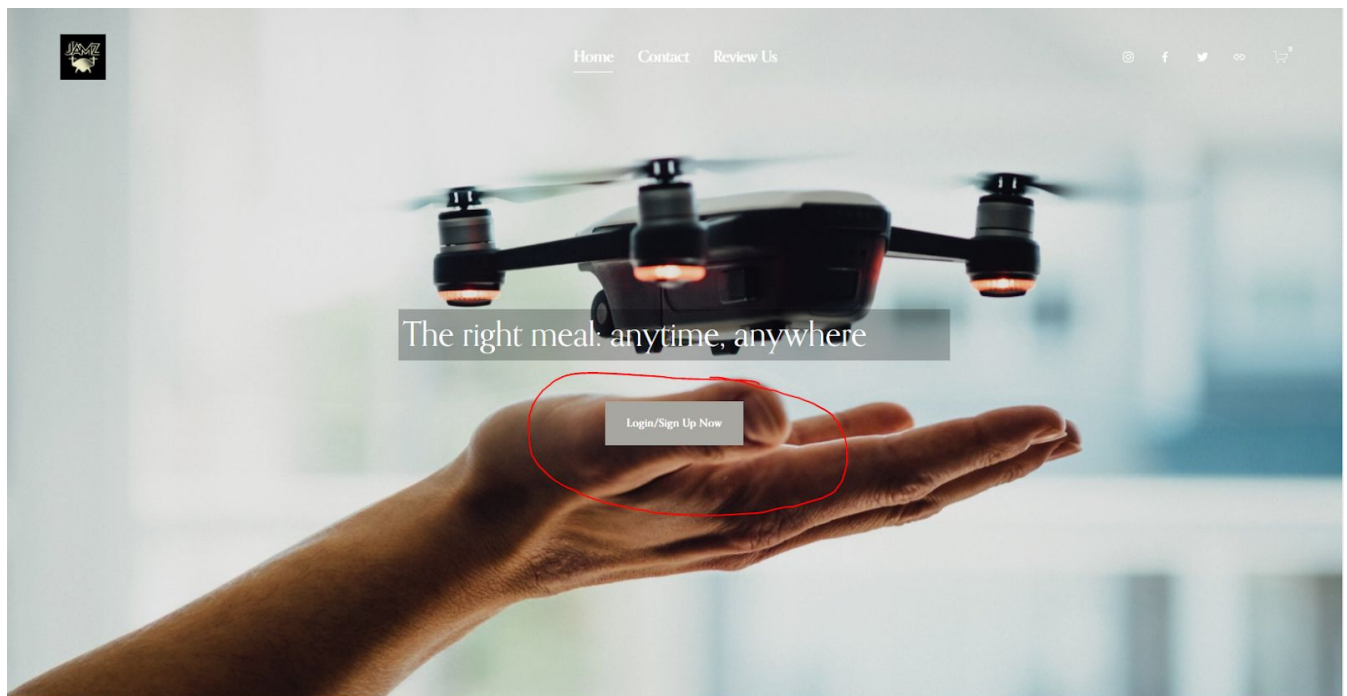


Figure 1: Home page

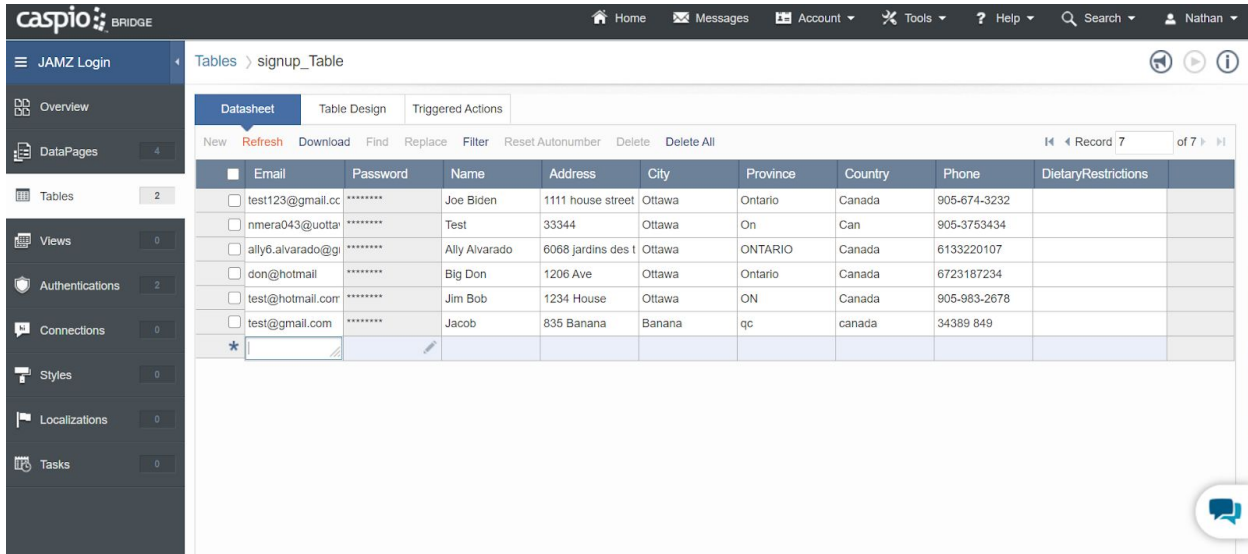
Figure 1 shows the main home page of the JAMZ food delivery webpage. The main emphasis of the home page is on the “Login/Sign Up Now” button since it is essential that the user creates an account/ logins in. It is very important that the user logins so that their address can be known by the website. With this being said it is important that the users address is in the database so only restaurants within their 10 km radius are shown.

The image shows two forms on a webpage with a background of a snowy mountain range under a blue sky. The top form is titled "Member Login" and contains fields for "Username" and "Password", followed by a blue "LOGIN" button. Below it is a small disclaimer: "Create a Free Online Database. Disclaimer: This is a Caspio free app. Do not submit passwords or other sensitive data. Report Abuse". The bottom form is titled "Sign Up Today" and contains fields for "Email *", "Create Password *", "Confirm Password *", "Full Name *", "Address *", "City *", "Province *", "Country *", "Phone *", and "Delivery Restrictions", followed by a blue "SUBMIT" button. It also includes the same disclaimer as the login form.

Figure 2: Sign up / Login Page

Figure 2 shows the user sign up/ login page. The user can either choose to login if they already have an account or sign up if they would like to register one. This login system uses an online database called caspio¹.

¹Caspio. (2020, October 02). Build Online Database Apps - Low-Code Platform. Retrieved November 13, 2020, from <https://www.caspio.com/>



