Unity Point Health
Health Care Analytics

Project Plan

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Table of Contents

Introduction

Project Statement

Health care is an evolving service in the modern world. Recently, there has been a push in the healthcare industry to make patient profiles more accessible by digitizing them. Introduction of electronic medical records has made it easier for doctors to provide better care for their patients. Unity Point Health would like our help to further improve the healthcare industry by utilizing technology. The main goal of this project is to create an iOS application that can help patients contribute to their electronic medical record through the MyUnityPoint system. UPH would like to develop a proof-of-concept to help collect, aggregate, and analyze new “patient data” generated by wearable devices so that UPH can conduct subsequent data analyses to help improve the health of patients.

Deliverables

For this project, Unity Point Health has requested we deliver an iOS application. The application should allow the user to sign into their MyUnityPoint account and sync health information from their smart wearables to their electronic medical record. Mini games will also be included in the application to help encourage users to sign in more frequently. Eventually, the application will also include some form of health analytics to help clients better track and predict their health status.

System Requirements

Project Requirements

Functional

- Integrate wearable device data with UnityPoint Health’s MyUnityPoint
    - Correctly read data from multiple devices
    - Use Apple Healthkit to collect data
    - Securely upload users’ health data to UnityPoint servers.
- Create iOS application for user interaction with data
    - Must follow Apple’s Healthkit app design guidelines.
- Analyze users’ wearable data with Electronic Medical Record

Nonfunctional

- iOS application must have fun or competitive user interaction
- Application must follow UnityPoint Health and Epic design guidelines.

System Description

Content

Our project includes three parts. The first part is the main health application which can interact with MyUnityPoint system and Apple HealthKit. The application will get data from wearable devices like the upcoming Apple Watch and FitBit, and integrate it into the MyUnityPoint system. After data is received, it will be used to create some user interaction function such as a competitive or comparative mini game as well as simple visualization of the data. Lastly, data retrieved by the application will be analyzed to produce a health result. The goal is to make the application more attractive to users and allow them to view their health data in a useful manner while encouraging more frequent use of their MyUnityPoint profile.

Initially, the application will include three functions:

1. Data Collection/Aggregation and integration with MyUnityPoint account access
2. Health data visualization and user interaction
3. Health data analyzation

Technical Approach

The production of the application will be broken into three segments:

1. Data Collection/Aggregation
2. Data Visualization
3. Data Analyzation

The Data Collection segment will include connecting an iOS application to both Apple HealthKit and UPH's MyChart. Starting with Step Count, the app would retrieve data sent to HealthKit by wearable devices and add the step count information into the patient's MyChart profile. Once the basic functionality of recording steps in MyChart is achieved, functionality for importing other information such as heartbeat and sleep activity will be added. The goal of this project segment is being able to incorporate more health data by the end. This segment will be the bulk of the project and will take the majority of the rest of this semester.

This data collection and aggregation section can be split into three main parts itself:

- Basic iOS app set up including following Apple and Epic UI guidelines
- Integration of accessing MyChart profiles through Epic/UPH
- Integration with HealthKit to retrieve health data

Following the collection of data, an interactive visualization of the user’s health data will be created. There will be a mini game within the app that may calculate a ‘health score’ that can be compared to the UPH average patient. This adds a competitive aspect that may encourage the patient to sign in and record their info more frequently.

Finally, the third segment includes the health analysis of the data. Aspects like analyzing recorded health data to predict potential ailments. This is a pretty broad description, but will become more defined as the project evolves.

Process Details

The general connection of the entire system can be seen in **Figure 1** below.

