

MICHIGAN STATE
UNIVERSITY

Project Plan

Wellness Application for Medtronic Patients

The Capstone Experience

Team Medtronic

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Fall 2010



*From Students...
...to Professionals*

Project Overview

Goal

- Complete and polish current Wellness Portal apps
 - Web app
 - iPhone app
- Integrate with
 - Microsoft HealthVault
 - Medtronic devices
 - Nutrition source (FatSecret)
 - Streamline Existing Functionality



Functional Specifications

- Ingest Medical Data Automatically
 - Medtronic Devices (Mocked XML)
 - Microsoft HealthVault (XML-WS)
- Collect food and exercise information from user
 - Automatic entry via search
- Track *arbitrary* data, e.g. carbohydrates or weight
- Create and track goals related to any tracked data
- Provide recommendations from USDA guidelines

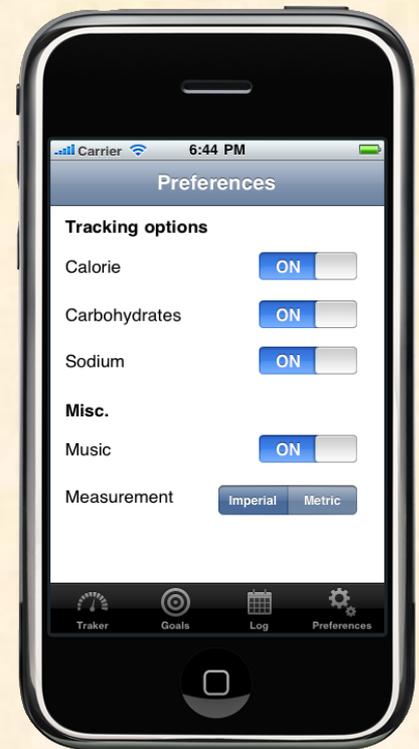
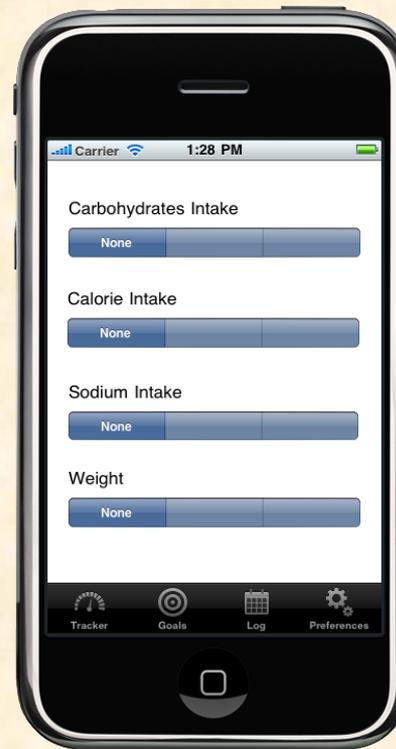
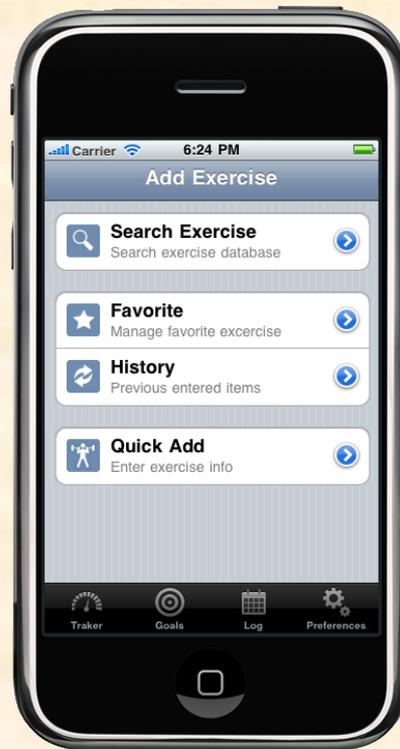
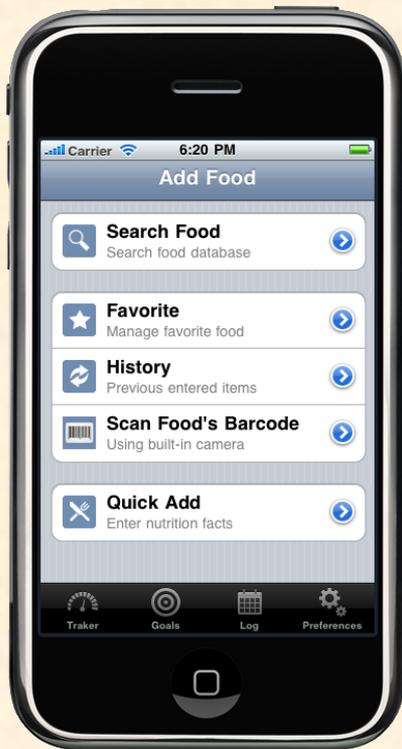


