Article

Augustana Health & Dining App

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Abstract: Many apps have been created for food and health-related purposes, given our app's secondary focus on calorie metrics and health, surveying existing apps, and previous approaches to curtailing the dining experience and promoting health will be helpful. An important aspect to consider when designing an app is a user engagement and how many people one can expect to use an app. Research has been done to study usage metrics and user experiences and opinions regarding mobile app usage, particularly in the health and diet app sector, which pertains to our app's health features. Even with high user engagement, an app's overall utility and benefit also need to be considered and measured in some qualitative and quantitative sense. Numerous studies have been conducted to determine the effectiveness of food and diet apps on personal behavior. Although the app that is the subject of this proposal is not mainly a "dieting" app, its features, such as the calorie counter, can help facilitate these use cases for users inclined to do so.

Keywords: dining; health; Kotlin; Android; Android Studio; MongoDB; SQL; Java; calories; dieting; mobile app; menu; mobile application; calorie tracker

1) Literature Review

While we are creating an app specifically for the Augustana College dining experience (which may be generalized for other schools), many apps have been created for food and health-related purposes. Given our app's secondary focus on calorie metrics and health, surveying existing apps and previous approaches to curtailing the dining experience and promoting health will be helpful. Another important aspect to consider when designing an app is a user engagement, and how many people one can expect to use an app. Research has been done to study usage metrics and user experiences and opinions regarding mobile app usage, particularly in the health and diet app sector, which pertains to our app's health features. Even with high user engagement, the overall utility and benefit of an app also need to be considered and measured in some qualitative and quantitative sense. Numerous studies have been conducted to determine the effectiveness of food and diet apps on personal behavior. Although the app that is the subject of this proposal is not particularly a "dieting" app, its features such as the calorie counter can help facilitate these use cases for users inclined to do so. According to a study conducted by researchers at Brigham Young University, over half of the respondents felt the use of a nutrition app increased their motivation to eat healthy (West et al.). Another review of research from 2006 to 2016 regarding app usage in weight loss and diet plans also found that these kinds of apps did provide benefits for achieving these health goals, particularly when combined with other intervention techniques (Jarmen et al.). In a separate study conducted in 2016, more results were found that supported the notion that apps were moderately helpful in the context of improving diets. An app called Healthy Shopping connected a smartphone app with a barcode reader and a shopping cart, to allow shoppers to scan items as they shopped to determine their nutritional value. The study based on the app usage found that purchases on average included healthier food options. Given our app's target audience is college students,

 doi:10.20944/preprints202212.0571.v1

analysis of college students' opinions regarding food apps specifically is useful. One study found that through analyzing various factors, there was a positive indication regarding college students' perceived usefulness and perceived ease of use of health apps (Cho & Lee). Given this information, we can deduce that an app such as ours would likely find an engaged user base. When creating an app, one must also consider how current apps are perceived, to try and find ways to improve. Comparing user reviews is one approach researchers have done. Another study from 2016 analyzed the characteristics of various health-based mobile apps and their ability to positively influence healthier food choices. It was found that there are currently some apps that fulfill this goal, but some can improve concerning user customization and nutritional information. (Flaherty et al.). Working with dieticians provides another angle at which to approach health-based mobile app development. Researchers at the University of Maryland found that when designing food tracking apps in coordination with dieticians, these apps can be beneficial for those trying to diet. Additionally, customization was found to be a very important factor in the success of these apps (Luo et al.). A study involving another health app called SmartAPPetite was found to help promote healthy food consumption when specialized messages relaying nutritional information and encouragement were provided to users (Gilliland et al.). A different study conducted in 2014 regarding health mobile app usage demonstrated a few things. They found that reminders, goal setting, and tracking were features beneficial to app users. (Peng et al.).

Our product is an Android phone software created to help Augie students navigate the Gerber Center more quickly and increase their understanding of where different food items are situated and how many calories they have so that they can eat a nutritious diet. Students could generate alerts for themselves to remind them to eat on time, and it would allow them to upload their daily diet plan and give them an indication of the calorie count. Furthermore, people could just consult the menu on their phone to determine whether or not they wanted to visit the Gerber Center. The app will also show Allergens on various food items so that pupils are aware of them ahead of time. The findings would be displayed in a profile section, which would include information such as the user's specific food plan and calorie count. Users can check for information regarding each food category, such as Bella Luna or Global Fusion. In a nutshell, the app will include daily menu information as well as customer evaluations and ratings provided by other users.

