California Polytechnic State University Department of Biomedical Engineering BMED 456 Senior Project Winter – Spring 2021



Final Report Ginger and Honey

I. Project Introduction

In today's world, there are various food options present in local grocery stores and the sheer number of choices can be overwhelming. Ginger and Honey aims to provide eating plans geared towards preventing disease. Using machine and deep learning, each plan will be unique to the user based on previous medical history, known conditions or current prescriptions. The App Team will address how users can prevent future disease and lead healthier lifestyles by offering knowledge and recommendations from holistic health experts.

II. Indications for Use

Ginger and Honey is an app service indicated for use by those interested in holistic health and wellness. The app will utilize machine and deep learning to create a unique experience for every user based on medical history, known conditions and prescriptions.

Ginger and Honey is intended to provide a cohesive space where eating plans, recommendations and information can be easily accessed. It is not intended to offer pharmaceuticals or medical advice; rather, it is a database of knowledge provided by a collection of health professionals.

III. Customer Requirements and Specification Development

The customer requires the main deliverable to be an application prototype that demonstrates a range of functionality. Additional goals include preparing for required patents during development and beta testing of the final product. A possible constraint the customer foresees is the non-disclosure requirement during company development. Because this is an app designed for a mobile phone, there are no engineering metrics or qualifications thus far. The only main specification is designing an app that is accessible for all mobile device users (Android, iPhone etc.)

IV. Total Available Market and Competitive Advantage

The total available market is predicted to be individuals interested in holistic health and wellness. This broad overview can be specifically divided into three subcategories including: fitness trainers, weight loss experts and life coaches.

V. Network Diagram

The PERT chart for the project was created in Microsoft Projects and a view of all the tasks are shown below, with the critical path items highlighted in yellow.



VI. Budget

The current projected budget is tabulated below. More materials will potentially be added and utilized accordingly.

0	verall B	udget		
		Purpose	Quantity	Cost
	Coding Platform [4]	Assist in app buildout	1	\$0
	Health Resources [5&6]	Reference as sources	15	\$100
	Literature	Provide framework	20	\$0

VII. Intellectual Property

Several patents / patent applications potentially conflict with the proposed deliverable. They are show below alongside how we plan to address avoiding patent infringement.

Patent No	Patent Title	Potential Infringements	How to Address
	Methods and	 Wherein the server is configured to receive a user activity datum 	1) This might allow for better tracking, but we do not need the individual's fingerprint
16/582,283	Methods and Systems for Using Artificial Intelligence	2) Wherein the server is configured to store the user activity in a fingerprint database	2) Information could be accessed via a passcode instead - we can avoid copyright infringement by having the app be accessible to all
20190355458	Predicting Interactions	1) Wherein a computer identifies drug similarities by calculating a cosine similarity said exhaust blower is	1) We do not plan on incorporating drug similarities because the experience should be unique to the user
20190355458	Between Drugs and Food	2) Wherein the computer system generates one or more drug-food feature vectors based on regression model	2) This is not a novel idea - many ad promotion companies utilize this idea to draw back customers on various platforms
M 20180246127 Pr	Method for Predicting Risk of Obesity in a Subject	 A method for determining fat processing activity and predicting risk of obesity The method as stated in 	1) Not applicable, the apps intention is to provide a breadth of knowledge so the user can make decisions about their body weight
	,,,	claim 1 correlates to sample of body fluid with said level of peptides	2) We do not intend for the subject needing to check body fluid.
62164307	Medication Adherence Device and Coordinated Care	1) Wherein said method of supporting adherence provides a medication regiment	1) Our goal is not to provide pharmaceutical advice / offer
	Peptide Combinations for	 A method for killing target cells in a patient who has cancer 	 We do not plan on offering medical care or assisting after one is suffering from disease
15881078	Use in Immunotherapy Against Cancers	2) Wherein said cancer is selected from the group consisting of ovarian cancer, breast cancer,	2) This claim is considered obvious as it lists the various types of cancers that may be involved, the app would provide information about food

		acute myeloid leukemia etc.	options may affect one's chance of disease
15/576 225	Method and Kit for Diagnosis of	1) Colorectal cancer treatment administered to the subject in the form of radiological therapy	 The claim is obvious and does not provide any information on outcome, we do not plan on discussing disease treatment
	Colorectal Cancer	2) Wherein said quantitative analysis is performed with Real Time PCR is carried out	2) The app we intend on designing contains basic information and analysis will be provided with verified sources, this claim can be ignored