Design Specifications

- Most used functionality on the home page
 - Search for food /exercise
 - View recurring (daily) and long-term goal progress
 - Bar / Pill Graph
 - Viewing recommendations
- Focus on quick and seamless data entry
 - Gratuitous use of autocomplete
 - Search -> Select -> Record



Screen Mockups (iPhone App)



Screen Mockups (Web App)

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Dashboard

Food

Fitness

Goals

Medical



Zoom: 1d 5d 1m 3m 6m 1y Max **Sold Pencils 33.32 k** • **Sold Pens 39.46 k** | February 06, 2008

A. Out of Stock Ran out of stock on pens at 4pm 2008-2-4

B. Bought Pens Bought 200k pens 2008-2-5

Recent Activity More

- Ate one banana 5 hours ago
- Measured weight, 150 lb 9 hours ago
- Blood glucose level, 150 mg/dL 14 hours ago

Select data to compare on graph

Measurements

Blood Glucose Level

Blood Pressure

Weight

Nutrition

Calories Total Carbs

Saturated Fat Sodium

Cholesterol Protein

Total Fiber

Timespan

From 

To 

Update Graph

Goals Add Goal

Carbs by end of today

Calories by end of week

Weight by December 25

190 lbs 150 lbs



Screen Mockups (Web App)

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Dashboard

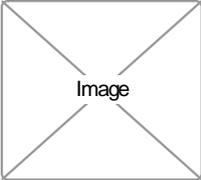
Food

Fitness

Goals

Medical

Banana Split



Based on your weight of 140 lbs, if you should consider burning off the 494 calories from this Banana Split, try one of the following:

- Running for 74 minutes
- Swimming for 99 minutes

Nutrition Facts	
Serving Size 1 cupcake (67g)	
Servings Per Batch 12	
Amount Per Serving	Calories from Fat 81
Calories 194	
% Daily Value *	
Total Fat 9g	14%
Saturated Fat 2g	10%
Monounsaturated Fat 2g	
Polyunsaturated Fat 2g	
Trans Fat 0g	
Cholesterol 0g	0%
Sodium 160mg	7%
Potassium 60mg	2%
Total Carbohydrate 29g	10%
Dietary Fiber 2g	8%
Sugars 18g	
Protein 2g	4%
Vitamin A	1%
Vitamin C	0%
Calcium	4%
Iron	7%

Have you eaten this food?

Serving Size

When?

at

Recent consumption

- 2 sundaes
Sept 5, 2010
- 1 sundae
Aug 9, 2010
- 3.5 sundaes
Apr 23, 2010

Recent Activity More

- ~~Ate one banana~~
5 hours ago
- ~~Measured weight, 150 lb~~
9 hours ago
- ~~Blood glucose level, 150 mg/dL~~
14 hours ago

Goals Add Goal

Carbs by end of today

90

→

200 g

Calories by end of week

4000

→

9000

Weight by December 25

140

→

10 lbs

190 lbs 150 lbs

* The Percent Daily Values are based on a 2,000 calorie diet, so your values may change depending on your calorie needs. The values here may not be 100% accurate because the recipes have not been professionally evaluated nor have they been evaluated by the U.S. FDA.

The Capstone Experience

Team Medtronic Project Plan

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Screen Mockups (Web App)

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Search for food, exercises, drugs...

Dashboard | Food | **Fitness** | Goals | Medical

Fast Running

Have you done this exercise?