This app will be especially helpful to Augustana students who visit the campus regularly, but it will also be beneficial to anyone unfamiliar with the campus, such as new students and guests. Augustana has a menu online, however, our app would add features that the website lacks. It would provide more thorough search possibilities based on the services the user is looking for, as well as the ability for users to review food items and get a customized diet plan. Furthermore, while most of this information is available on numerous websites, such as Augustana's, this would bring it all together in one convenient area.

This application will provide available resources at the disposal of the user, and could be used by other schools too. With the basic code layout that we would be using, it would be simple to take out the Augustana configurations that will be implemented, then a different school could use it to benefit their students. There could also be instances where this application could be framed to have multiple schools on the same app. Alongside moodle and handshake, it could be programmed to make it so that schools all around the country could have access to creating a section. That, however, would require a lot of time and effort.

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For the product that we are trying to create, there have been apps that are parts of what we are trying to accomplish. One that has some of the same goals as our app is ShopWell. Their android app page states to accomplish “personalized nutrition scores when you create a Food Profile with your dietary goals, health concerns, allergies, and dislikes. Simply scan any item to see quick nutritional information and learn how it matches your needs -- not an average. Discover products that are a better match for you. Create lists of your favorite finds and share them with family and friends. It’s that easy.” This approach is limited to supermarkets or grocery stores. While it is a useful app to look at, we would have to hard code certain items from the meal options into the app.

2) Intellectual Merit

Augustana students would be able to choose their food plan from the comfort of their dorm room using our app. Developing this software in a collaborative setting would allow us to acquire experience working in a group setting while also allowing us to excel in our industries. Knowing that this project is a one-of-a-kind concept, we believe that our organization could benefit from it to assist existing and prospective students. This app will offer us useful knowledge and experience for future design and operation of similar projects, as well as assist us to understand the limitations of app development. All students will work on the project, earning cutting-edge app development skills and competence. Our current initiative, which focuses on the dining center's food, can highlight how healthy Augustana's food is, allowing students to eat healthy even when under the stress of ongoing classes.

The team can't afford to create a mobile application that blends in with thousands of others or deviates from its objective in this competitive industry. The best mobile app developer for the team will be able to:

- Help our team’s application stand out from the competition by exposing it to a large audience.
- Combine an easy-to-use user interface with a visually appealing design that complements Augustana's name.
- Conduct extensive meaningful testing to guarantee that our app works flawlessly across a wide range of operating systems, devices, and software versions.
- Transform our vision into a useful final product.

With the development of the app, there are certain areas that we are focusing on in particular. Since there have already been thousands of weight-watching apps that are currently on the market, that is not going to be the

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selling point of this app. We intend on helping every student on campus in some way. The vision that we have going forward is during the orientation for Augustana and potentially any school. The advisors of the students would advise them to download this app to get important information with a click of a finger.

3) Framework

Implementation

The groundwork for this app begins with how we go about implementing it. For our app to be successful, it must be both easy for students to use as well as easy for other schools to implement their version of the app that caters to the respective school's dining options. To achieve this feat, careful consideration will be put into not only how we make the app, but also how easy we make it for dining center workers to update the app with the most recent information for the dining center. Starting, we will be making the application using Android Studios, which is a program made specifically for making Android apps. This software is completely free to download for anyone which means that it will be very easy for other parties interested in this app to view our code and make minor changes to it so that it may cater to other schools outside of just Augustana. This is due in part to the way we plan to implement the code in which we will have all of the underlying infrastructures in place and working and all that would have to be done for it to apply to other schools are changing the names of eating stations and updating the menu with their own.