The screenshot shows the Caspio BRIDGE interface for a database table named 'signup_Table'. The interface includes a navigation menu on the left with options like JAMZ Login, Overview, DataPages, Tables (2), Views (0), Authentications (2), Connections (0), Styles (0), Localizations (0), and Tasks (0). The main area displays a data table with the following columns: Email, Password, Name, Address, City, Province, Country, Phone, and DietaryRestrictions. The table contains 7 records, with the last one being a new entry marked with a star.

Email	Password	Name	Address	City	Province	Country	Phone	DietaryRestrictions
<input type="checkbox"/> test123@gmail.cc	*****	Joe Biden	1111 house street	Ottawa	Ontario	Canada	905-674-3232	
<input type="checkbox"/> nmera043@uotta	*****	Test	33344	Ottawa	On	Can	905-3753434	
<input type="checkbox"/> ally6.alvarado@g	*****	Ally Alvarado	6068 jardins des t	Ottawa	ONTARIO	Canada	6133220107	
<input type="checkbox"/> don@hotmail	*****	Big Don	1206 Ave	Ottawa	Ontario	Canada	6723187234	
<input type="checkbox"/> test@hotmail.com	*****	Jim Bob	1234 House	Ottawa	ON	Canada	905-983-2678	
<input type="checkbox"/> test@gmail.com	*****	Jacob	835 Banana	Banana	qc	canada	34389 849	
<input type="checkbox"/> *								

Figure 3: Caspio Account Database

Figure 3 shows the website account database stored on caspio. When the user signs up the data they enter is stored into this caspio database. When the user tries to login once again this database will be checked to ensure that the user's info exists in the system.

