Dashboard for Parkinson's Symptom Collectors

Bamboo Mobile Health

Project Summary Report

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CSC 591 006 - User Experience

Objective

To design and develop an intuitive and user-friendly web-based application, in order to provide doctors and patients with the ability to view or monitor finer details of a Parkinson's patient's symptoms.

Experiential goals

Our goals are divided into two major sub goals based on the type of user.

1. Patient: We aim to provide the patient with the sense of control over their disease. By presenting information about parts of their disease, in a simple interface, patients can gain a positive outlook. The patient will have data they can show to their doctor, and can track whether their treatment is going well.
2. Doctor: We aim to provide the doctor with the ability to monitor and analyze the symptoms experienced by the patients. The doctor can look for recurring patterns and determine how to proceed with future medical care. By presenting validated data, the doctor can adjust treatments as needed.

Initial evaluation

This project involved working with an undergraduate team to gather and display data generated by a wearable device. The device gathered raw log records that our application parsed and validated. As the raw logs are generated by patients with severe physical symptoms, they come with many inconsistencies. Significant programmatic effort went to "validating" this data for proper display in the dashboard. We specifically anticipated these inconsistencies:

- Repeated presses, two or more "symptom start/symptom stop" events in a row.
- Missed stops, a "symptom start" event with no corresponding "symptom stop"
- Missed starts, a "symptom stop" event with no corresponding "symptom start"

Our goals involved a simple interface, so we mocked up a card-based layout with a few simple graphs. Displaying a daily history of the patients' records would allow our patients to directly see the symptom history. We decided to display messages and colors to reward patients for good medication adherence. We also mocked up a weekly view, monthly view and a yearly calendar view to make it simpler to spot emerging patterns.

We presented our initial prototype to our client, Bamboo Mobile Health, and got our design approved. After several meetings and couple of modifications to the original design, we finalized our card based layout and the use of d3.js and other javascript libraries for visualizations.

Experiential results

After showing our prototype to a patient, we gathered these notes:

- Patient had no trouble with the Gantt chart and found it easy to interpret.
- Patient was interested in a simple display of data; too many charts add too much noise.
- Patient enjoyed textual descriptions even if it replaces a chart.
- Total off-time (symptom duration) for a day was the most informative measure.
- A weekly view would be most helpful. Seeing a weekly snapshot is motivating.
- Displaying “bad” and “good” days in different colors helps when evaluating each month.
- Patient was interested in a feature to filter medications; showing only one medication of the two or three he’s taking.

Final design

Coordinating with the undergraduate team, we implemented an API their application could use to post events to our server. To handle raw logs, we implemented a daily validation script. This script runs through each day’s log records and outputs events suitable for our dashboard application.

Taking the patient’s feedback, we honed our design. Instead of two rows with cards, we placed more emphasis on the Gantt chart and had just one row of cards. This allowed our design to fit on one screen, if the user is viewing from a tablet or desktop computer.

We also placed more emphasis on the weekly view, as suggested by the patient. In this view, the Gantt chart is replaced with a bar graph showing the last week’s off-time durations. In the cards below, we display messages comparing that week to the average of the previous week. We have also implemented a similar page for the monthly view. We have implemented a calendar view, which is very helpful in checking the trends of symptom duration over a period of time, and deciding whether the current medication is effective or needs to be altered.

We also implemented a social forum where the patients can go share positive thoughts and experiences. Other users can read these posts and can upvote or downvote them. A list of the most upvoted posts can be viewed by any patient. This helps to develop a sense of community and helps patients fight the feeling of isolation.

As the wearable prototype evolves, more features will be possible on the dashboard. Better linking with the mobile app can be accomplished, perhaps showing the dashboard in the app without needing to open a browser. To give better doctor-patient feedback, doctors could be

allowed to send messages to patients through the dashboard. Future work on our design could include the patient's suggested medication filtering feature and rewarding patients based on exact medication adherence statistics of the patient.