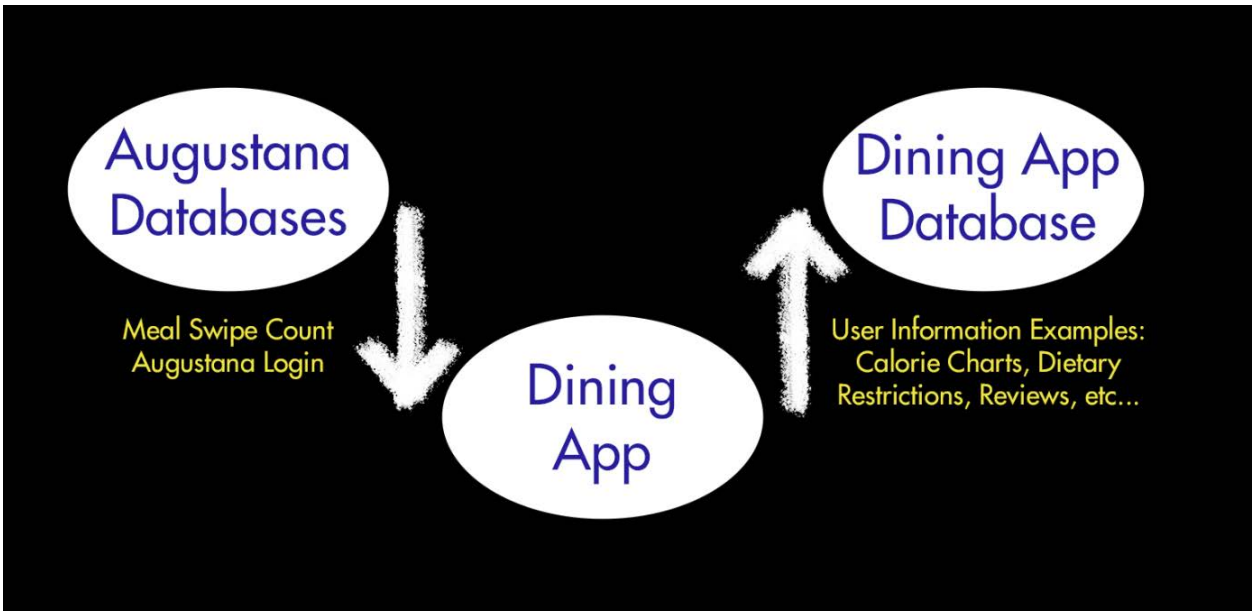

Figure 1: This is a flowchart demonstrating how our app will connect to both Augustana's databases as well as one we would set up to store user information

User Experience

Just as important as the implementation of the app, the user's experience using the app must be sufficient enough if our app is to see widespread usage. To accommodate this, our group has put a lot of effort into thinking of ways that the user both enjoys and can benefit from using our app. Having the sole purpose of our

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app as a mobile menu does not promote good user experience nor does it encourage users to use the app more than once a day. To combat this, we will add many health related features to enhance the user experience. The main health tracking feature to be added is a daily calorie tracker. This will add to the user's experience by having a completely separate tool from the dining menus that can be used in conjunction with our "add a meal" feature to ensure our app is useful in areas outside of Augustana's dining centers. The calorie tracker will keep a running daily/weekly total of calories consumed so that tracking your health is just as easy for experienced health trackers as it is for people new to health tracking. The "add a meal" feature allows for calorie tracking on the go by letting the user add any meal they want to the app along with its calorie and nutritional information, if that information is known. To review, having an optimal within-app user experience is key to the success or failure of our app. To ensure the user experience is as good as possible, our group is planning on adding features such as calorie tracking and adding your own meal as to give the app more purpose than just being a menu in mobile form, and hence, providing the best user experience possible.

Maintenance

For any good app to have a long lifespan, there must be after launch support. This is where maintenance of our app comes in. Alongside making sure that the implementation and user experience of the app are given proper attention, our group will also focus on making after launch maintenance as easy as possible seeing as it is highly unlikely that any of us will be maintaining the app after graduation. Similar to the ACES app for rides around the Augustana campus and surrounding area, we hope our app will be adopted by the school to facilitate their dining experience needs. Ideally, our code will be easily modularized and manageable enough to be modified as needed based on the school's current interests with regards to the dining experience. Keeping all three of the implementation, user experience, and maintenance of our app as our top priorities will ensure the best probability for our app to be useful, impactful, and long lasting within the Augustana community and perhaps extending to other communities as well.

4) Introduction

For our senior inquiry project, we plan to create an Augustana Dining & Health mobile application. We wanted to create an app to polish our development skills, as well as give back to the college in a place we believe the college could improve in. This app will strive to provide a useful user experience entailing a concise view of the Augustana Gerber Center dining menu that provides a variety of features, including the following:

- Images of the food items being served to help students gauge their interest in what is currently being served.
- Food items are organized on a per-station basis to allow students to quickly view what their preferred stations have to offer.
- Nutritional information is readily displayed to assist students with certain dietary needs such as allergens, vegetarian diets, and other special needs in determining what they would like to eat.

 doi:10.20944/preprints202212.0571.v1

- Estimated calorie information for each meal item, to allow students to plan their consumption with a focus on personal health, allowing the monitoring of their diets.

- A built-in calorie/health metric based on student height, weight, and other characteristics to attempt to help decide meal options and to track their current health in this regard.

- For students with meal plans: access to the number of swipes they currently have available to them in their meal plan, be it a weekly budget plan or a per-term lump sum of swipes; this information is not currently available unless a student physically goes to a campus food vendor and swipes their card.

- A graph/chart displaying meals they have added to their daily meals, which could track calorie averages, high points, and low points to help monitor health and consumption.

- A display of a meal swipes usage log on a time basis, allowing for the planning and management of the usage of meal swipes over longer periods.