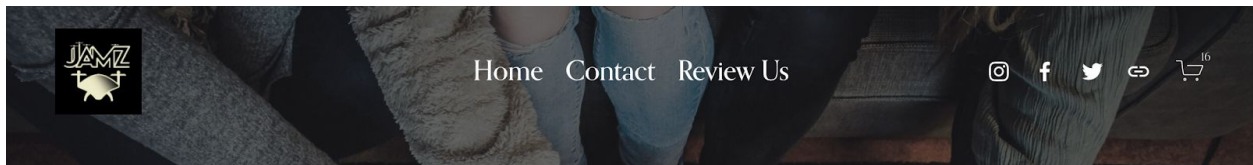


Figure 4: Website heading

Description: From the Menu Bar Located at the top of the website, users can access the 3 main pages (Home, Contact and Review), the cart feature, social media links including Jamz's Instagram and Youtube feeds. As well as it includes the JAMZ Logo.

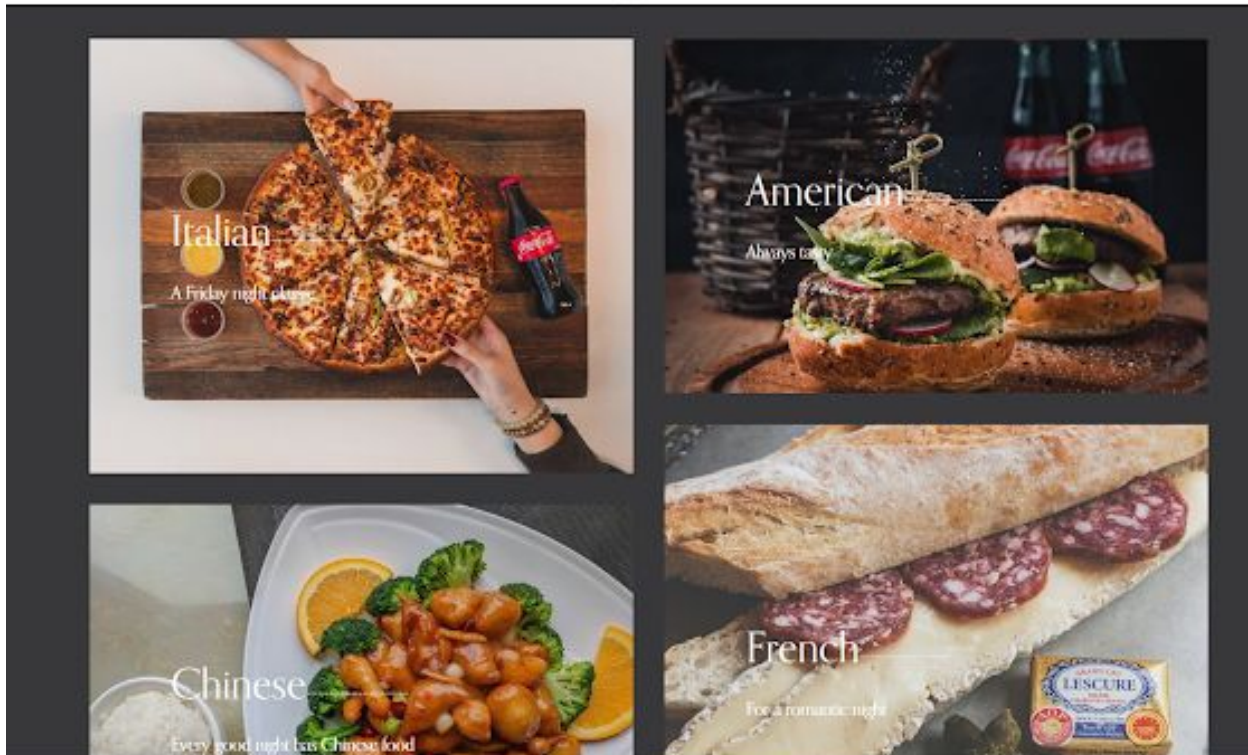


Figure 5: Cuisine

Figure 5 groups different available sample restaurants by cuisine for users to easily find what they want to eat.