VIII. Conjoint Analysis

Conjoint Table with Factors and Labels

Factor	Level 1	Level 2
Cost	\$0	\$3.99
Number of Diseases	5	10
Meals Plans	Daily	Weekly

List of Conjoint Cards

Card Number	Cost	Number of Diseases	Meal Plans
1	\$0	5	Daily
2	\$0	10	Weekly
3	\$3.99	5	Weekly
4	\$3.99	10	Daily

Statistical Analysis

SUMMARY O	DUTPUT							
Regression	n Statistics							
Multiple R	0.2298661							
R Square	0.0528384							
Adjusted R S	-0.0824704							
Standard Err	0.5483486							
Observation	9							
ANOVA								
	df	SS	MS	F	Significance F			
Regression	1	0.1174187	0.1174187	0.3905025	0.5518527			
Residual	7	2.1048035	0.3006862					
Total	8	2.2222222						
	Coefficients	tandard Erro	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	0.209607	0.4178928	0.5015808	0.6313498	-0.7785523	1.1977663	-0.7785523	1.1977663
1	0.0480349	0.0768679	0.624902	0.5518527	-0.1337289	0.2297987	-0.1337289	0.2297987

Some of the important factors I considered for the Ginger and Honey App project are cost, number of diseases discussed, and the meal plans offered. The team is currently figuring out whether the application will be accessible to all or based on a monthly subscription. In terms of the number of diseases, we are working with the sponsor to figure out which will be vital to include. Lastly, the meal plans need to be tailored to the individual's needs and dietary aspirations.

IX. Statement of Work

<u>Executive Summary</u>: This Statement of Work (SOW) is between the sponsor, Anya Booker and the App Team, Samana Shah and Austin Shin. It outlines the Ginger and Honey App Project's long-term goals and how they will be fulfilled in a timely manner.

Effective as of **06/01/2021**

Customer Meeting:

The project sponsor has illustrated the need to create a space where meal plans and recommendations – based on disease and desired health experiences - can be offered. The end goal is to produce a prototype of the app and demonstrate its range of functionality. Ginger and Honey's overall purpose is to educate users on using food as medicine to help prevent and heal disease. The App Team is also interested in exploring / designing a friendly user interface that would encourage more usage.

Existing Literature: Refer to References

Current Industry Standards: N/A

Related Patents				
Patent Number	Description			
20180246127	A method for determining fat processing			
	activity and predicting risk of obesity			
16/582,283	Utilizes a server that is configured to receive			
	user activity datum			
62164307	A method of supporting adherence and			
	provides a medication regiment			

Objectives

The objective of this project is to create an app prototype that provides eating plans, recommendations and information for those interested in holistic wellness and disease prevention. The project will meet the following specifications:

- App Prototype
- Friendly user-interface

Project Management

For our design, we aim to tackle the app production in three steps: Research / Initial Concept Design, Creating the Backend Code, Testing the Functionality. These areas of focus are all outlined within the design, assemble and qualifications phase.

Timeline of Deliverables (Winter Quarter)							
Deliverable	Duration Start Date End Date						
Project Kick-Off /	1 Day	1/15	1/15				
Meeting with							
Sponsor							
Compile Research	21 Days	1/25	2/8				
Initial Design Phase	10 Days	1/27	2/3				
Concept Design	7 Days	2/1	2/8				
Review + Prep							
Risk and Hazard	5 Days	2/10	2/15				
Assessment							
Backend Build Out	21 Days	2/8	3/1				
Critical Design	7 Days	3/1	3/8				
Review +							
Presentation							