- An alert display for various things determined by the college/dining center staff is to be shown. Examples include: if a certain food item were to run out, a certain station being closed, a change in hours for particular days, new food options available, limited capacity, among others.

- A profile page that compiles the various information metrics, such as available meal swipes, student health metrics, modifiable allergen/dietary needs, a chart/calendar displaying the usage of meal swipes, and which foods were consumed.

- An “add your own” meal option, to account for meals/calories outside of the Augustana dining services, to incorporate them into your calorie counts and health metrics.

- A section for FAQ/links to Augustana’s website for questions and concerns regarding the dining experience not covered by our app.

- A review system on a per food basis to help students determine which foods they are most likely to enjoy based on cumulative user feedback.

- A search feature to allow for finding desired food items and their availability

We hope to provide integration with the official Augustana databases that handle meal swipes, to provide this information to students at a moment’s notice, outside of having to visit a campus food vendor. If this is unavailable, we plan to at least set up a separate proxy database to demonstrate these features. If the college sees utility in this app-based approach to dining, they might adopt our app or something similar in the near future. Given our group’s experience with Android is significantly more than iOS, we are developing this app in Android Studio for Android. We would like to note; however, that a large portion of the student body at Augustana uses Apple products on iOS. This means we may not have as large of a user population as we

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would like unless we change development space or let the school or another development group create a version for iOS.

5) Motivation/objective

The motivation for choosing our project came from multiple places. Our group desired to create an app, as we believed this would be the most effective way to demonstrate our abilities. We chose a dining and health app because we saw a potential need for it on campus. It also allows the opportunity of giving back to the school. At one point during development, the dining menu was not present on the Augustana website. The current menu has a QR code to share with others, a list of dining area menus, a search feature, and filters for allergies and options for certain dietary needs such as vegetarian. While there is one present on the website, it only provided food names and places, and we would expand upon this by adding more information such as a photo and calories. The website restructured the dining section recently, and the menu is now hidden in a “dining calendar” page that is not even linked on the main “dining” page. Creating an app that readily and concisely displays the menu information would benefit students in ease of access and by providing helpful information, with less hoops to jump through and less time searching the website. Although the website currently includes a fair amount of information, we believe an image of the food being served would give a greater understanding of what one would like to eat, as far as appetites and appeals are concerned. Some students might not know what to expect when getting a meal at the Gerber Center, and this would help alleviate this concern. We also plan to incorporate a calorie counter within the app, based on each item from the dining center. Each food item would have an attached estimated calorie count, as well as potential allergens. The allergen notifier would assist people with allergies in finding something they can eat. The calorie counter is an integral part of our design, as it can promote a healthier lifestyle and help people track what they eat. We also plan to integrate an “add your own meal” feature. This is to allow users to incorporate calories and meals outside of the Gerber Center food items, in order to gain a more accurate view of their calorie consumption, as plenty of people do not only eat at the Gerber Center. This also gives the app more viability, not limiting it only to Augustana dining, so users older than sophomores (who typically have less or reduced meal plans) can still find benefits of using the app. We plan to integrate a time-based chart that would be displayed to show various data points such as daily calorie totals or weekly averages. These could be used in creating diets, as well as help in deciding what to eat in the many dining places. Another reason we decided to create a dining app was to hopefully allow students to acquire access to their current meal swipes without having to go to a campus vendor. Currently, to find your amount of swipes, you have to go to a place on campus to swipe your card. It would greatly benefit students, especially those with meal plans that need to be budgeted weekly if they could check their swipes anytime and anywhere at their convenience. Finding out you do not have enough swipes for the remaining time period in a meal plan schedule is a potentially annoying problem, and this information should be available at all times. We are not sure if this information is available to us, given our assumption that it is linked to official Augustana servers that would require extra security. Additionally, this could provide data metrics for Augustana and the students themselves on eating habits and food consumption. While the school can likely tell how much of which kind of food is eaten based on inventory, a digital record on a per person basis could be beneficial and reveal new information, although this may be a privacy concern unless

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an opt-out of data collection feature is implemented. With our review feature, we considered many people, particularly new students, might want an extra opinion on what to eat at the Gerber Center. User reviews would allow students to give a rating for each individual food item, which would then be aggregated to allow for a decent consensus on the quality of a particular food. Giving the ability to rate food items could also drive user engagement, creating a more robust environment of users within the app. People would be more likely to use the app if they felt they could make their opinions about the food known.