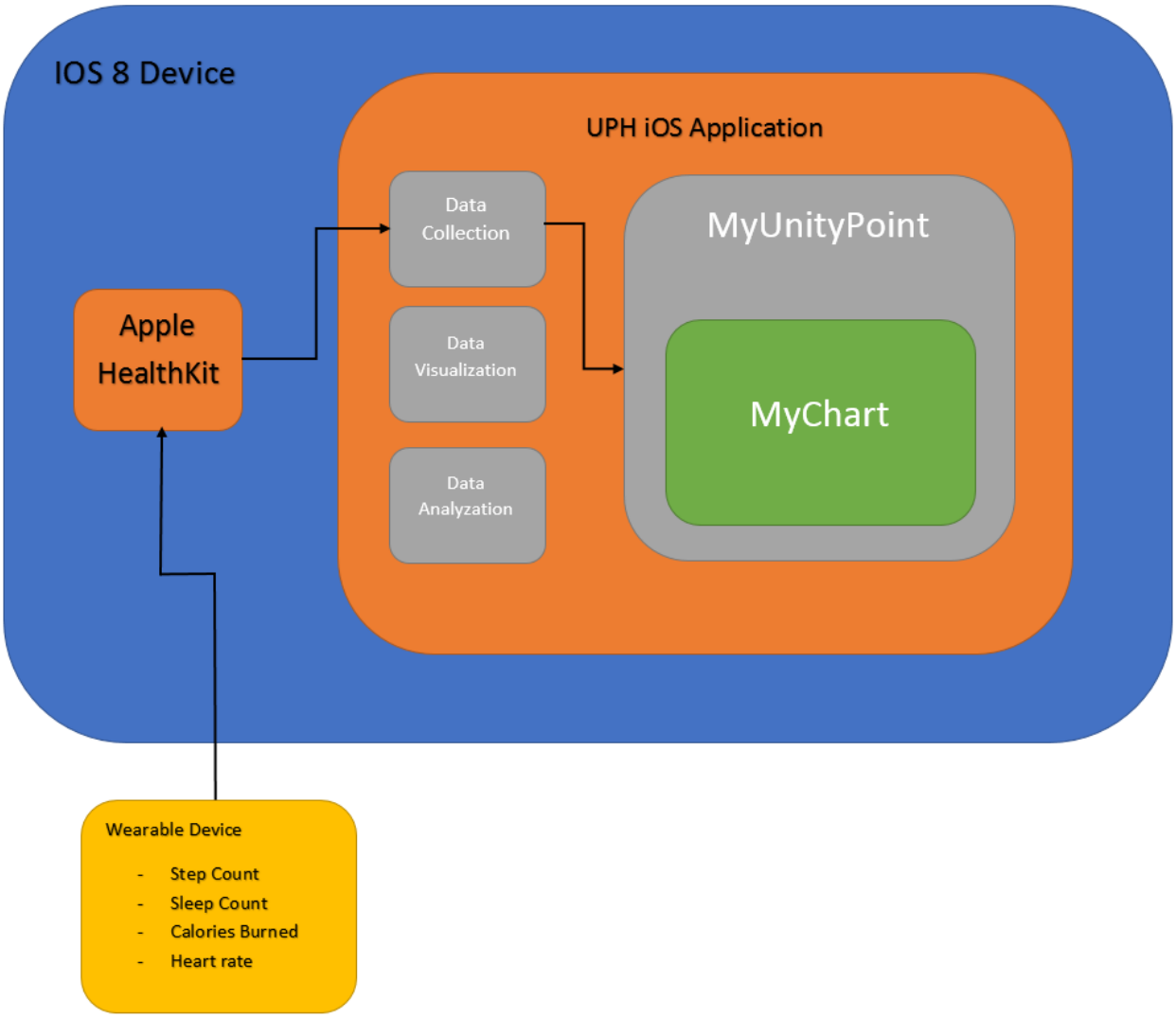

Figure 1 - Project Flow Chart

The first part is the data collection. During this part, we want to be able to get data from the wearable device into our app and be able to see that data in some small way. We also want to be able to transfer that data over to MyChart and into that persons EMR, so that it's stored for the patients and doctors to be able to access easily. For this step, we want to start small and then expand, so we are planning on starting with getting step count data from one of the devices we have. Once we have that down, we should be able to better generalize it into

getting and interpreting other types of data from those devices. Then we'll be able to work from there to start uploading that data into MyChart and the patients EMR.

The next part is data visualization. For this part, we want to be able to get the data from MyChart and show it to the user in some way that they'll find interesting. The first step to doing that is getting the data from MyChart and simply showing it in the app for them to view. This can be done as some sort of basic health overview. We also want to try to make sure users stay interested and keep coming back, so we want to try to create some form of game or other type of interaction that will keep them interested.

The final part is data analysis. We want to take the data that we have collected in the app to perform some form of basic analysis, possibly giving the user some idea of what they should do to prevent future health problems. We would start this by performing some analysis on the users data, finding some simple things. We could then expand that if we find it to be possible.

Test Plan

Since there are three large parts to this project, we of course need to test each part a bit differently. For the data collection part, we plan to more or less collect packets of sample data that we can send through our data collection process and make sure that everything is being parsed out correctly. We plan on collecting this data by using the wearable devices that were loaned to us by UnityPoint Health. Once we have a fair amount of sample data, we will need to find some way to separate out the data we want to have as part of a packet and then store that somewhere that we can get to it for testing purposes. Then we can create enough of these packets to test a wide variety of possible scenarios that our app could be used for. We will also need to ensure that this data is being written to their medical records correctly, so we'll likely need some test users for that. We should be able to verify that everything is being written correctly by checking out MyChart.

For the data visualization portion, we would most likely want to check how we are retrieving data from MyChart and displaying that, making sure everything is being displayed accurately. For this, we want to have some test users that we can fill up with data and then make sure that we are pulling the data from those users into the app correctly and make sure it is shown correctly. We will also need to be absolutely sure that no patient can somehow get data from another patient that they shouldn't have access to, so we will need to look into doing some security testing for that. We also want to try to create some form of game that deals with visualizing the users data in some way, so that the users have some form of interaction with the app rather than simply passively reading through their data, so we will need to do some form of playtesting for that as well.

