SFWR 4G06B - Hazard Analysis - Rev 0

Group 9
Gundeep Kanwal 400015267
Ivan Bauer 001418765
Yousaf Shaheen 400026476
Scott Williams 400031554
Lucas Shanks 40002994

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Contents

List of Tables

List of Figures

Revision History

Revision	Date	Author(s)	Description
0	01/15/2020	GK, IB, YS, SW, LS	Initial revision of the Hazard Analysis

1 Introduction

1.1 Document Purpose

The purpose of this document is to determine the hazards which exist in our application, and to create feasible solutions to handle such hazards to ensure that our product won't cause any harm to our users. We will be evaluating the hazards thoroughly, taking note of the consequences for which those hazards can cause. We will be defining our hazards by focusing on the functionalities of each individual module within our application, in order to conduct a thorough analysis of our entire system. We will be taking stock of any hazards that may be present before, during, and after the launch of our application, including hazards that may arise over long periods of time. Hazards will be mainly identified through an analysis of similar applications, more specifically, hazards will be based on adverse effects that may arise for our user on their health and fitness.

It is a top priority for us to ensure that our application will have all hazards covered, our users safety and well being is paramount.

1.2 Scope

This project shall primarily be centered on enabling the user to understand the nutritional content of the food that they are eating. The system shall be able to figure out the nutritional information of the food that the user captures with their picture, or scans with a bar-code. It shall be able to summarize a day's nutritional intake and visualize that information to the user. It shall also incorporate

1.3 Definitions

1. Hazard - A situation that already exists that has a chance to cause harm or danger to the user.
2. Failure - The event where a hazard is actualized.
3. Risk - A dangerous or harmful situation that may or may not arise due to other parameters.
4. Unacceptable Event - The consequences that arises from a failure.

2 Component overview

1. **User Login Page Module**: Given login credentials, will authenticate the user with the system to track account details. Also contains a registration function
2. **Profile Module**: Contains user profile information (ex. height, weight, email, password, desired weights)
3. **Backend Mobile App Service**: Will route different components of the system to store/retrieve data from the backend
4. **Image Sending Module**: Takes a picture and uploads to the backend service module for processing
5. **Image Processing Module**: Processes the uploaded image and returns the results to the user
6. **IBM Watson Service**: Machine learning IBM product to identify the food items in an image
7. **Food Diary Module**: Shows the nutrition requirements and goals for the selected date
8. **Timeline Module**: Provides a calendar view on nutritional data for past days

3 Safety Considerations

3.1 Login Module

3.1.1 Software Issues

1. Unauthorized modification request of a user's username or password.
2. Weak password selection by the user.

3.1.2 Hardware Issues

1. Database (Firebase) becomes unavailable or unreliable.
2. Application is not compatible with the resolution of user's mobile device.

3.2 Profile Module

3.2.1 Software Issues

1. Database (Firebase) becomes corrupted.
2. Profile information getting leaked.
3. Application Profile Front-End fails to update according to Database state changes.

3.2.2 Hardware Issues

N/A

3.3 Back-end Mobile App Service Module

3.3.1 Software Issues

1. Server becomes unavailable (too many users)
2. Response times become significantly delayed
3. Attacks on the server (code injection or other attempts for unauthorized access)

3.3.2 Hardware Issues

1. Server is not able to verify user due to internet issues or other component failure

3.4 Image Sending Module

3.4.1 Software Issues

1. Incompatible picture format

3.4.2 Hardware Issues

1. Loss of internet access

3.5 Image Processing Module

3.5.1 Software Issues

1. The image may not be processed due to poor lighting conditions
2. Misidentifying food

3.5.2 Hardware Issues

1. The image is not capture properly due to a broken camera or blocked image

3.6 Food Diary Module

3.6.1 Software Issues

1. Uneditable user details
2. Incorrect calculations of nutritional information.

3.6.2 Hardware Issues

N/A

3.7 Timeline Module

3.7.1 Software Issues

1. Incorrect visualizations of the various timelines.

3.7.2 Hardware Issues

N/A

4 Correlation Between Hazard Functions and Requirements

Hazard Function	Functional And Non-Functional Requirements
F1:Taking a picture	FR1 FR2 FR10 FR12 NFR1.1 NFR3.2
F2: Login to Account	FR9 NFR1.2 NFR2.3 NFR3.1
F3: Adding a food entry	FR2 FR3 FR4 FR5 FR6
F4: Changing User or Account Information	FR4 FR9 NFR2.1 NFR2.3 NFR 3.1 NFR 5.1 NFR 5.2
F5: Setting a Fitness Goal	FR7 NFR1.3 NFR6.1 NFR6.2 NFR6.3
F6: Setting a Macro-Nutritional Goal	FR8 NFR1.3 NFR6.1 NFR6.2 NFR6.3

Table 2: Login Page Trace-ability

5 FEMA Worksheet

5.1 Hazards Considered Out of Scope

1. External services used by the application that fail in any way by an external cause.
2. Data breaches that occur on on Firebase's database.

5.2 Failure Modes and Effect Analysis Table

Function	**Failures**	**Unacceptable Event**	**Severity of Failure (0-10), 0 being not severe**	**Cause of Failure**	**Likelyhood of occurrence(s) (0-10, 0 being least likely)**	**Recommended action**	**Likelyhood of failure detection(0-10, 0 being least likely)**
Taking a picture	Food image cannot be processed	User will not receive information on the food they will consume	8	The picture was unable to be processed	8	Error to user if image is not readable	9
Login to account	User cannot login	User will be unable to login to their account	8	Functions to recover password does not work	8	Try again	9
Adding a food entry	Incorrect calorie/ nutrition information returned to the user	User will be misinformed on food history	10	Issues with camera detecting food and portions of food	9	Notify the user of the ranges of which the nutritional data is relatively accurate	9
Changing User or Account Information	A user is able to change the account or user info of a different user	Users will have access to unauthorized functions	8	A lack of security measures to authenticate a users identity	2	Force the user to verify themselves through an email and authenticate users identity before changing any account or user info	1

Setting a fitness goal	A user sets an unhealthy fitness goal	Nutritional goals will be guiding the user to intake unhealthy amounts of calories or macronutrients	8	A lack of constraints on the users fitness goals	9	Incorporate constraints within our code to ensure the user can only lose or gain a certain amount of pounds per week, using health guidelines from reputable sources	9
Setting a Macro-Nutritional goal	A user sets an unhealthy macronutritional goal	Nutribud will be guiding the user to intake an unhealthy amount of macronutrients	8	A lack of constraints on the users macronutritional goals	9	Incorporate constraints within our code to ensure the user can only set healthy percentage breakdowns of their calories in terms of their macronutritional intake, using health guidelines from reputable sources	9