Duration: minutes

Heart Rate (optional):

Distance: miles

When? at

Recent Fast Running workouts

- 2.5 miles, 30 minutes
Sept 5, 2010
- 1.8 miles, 20 minutes
Sept 2, 2010
- 5.9 miles, 1.3 hours
Aug 28, 2010
- 4.2 miles, 1 hour
Aug 24, 2010
- 3.7 miles, 45 hours
Aug 23, 2010
- 34 miles, 55 minutes
Aug 20, 2010
- 1.8 miles, 15 minutes
Aug 17, 2010
- 2.2 miles, 18 minutes
Aug 4, 2010
- 1.2 miles, 18 minutes
Aug 2, 2010
- 3.1 miles, 40 minutes
July 30, 2010
- 2.9 miles, 37 minutes
July 27, 2010
- 2.5 miles, 22 minutes
July 24, 2010

Recent Activity

- **Ate one banana**
5 hours ago
- **Measured weight, 150 lb**
9 hours ago
- **Blood glucose level, 150 mg/dL**
14 hours ago

Goals

Carbs by end of today

Calories by end of week

Weight by December 25
190 lbs



Screen Mockups (Web App)

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Search for food, exercises, drugs...

Dashboard | Food | Fitness | **Goals** | Medical

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Recent Activity [More](#)

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- Blood glucose level, 150 mg/dL 14 hours ago

Goals [Add Goal](#)

Carbs by end of today
90 200 g

Calories by end of week
4000 9000

Weight by December 25
140 10 lbs
190 lbs 150 lbs

Limit Carbohydrates to 200 g per day

Edit Goal

Cholesterol
250 g
[Delete Goal](#)

Define goal target by

Interval every day
 Date mm/dd/yyyy [Calendar](#)

[Update Goal](#)

Change timespan of graph

From mm/dd/yyyy [Calendar](#)

To 09/20/2010 [Calendar](#)

[Update Graph](#)



Screen Mockups (Web App)

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Medtronic

Search for food, exercises, drugs...

Dashboard | Food | Fitness | **Goals** | Medical

Start a new goal

Measurement

- Blood Glucose Level
[] mg/dL
- Blood Pressure
[] bp
- Weight
[] lbs

Nutrition

- Calories
[] g
- Total Carbs
200 g
- Saturated Fat
[] g
- Sodium
[] mg
- Cholesterol
[] g
- Protein
[] g
- Total Fiber
[] g

Define goal target by

- Interval every day
- Date mm/dd/yyyy

Add Goal

Recent Activity

More

- Ate one banana
5 hours ago
- Measured weight, 150 lb
9 hours ago
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Goals

Add Goal

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Screen Mockups (Web App)

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Search for food, exercises, drugs...

Dashboard Food Fitness Goals **Medical**

Measurements

September 20, 2010 (Today)

- Weight: 150 lb
2:14 PM
- Blood glucose level: 150 mg/dL
12:09 AM Edit Delete

September 19, 2010 (Yesterday)

- Blood pressure: 199/70 bp
10:54 PM
- Weight: 148 lb
9:44 PM
- Blood pressure: 174/66 bp
10:54 PM
- Weight: 147 lb
11:3 PM

View Order

Edit Measurement

Date: 

Blood glucose level
 mg/dL

Time: 

Update measurement

Recent Activity More

- Ate one banana
5 hours ago
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9 hours ago
- Blood glucose level, 150 mg/dL
14 hours ago