6) “Hurdles”

The main purpose of mobile application development, as the number of mobile purchases and users expands year after year, is to improve the user's experience and, to some extent, to facilitate them by saving them time. It's crucial to comprehend the importance of utilizing this medium to get out to your target audience. That said, we anticipate certain roadblocks along the way, including gaining access to the necessary data, such as the Augustana Dining Center's menu. If we can't connect to Augustana's official website, our app will add a feature to update the menu in real-time, which will require someone to complete the work every day so the app can stay updated, which we'll have to allocate to someone on the CSL staff. Another issue we'll have to deal with is learning the tools required to construct an app that will run on iOS or Android or even both. Understanding the operating system on which the developers may be focusing their efforts is crucial. It's vital to know which platform our software will operate on because Android and iOS perform differently and have different target audiences. We do not intend to postpone this decision because it would result in a mess of details. As a result, making a decision and providing the proper objects and patterns is crucial. The learning process will take some time, which will delay the app's completion, but we don't anticipate it taking too long. Returning to the platform we'll be using, we'll need to choose the finest technology to meet our objectives, as making the wrong option could lead to a number of problems. When it comes to creating an app, everything from programming languages to frameworks must be considered. It's difficult to make a flexible app, and it's even harder to locate the most innovative technology to assist you to reach your objectives. We have two milestones in mind, the alpha and beta milestones will be two significant milestones in the development process. At the alpha milestone, around 40-60% of the features should work, and at the beta milestone, 100% of the features should work, albeit with the risk of difficulties.

The apps will be sent to QA for testing and bug fixes after they reach the beta milestone. After these bugs are fixed, the apps will be ready for user acceptance testing. A week testing period begins after user acceptance testing is finished (which means you've tested and confirmed everything is in working condition). It is expected that the entire development process will take between 5 and 6 weeks.

The app would have a graphical user interface (GUI), a database to store information on the Gerber Centre, and modules to implement the app's different features. For example, a search tool would allow users to identify services and utilities within the CSL based on information in the

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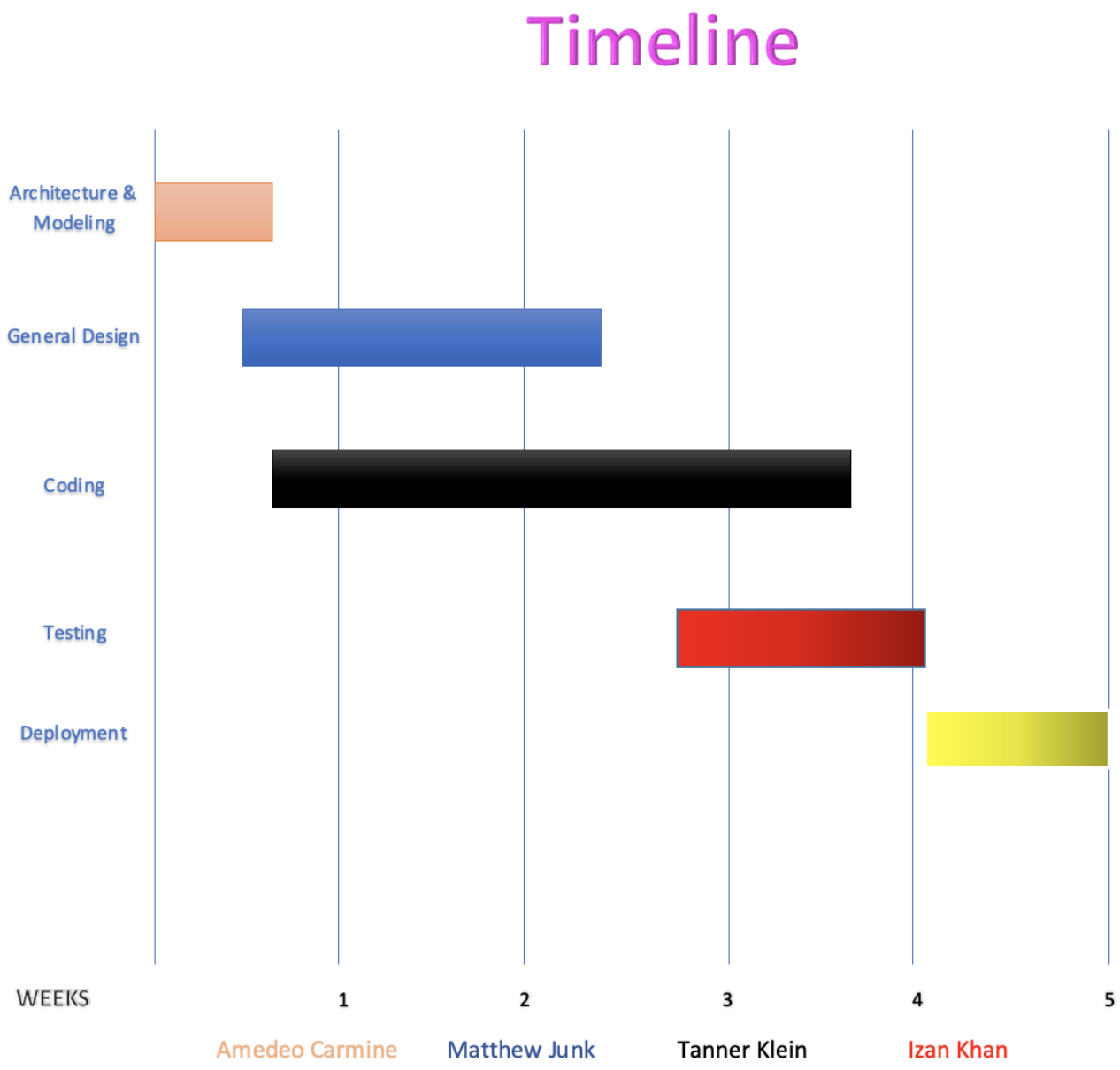