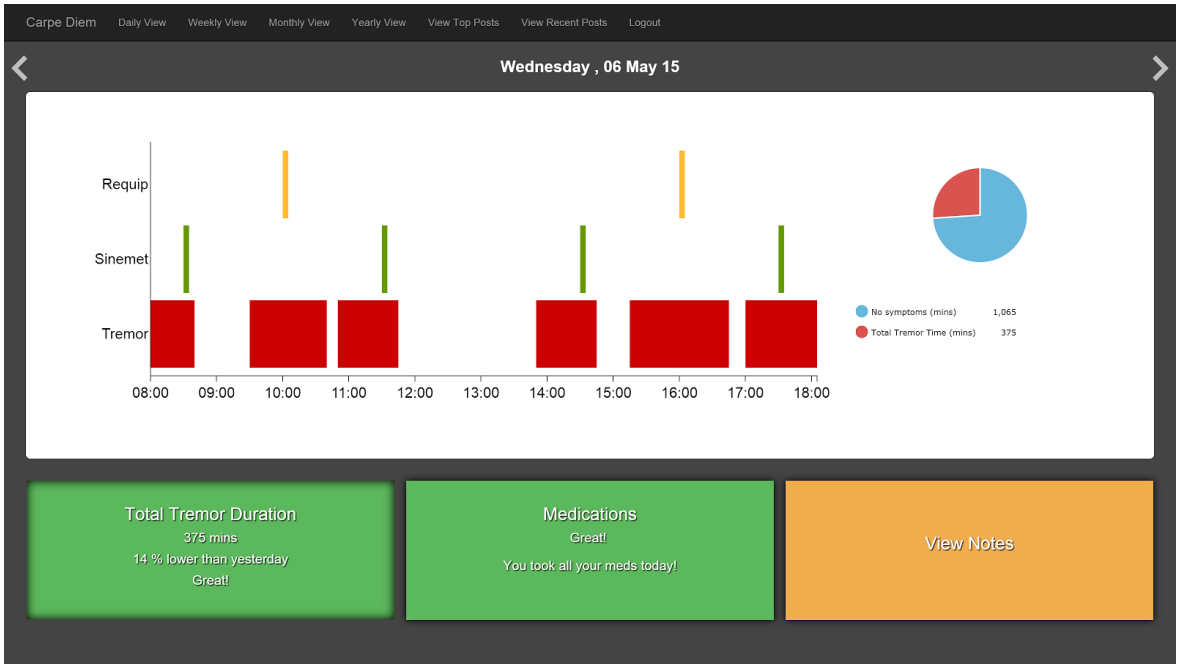
Extra credit implemented

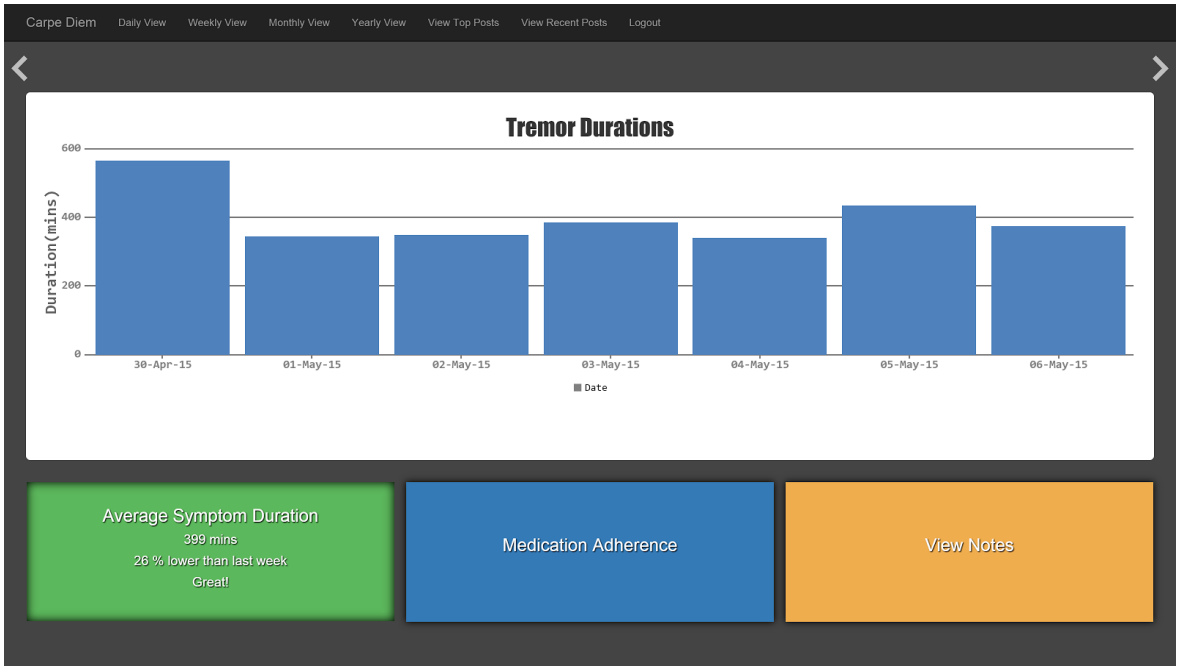
1. Regular weekly meetings with client for status update and feedback
2. Integrated animations to make the frontend seem more fluid
3. Implemented Social Forum to provide community encouragement.