Figure 6: Restaurant Page

A sample restaurant with its food options containing different size and price options

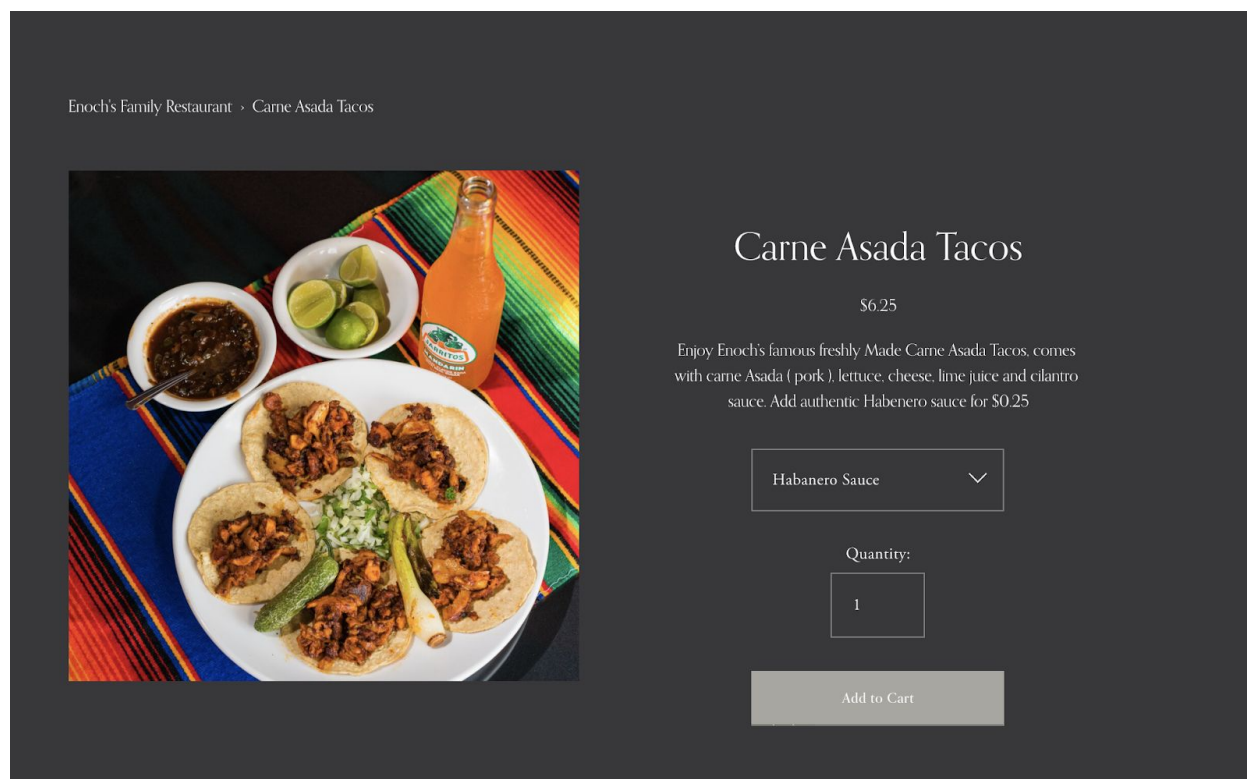


Figure 7: Food Ordering Prompt

Gives a brief description of the food they selected, gives total price for food and quantity they selected, additional options can also be added such as Extra Toppings or Size. This page also has an add to cart button once you are happy with your order, the order then gets added to cart and can be accessed in the top header.