Figure 2: A timeline of our team's app development process. The timeline is sorted by color to display who on the team was responsible for each part of the project. In tan color, Amedeo Carmine will take lead role for the architecture & modeling of our app. In blue, Matthew Junk will take the lead role for the general design and coding phases. In black, Tanner Klein will assume lead role for coding & testing while also helping with general design. In red, Izan Khan will head the testing process. In yellow, all of us will equally contribute on the deployment of our app.

database, as well as a function to determine the calorie count of a food item and any allergens present. Users would also be able to set notifications and add meals to their profiles, allowing them to keep track of their diet and calorie intake. It would also include a navigator that would display the various portions of the CSL. From a technical standpoint, this project is intriguing because it entails developing an Android phone app, creating

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a user interface, implementing a database to track calorie counts, updating daily menus, and ensuring that it is simple and easy to use in order to provide students with a useful tool for finding things in the CSL.Gathering and managing connected data via a database, as well as designing an Android app in general, are the two most difficult aspects of developing the product. Both of these challenges stem from a lack of familiarity with the relevant concepts. Both of these risks can be mitigated by ensuring that someone on the team is knowledgeable enough with the concept to work on that aspect of it, or by having the team collaborate to guarantee that they have learnt the concepts in a timely enough manner to finish the product on time. The Figure 2 picture is the scheduled timeline for the process.

7) **Design**

For the design of the app, it came down to how we wanted to make the layout. We wanted something simple enough that everyone could use it. Either based on the picture of the area that they choose their meal from or the wording. This list of areas that you can visit will also be a slider bar which you can choose also the SÖt which is the area for desserts and Gus' Snack

Figure 3. The home page of the app. It will be a scroll down view to see the other options like the sweets section and the snack bar.

Bar. When you open one of the tabs, it will display all of the food choices for the day, along with the allergens that are present in the food that you select. Below the allergens, it will show the calorie amount that the item selected has and an option to add those calories to your daily intake. This design shows a picture of the meal above all of the health information to display what the

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food would entail. With that design in mind, we had to think of the next question “what if the user doesn’t eat at the dining center?” We came up with an option to add a meal to their app. This option allows the user to input a calorie amount and the ability to type in the meal that they had. Whether it be a fast-food restaurant or something homemade, the user can put their meal in the