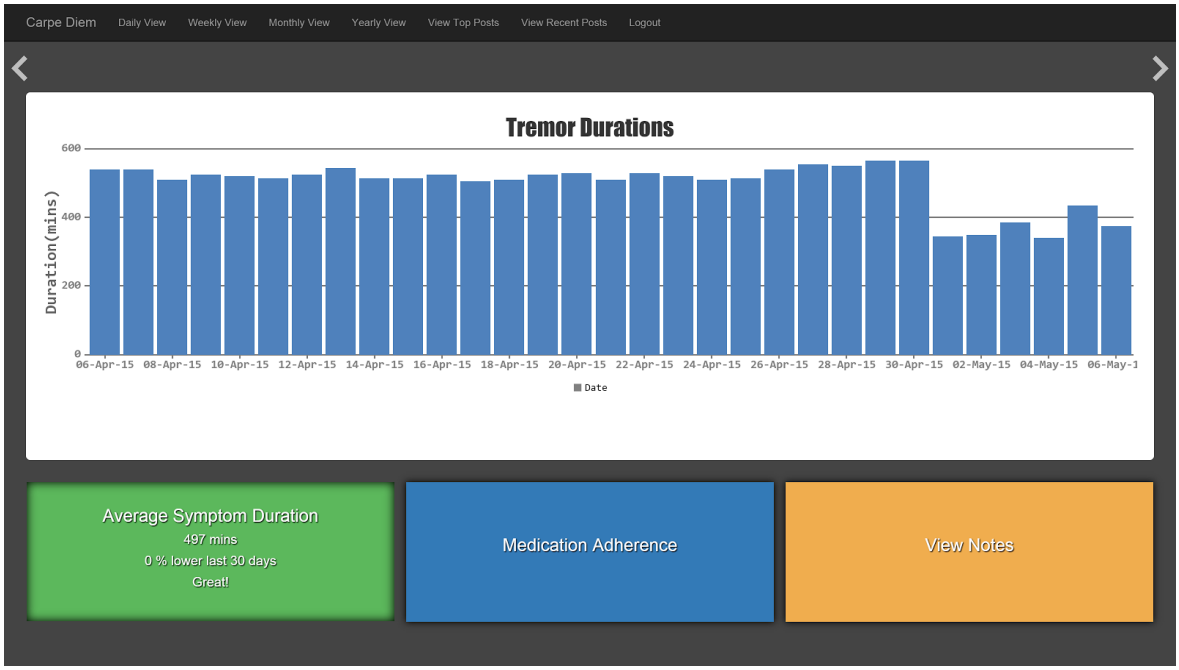
Live prototype

Log into http://54.152.53.243/dataviz/, using the username becky@PD101.me and password qweqwe123. The code is submitted to Bamboo's BitBucket repository at https://bitbucket.org/raymondzwycewicz/591dataviz.