Figure 8: Shopping Cart Feature

Cart functionality, displays selected orders , quantity and price. There is a functioning checkout feature, with online payment methods (paypal, or credit card)

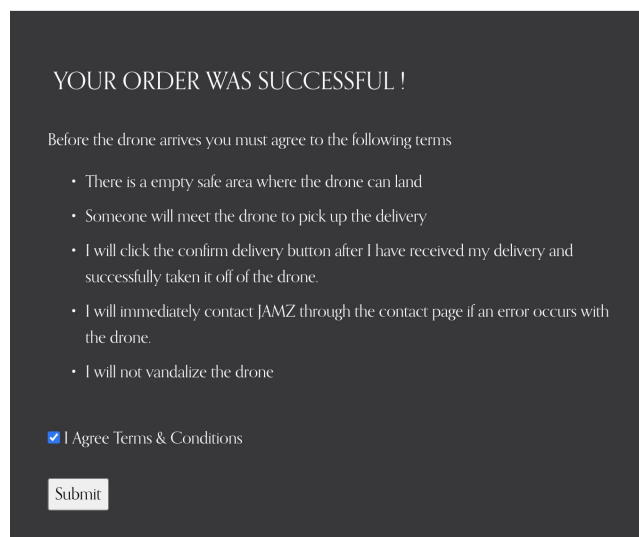


Figure 9: Term and Conditions and Order Confirmation

Confirms order that order has been successful and gives a list of terms and conditions that the user must read and agree to before the order arrives. The submit button will bring users to the ETA page, the Submit button is only clickable if the terms and conditions are agreed.



Figure 10: ETA of order once placed

A sample delivery time taken once an order has been processed. In the future, a tracking map to track the drone will be displayed on the right with an accurate estimation of time, this will be done by calculating the distance between the drone and delivery location and then factoring in the drones speed. A working model (albeit with some bugs here and there, is already working - based on the following code)


```

function getDistanceFromLatLonInKm(lat1,lon1,lat2,lon2) {
  var R = 6371; // Radius of the earth in km
  var dLat = deg2rad(lat2-lat1); // deg2rad below
  var dLon = deg2rad(lon2-lon1);
  var a =
    Math.sin(dLat/2) * Math.sin(dLat/2) +
    Math.cos(deg2rad(lat1)) * Math.cos(deg2rad(lat2)) *
    Math.sin(dLon/2) * Math.sin(dLon/2)
    ;
  var c = 2 * Math.atan2(Math.sqrt(a), Math.sqrt(1-a));
  var d = R * c; // Distance in km
  return d;
}

function deg2rad(deg) {
  return deg * (Math.PI/180)
}

```

Figure 11: ETA Code²

The haversine is used to calculate the distance between the drone and the user. First, the user is prompted for its location(coordinates). Then, the haversine formula is used to calculate the distance between both coordinates. Later, when the drone speed is known, the ETA of arrival will be used.