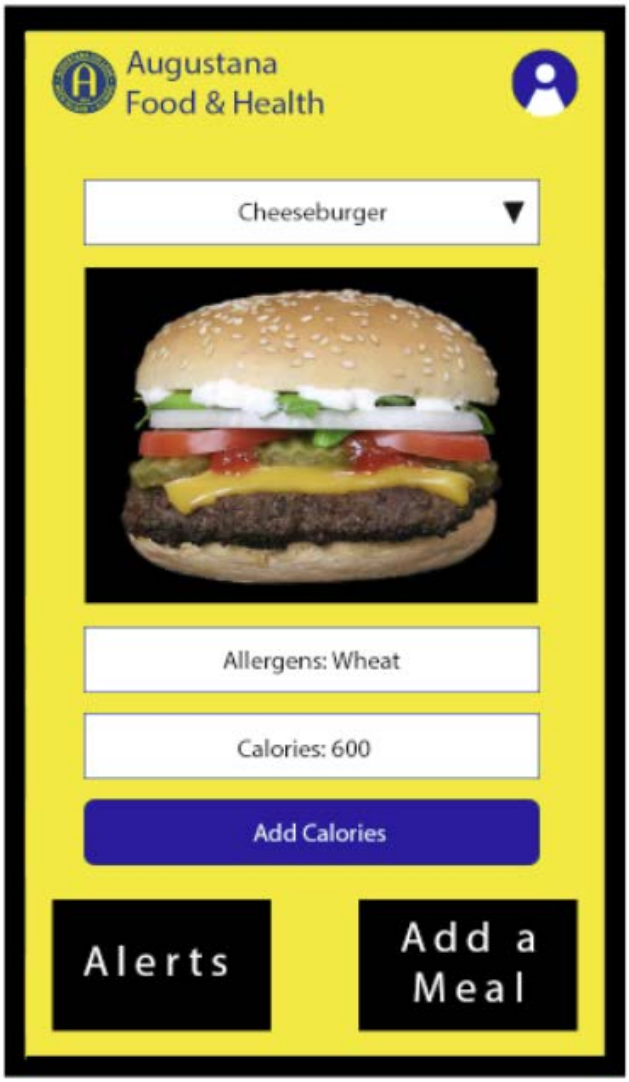

Figure 4. This will be the premise of the food selection side, there will be a drop down menu of what’s in that section for the day. It will list the caloric amount, and the allergens present.

application. In future mock-up designs, there will be an overview of the profile design, the added meals option and what that will entail, and the alerts option for the dining staff to use to disclaim information on a change in a meal, or a change in the hours. The alerts option at the bottom

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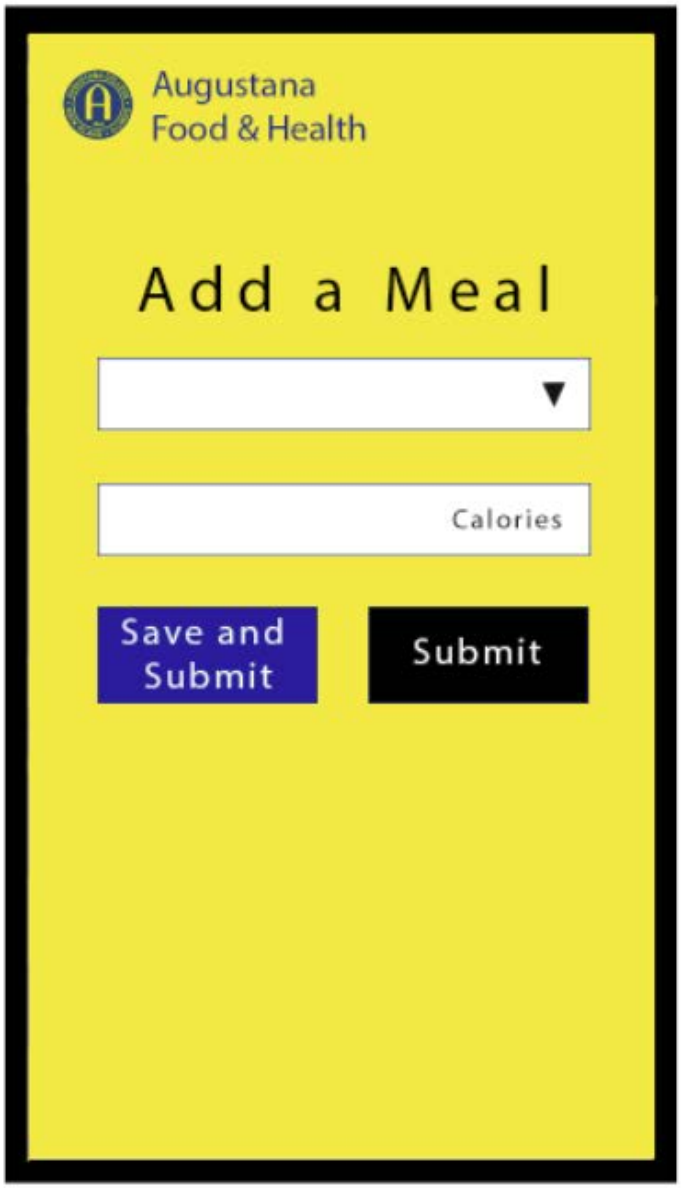

Figure 5. This is the basis of what our add a meal function will look like. With the drop down menu, it will save previous options so meals that you eat on a regular basis will be already available.

would highlight red if there was some issue regarding either the dining center or the snack bar. Issues could include some items that they are serving being out of stock so they no longer can serve anymore, reduction in the hours of any of the food services, or alerts about outages and unpredictable outcomes. The two bottom buttons would be stationary so that they are always on the screen so that they are easily accessible and not missable. The user profile will display the total amount of calories consumed for that day and past week, so people that are tracking those values can have access. Also in the user profile, we plan to make it so that the user can set specific allergens that they have and it would not display that specific food for them. This makes