Goals Add Goal

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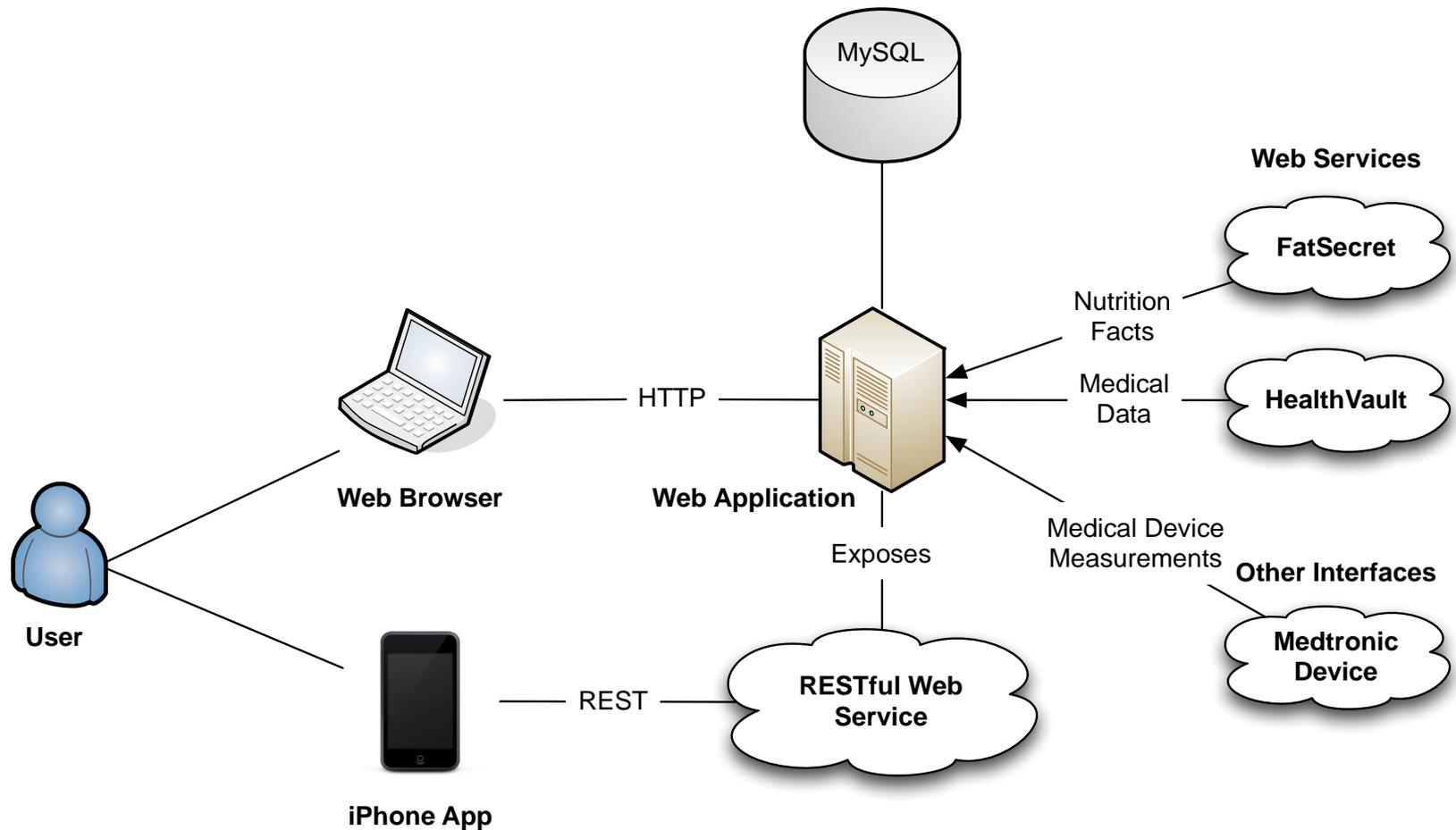


Technical Specifications

- Web app
 - Compatible with IE7, IE8; Firefox 2, 3; Safari
 - Developed with Groovy on Grails, JDK
 - MySQL Database backend
 - Exposes RESTful Web Service to iPhone
- iPhone app
 - Run on all iOS-compatible devices
 - Developed with Xcode 3.2.4 and iPhone SDK 4.1
 - Interface with Web App via RESTful Web Service



System Architecture



System Components

- Hardware Platforms
 - Web App: All platforms that support Java JVM
 - iPhone app: Apple iOS
- Software Platforms / Technologies
 - Web app
 - Groovy on Grails
 - iPhone app
 - Xcode 3.2.4 with iPhone SDK 4.1
 - RedLaser SDK
 - MySQL Server
 - External Data Sources
 - Interface via REST and XML web services



Testing

- Web
 - Exploit unit and integration testing support in Grails
 - Code reviews from Medtronic
- iPhone
 - Exploit Xcode unit testing functionality
 - Code reviews from Medtronic
- Integration testing when all new features completed



Risks

- Communicating Between iPhone and Server
- Import information from Microsoft HealthVault
- Interface with Nutrition Data provider
- Interface with Medtronic devices