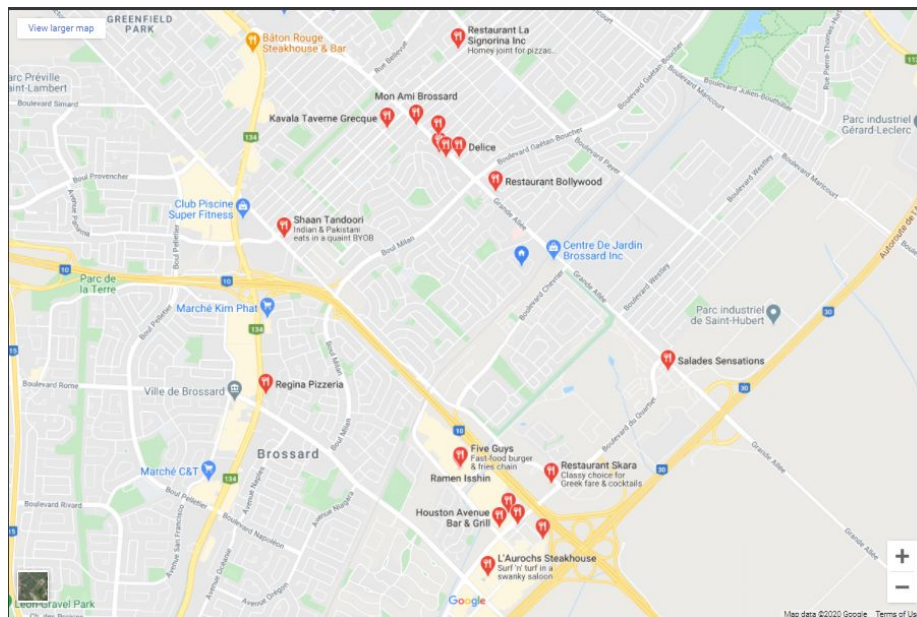


Figure 12: Maps

Integrated map that shows restaurants within the vicinity of the user. The user must be within a 10 km radius of the restaurant to order food.

² <https://stackoverflow.com/questions/27928/calculate-distance-between-two-latitude-longitude-points-haversine-formula>

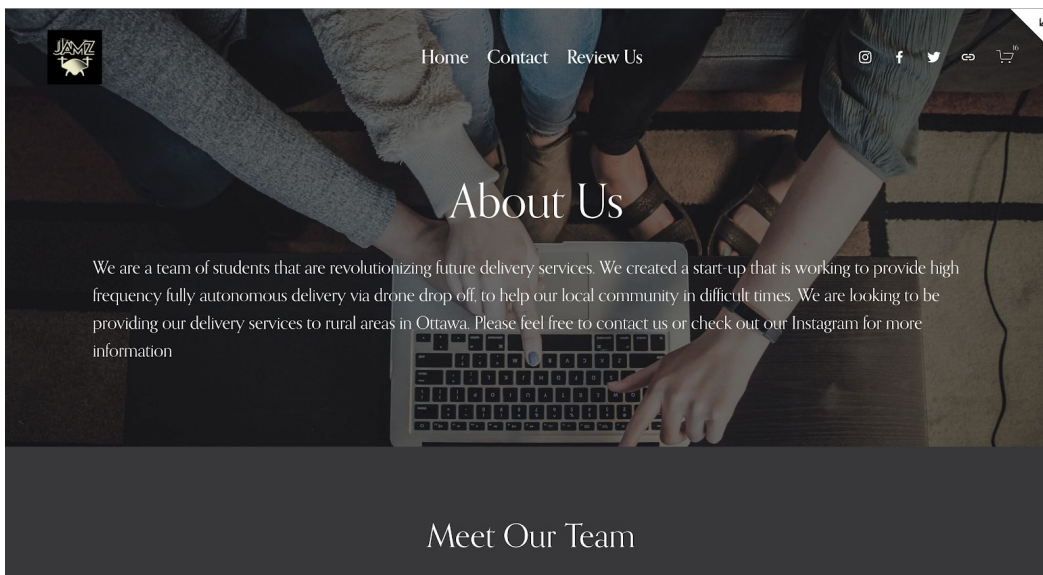


Figure 12: About Us

A brief description of the Jamz company and the team members; below will have pictures of the team members and ways to contact them through email or social media links.



Figure 13: Food delivery services not operating warning

Working current weather display that shows unavailability message when the weather is not within the JAMZ operating standards

Name *

First Name Last Name

Email *

* Required Field

How likely would you be to recommend our services to a friend?

Strongly Disagree Disagree Neutral Agree Strongly Agree

Was the delivery process itself smoothly executed?

Strongly Disagree Disagree Neutral Agree Strongly Agree

Will you be using our services again in the future?

Strongly Disagree Disagree Neutral Agree Strongly Agree

Were you pleased with the delivery times?

Figure 14: Review us

This is where customers can leave their name and email and enter their feedback about the JAMZ service (not the food), the data is also recorded to a location along with their credentials.

6.0 Feedback and comments

Prototypes need feedback in order to implement missing features, get feedback on current features and to enhance the UX (user experience). In order to do so, the team sent out a survey consisting of three questions:

1. Is the website intuitive?
2. How good is the color scheme of the website?

And finally, the most important question: feedback.