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This makes it so that they can see all of the items that they can have and not display items that they cannot have. There is also a design that is currently being thought of that you could have a

Figure 6. Notifications will come up on the phone with alerts from the cafeteria and snack bar, if there is a deviation from the normal.

list of your favorite meals at the dining center, and if any of the options are available that day, it will pop up a notification and tell the user. When thinking of the settings that relate to personalization for the app. We wanted to have it so that the user can insert their own profile picture, input the specific calorie input that they

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already have calculated, or if they have no clue on the specifics of the caloric intake that they need, there will be a way to calculate the caloric intake that is needed. That way if there are people who are unsure on what their needs are in regards to calories, it could and will be provided.

8) Impact

When discussing what potential ideas we all had for this project, it was evident that we all wanted something that would benefit the Augustana community, but that could also potentially be extended to benefit other college communities as well as visitors of Augustana. Eventually, we found a common problem that we could help solve. Here at Augustana, the CSL is what we refer to our cafeteria as, and the biggest mystery kept by the CSL on a daily basis is what was on the menu for the day. Of course, right at the entrance, there is a TV displaying the menu, but what our group found is that many students such as ourselves were rather irritated when we arrived at the CSL just to find out there is nothing good on the menu. This is where phase one of our project idea comes in. For phase one, we plan to have the daily menu displayed for all different stations within the CSL. This would allow students to pre-plan their breakfast, lunch, and dinner plans all at once as well as be able to check the menu at any time they please.

Our group quickly realized that this feature would only help Augustana students, but our goal was to have this help as many people as possible seeing as it would be a public app. This led us to phase two of our project idea which is the incorporation of health tracking features. What do we mean by health tracking features? Specifically, we thought it would be very beneficial to fuse our menu ideas with ideas revolving around health. We have a few ideas to support this including a calorie tracker for each food item that you could then add to your daily total as a means of keeping track of how many calories you eat in a period of time. This is a substantial feature to include for the health-conscious students as well as students who do not usually concern themselves with their physical health will have an easy means to start getting into calorie tracking. On top of this, we plan to include nutritional information about each food item so students can eat fearlessly even with the most severe food allergies. Nailing the framework for this app is essential to us because only if it is easy to implement, use, and maintain would this app see impact beyond the walls of Augustana.

Works Cited

“Shopwell - Better Food Choices - Apps on Google Play.” *Google*, Google, https://play.google.com/store/apps/details?id=com.shopwell.shopwellandroid.

West*, Joshua H, et al. “Controlling Your ‘App‘Etite: How Diet and Nutrition-Related Mobile Apps Lead to Behavior Change.” JMIR MHealth and UHealth, JMIR Publications Inc., Toronto, Canada, https://mhealth.jmir.org/2017/7/e95.

Jarman, Authors: M., et al. “International Journal of Behavioral Nutrition and Physical Activity.” BioMed Central, 22 Feb. 2022, https://ijbnpa.biomedcentral.com/.

Cho, Jaehee, and Erin H Lee. “Cross-National Comparisons of College Students' Attitudes toward Diet/Fitness Apps on Smartphones.” Proxy.augustana.edu, https://proxy.augustana.edu:2233/login.aspx?direct=true&db=a9h&AN=125434963&site=ehost-live.

Flaherty, Sarah-Jane, et al. “Can Existing Mobile Apps Support Healthier Food Purchasing Behaviour? Content Analysis of Nutrition Content, Behaviour Change Theory and User Quality Integration: Public Health Nutrition.” Cambridge Core, Cambridge University Press,30Oct.2017,https://www.cambridge.org/core/journals/public-health-nutrition/article/can-existing-mobile-apps-support-healthier-food-purchasing-behaviour-content-analysis-of-nutrition-content-behaviour-change-theory-and-user-quality-integration/B3874D1C9739FE8FAD4771D012B97167.

Luo, Yuhan, et al. “Co-Designing Food Trackers with Dietitians: Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems.” ACM Conferences, 1 May 2019, https://dl.acm.org/doi/abs/10.1145/3290605.3300822.

Gilliland, Jason, et al. “Using a Smartphone Application to Promote Healthy Dietary Behaviours and Local Food Consumption.” BioMed Research International, Hindawi, 25 Aug. 2015, https://www.hindawi.com/journals/bmri/2015/841368/.

Peng, Wei, et al. “A Qualitative Study of User Perceptions of Mobile Health Apps - BMC Public Health.” BioMed Central, BioMed Central, 14 Nov. 2016, https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-016-3808-0.