For the data analysis part of the project, we'll need to make sure that our analysis of the patients data is correct. In order to do this, we'll want to input data into the test users to test the analysis of the data on general data as well as possible corner cases we will run into. Since we don't want people to have false positives and worry for no reason, we'll want to try

and test this with all kinds of different types of data. At this point, we'll also want to do some overall system testing, having data that goes from the wearable, through the app, into the MyChart records, and then make sure the app is displaying and analyzing the data correctly.

Work Breakdown

Project Schedule

2/20

- Have project plan 1 completed.
- Have a very solid idea of what we want to have accomplished for this semester, and begin coding for the application.

3/13

- Have Design Document 1 completed
- Have the application framework created, and be preparing to integrate this system with MyChart.

4/3

- Have Project plan 2 completed, which will be a more detailed report compared to project plan 1
- Have the step count integrated with health kit, and a way to make this information interactive

4/17

- Have a basic integration with MyChart in order to display information on a user profile.

5/1

- Have a complete Design Document, which will be the plan for the next semester
- Have a prototype application that shows integration of information from a wearable device/health kit with information in MyChart

SUMMER 2015

- Currently, there are no plans for the summer, since most of us will not be in the area
- However, if there is time, we will be continuing working on project details, moving some of the tasks that need completing to second semester

8/24

- Resume Classes
- Reunite with the team, and catch back up on where we left off last semester, and what we must do this semester in order to complete the project

9/11

- Have the application visuals further advanced, keeping in mind the standards set by UPH and Epic.
- Start the integration of more wearable devices

10/9

- Have all wearable devices configured to the application

- Create a universal standard for sending information from these wearable devices to the MyChart application

10/30

- Have the interactive material with the user/customers figured out
- Have integration into the MyChart application fully figured out
- Have prototype 2 for the application ready

11/13

- Develop more advanced analytics that can be used with the data sent from each device
- Continue to use these analytics to add more interaction with the user or integrate with the MyChart model

12/4

- Have the final prototype complete, including all integration materials with the MyChart, medical records, and have a great final presentation planned.
- Have application ready for release with UPH

Risk Assessment

Risk	Probability of Occurrence	Criticality (0-100)	Risk factor	Mitigation Strategy
We are unable to work with Epic in acquiring MyChart information and creating new tables for the step count or anything we want to do beyond that.	.05	100	5.0	We are communicating often and thoroughly with the client. This will allow everyone to always be on the same page. However, if it isn't possible, we would have to come up with a different way to save the users information and link it to their medical record.

We are unable to pull data information from Apple HealthKit.	.01	20	.2	We are learning a lot of information about Apple Health Kit, as well as the information we can get from it. However, we are also looking into getting the information directly from the wearable in case HealthKit is difficult.
The company decides that they want to take a different route with the application.	.05	50	2.5	We are, again, maintaining strong communication with the company. We will continuously feed them our ideas and thoughts, and they will continue letting us know what they want when we need requirements.
We are unable to add information to a user's medical record.	.05	80	4.0	We are talking to the employer about allowing access to add information to someone's medical record. Otherwise, we will find a different way to make the information gained valuable for the user the next time they go to the doctor's office.

This project is feasible for our group. As a group, we mitigate a lot of problems simply by communicating a lot between each other. We also maintain on the same page as our client through communication and meetings. We are 4 computer engineers and a software engineer, which means that we are all very capable of creating an application. Many of the risks above have very little chance of occurring, because of the necessary steps we are taking to ensure that we are able to create this application the way we want to. The project is also balanced over the course of both semesters, which will allow us to gain a great understanding of the information this semester, and continue to build on that come the next semester. This project is quite feasible given the talent in programming on this team, as well as our communication with the client.

Cost Considerations

Since this project will not be having any sort of hardware development, there are no hardware costs. Since we will be using wearable devices, we will need to have some wearable devices in order to test our code. The company we are working with, UPH, has already provided these devices, so that cost has been taken care of by them. Other than that, we will only be using software, which will only require a little bit of data space and some information from UPH. Since the data space is provided by UPH as well as the University, all data costs will be negligible. Lastly, there will be no labor costs, since we are working on this project with the University. With all of that added up, the cost of this project looks to be negligible.

Competitive Analysis

Wearables are a relatively new technology in this world, so there aren't many products out there that have tried to link the device to official Medical Records. However, the FitBit has its own interface where a user can track their steps taken, distance traveled, calories burned, and sleep time/quality. Currently, they simply have a display for this, but do not have anything interactive with this material. This concept is similar to a lot of other wearable devices, where they simply post about the information, but don't do much else with it. The difference between our idea and their current features is that we want to make it more interactive with the user in order to maintain user use with the application.

Conclusion

In conclusion, we want to create an application that will communicate directly with Apple HealthKit, add information to a user's medical record, and create a fun and interactive way to share the information gathered from a wearable device. Furthermore, we want to add more analytics in order to make the application more helpful and user friendly. We are very capable of doing this based upon our past experience with software projects and our communication with the client.