3. What are some recommendations to improve the website?

These questions were sent to students, parents of these students and elderly. This was done in order to get a collective understanding of what people think (i.e. get feedback from young people as well as older people) as the tech gap between these groups is significant, and the website needs to fulfill the needs of these different groups.

6.1 Is the website intuitive?

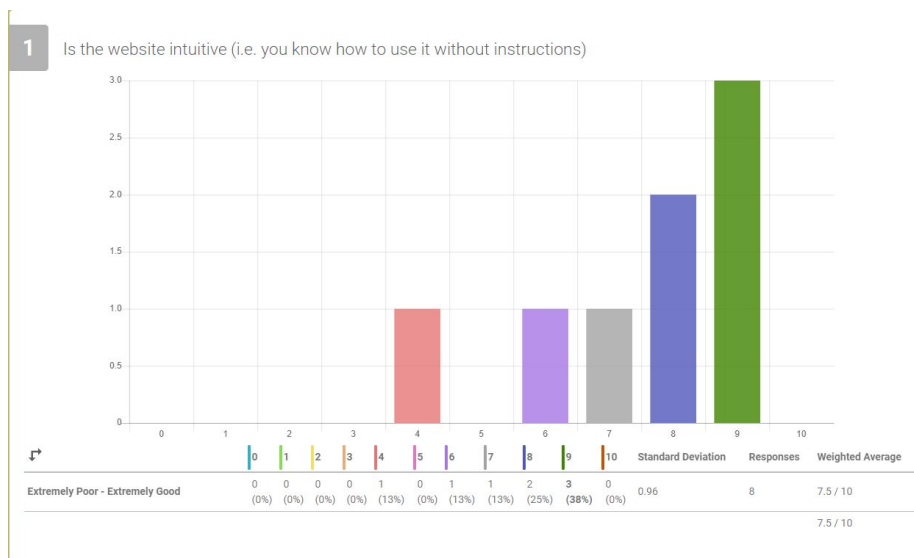


Figure 15: Survey question 1

Looking at the results, it was concluded that the website was fairly intuitive to use, with a good amount of people giving a 9 out of 10.