X. Morphology

				Mor	phology				
Product: Holistic I	Health App	0	Organization Name: C	Jinger	and Honey				
Function	Concept	1	Concept 2	Co	oncept 3	Concept 4	(Concept 5	Concept 6
App Interface / Layout	Branches out w/ subcategories		Content is split based on food, advice and disease	Sp o inf based	ecifically surated formation l on profile				
Provided Information	Access to All		Access based on monthly subscription fee						
Meal Plans	Developed on a week-to-week basis		Created daily	Ma fa sub based	eal plans ollow a scription- l plan only				
Backend Coding Platform	ckend Coding htform JavaScript w/ HTML editor Build Fire (non- technical option)		Th sour Cro	ird party ce such as wdbotics					
Team member: Sa	mana Shah T	eam	n member:		Prepared by	y: Samana Shah		T	
Team member:	Т	eam	n member:		Checked by	/:		Approved by	:
The Mechanical Design Copyright 2008, McG	The Mechanical Design ProcessDesigned by Professor David G. UllmarCopyright 2008, McGraw HillForm # 15.0					or David G. Ullman			

XI. Concept Evaluation

Har Pans	Rtp eccelstyn	> engine 2 diet
expert Advice >	Dr. Hazel Wallace	> instagram _education
	Amelia Preer (nultitional) therapist)	, Approach to Health + Pood

- Branched breakdown of information
- Subcategories of advice are divided based on health expert
- Following category yields text references and associated documents

Food Plans	Advice	Diceore
° spectfically	→ Include recommend-	1) cardlovascular
curated on individual's	experts and	2) cancer
profile	health prof-	3) Drabetes
		4) kidney disease
		5) stroke

ED MEAL PLO
CUPATO TA
carbs: # Food categories: veggies, protern. carbs inspirational Quote
expert advice, disease prevention information selected

XII. Conceptual Model / Selected Design

Platform

- Prototype will be built in a program such as Justinmind, InVision or Adobe Xd
- Backend will be serverless, built on AWS

- Based on three main components
- Easier to find the desired information

- Focused on the meal plans, curated for the individual
- Output = Information regarding disease and wellness

Details

- Required fields include current health issues, medication prescriptions and preventative actions interests
- Main Diseases of Interest: Cardiovascular, Cancer and Diabetes

XIII. Detailed Design / Manufacturing Plans

Platform: Justinmind where backend will be serverless Subcategories: advice divided based on disease that branches into associated resources Required Fields: current health issues, prescriptions, preventative action interests Beta Testing of the prototype will occur to test functionality

XIV. Test Plans / Diagrams





XV. Test Protocols / Testing Data

End-User Testing: last phase in the web development process before final release Plan: survey a group of individuals to provide feedback on the following criteria

- Usability
- Intuition
- Aesthetic
- Functionality

Breakdown of UAT (User Acceptance Testing):

- Analyze product requirements and define deliverables

 a. Provide targeted resources
- 2. Choose a time and form end-user testing
 - a. Last step before release, bugs and minor issues revealed
- 3. Recruit users and form UAT team
 - a. Testers are recruited from existing base

XVI. Conclusions

The Ginger and Honey App Team designed an application prototype that tracks the effectiveness of food as medicine to help prevent disease.

XVII. Discussion

Future plans for Ginger and Honey include the following enhancements:

- Implementation of customized meal plans using artificial intelligence
- Adding more fields to the user profile setup
- Continue the research component to include a broader list of diseases
- Build out and launch the live application

XVIII. References

[1] – Booker App Project Overview

[2] - LLC, Pomegranate Apps. "Nutrients - Nutrition Facts." App Store, 26 Oct. 2010,

apps.apple.com/us/app/nutrients-nutrition-facts/id396836856.

[3] - Hahn, Dominik. "SuperFood - Healthy Recipes." App Store, 13 Nov. 2019,

apps.apple.com/us/app/superfood-healthy-recipes/id1486190269.

[4] - BuildFire. "How to Create a Mobile App." *BuildFire*, App Builder | The Best App Maker for High End Mobile Apps, 1 Jan. 2020, buildfire.com/how-to-create-a-mobile-app/#chapter13.

[5] - "Books By Rip Esselstyn - Plant-Strong by Engine 2." *Plant*, plantstrong.com/books.

[6] - Films, A.U.M. WHAT THE HEALTH, www.whatthehealthfilm.com/.