6.2 How good is the color scheme of the website?

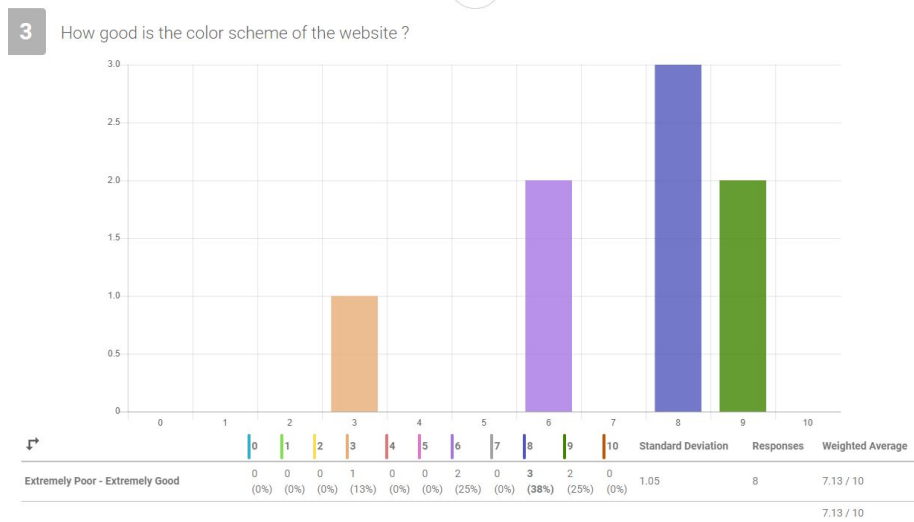
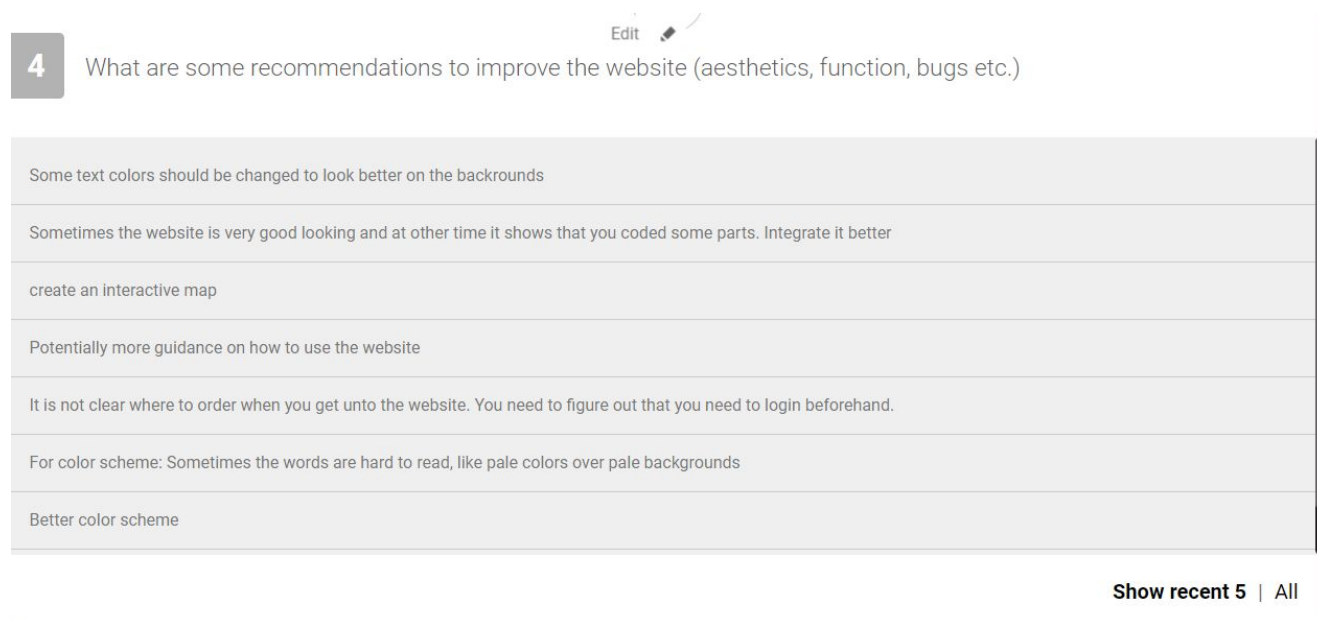


Figure 16: Survey question 2

The feedback showed that the color scheme of the website was not good,

6.3 What are some recommendations to improve the website?



4 What are some recommendations to improve the website (aesthetics, function, bugs etc.)

Some text colors should be changed to look better on the backgrounds

Sometimes the website is very good looking and at other time it shows that you coded some parts. Integrate it better

create an interactive map

Potentially more guidance on how to use the website

It is not clear where to order when you get unto the website. You need to figure out that you need to login beforehand.

For color scheme: Sometimes the words are hard to read, like pale colors over pale backgrounds

Better color scheme

Show recent 5 | All

Figure 17: Survey question 3

7.0 Conclusion

This document concerns the second prototype, and the feedback that the team receives will be of significant help to develop the next prototypes. This document also outlines the features and functions of the website in prototype II along with the explanation of the types of prototype modeling used. The test plan outlines what will be done to test each of the elements of the code to see if the features work in the way they were intended upon. From here the items can be modified to properly suit the needs of the client. The feedback the team received from the peers was also evaluated.

8.0 Bibliography

Caspio. (2020, October 02). Build Online Database Apps - Low-Code Platform. Retrieved November 13, 2020, from <https://www.caspio.com/>

³User1921user1921. (2008, September01). Calculate distance between two latitude-longitude points? (Haversine formula). Retrieved November 11, 2020, from [\[link\]](#)

³*** The author is actually User1921user1921, it is not a mistake.

<https://stackoverflow.com/questions/27928/calculate-distance-between-two-latitude-longitude-points-haversine-formula>.