Screenshots




Carpe Diem
Daily View
Weekly View
Monthly View
Yearly View
View Top Posts
View Recent Posts
Logout
Tremor Durations
Duration(mins)
600
400
200
0
30-Apr-15
01-May-15
02-May-15
03-May-15
04-May-15
05-May-15
06-May-15
Date
Average Symptom Duration
399 mins
26 % lower than last week
Great!
Medication Adherence
View Notes


Carpe Diem
Daily View
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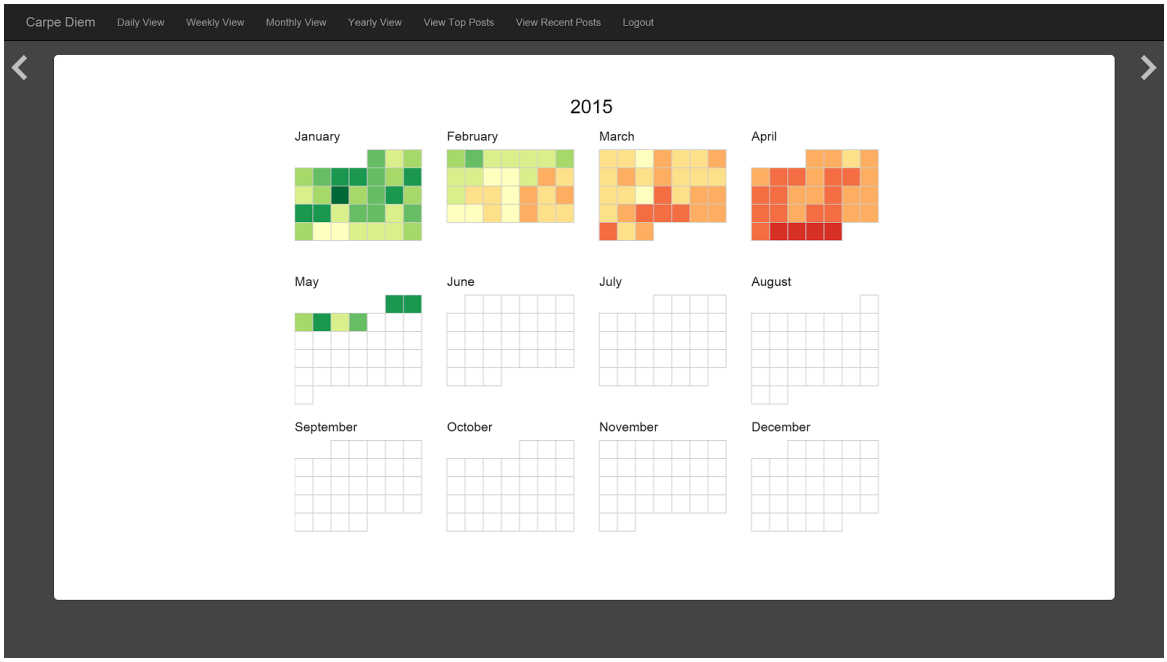
Logout
Tremor Durations
Duration(mins)
600
400
200
0
06-Apr-15
08-Apr-15
10-Apr-15
12-Apr-15
14-Apr-15
16-Apr-15
18-Apr-15
20-Apr-15
22-Apr-15
24-Apr-15
26-Apr-15
28-Apr-15
30-Apr-15
02-May-15
04-May-15
Date
Average Symptom Duration
497 mins
0 % lower last 30 days
Great!
Medication Adherence
View Notes


Carpe Diem
Daily View
Weekly View
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View Top Posts
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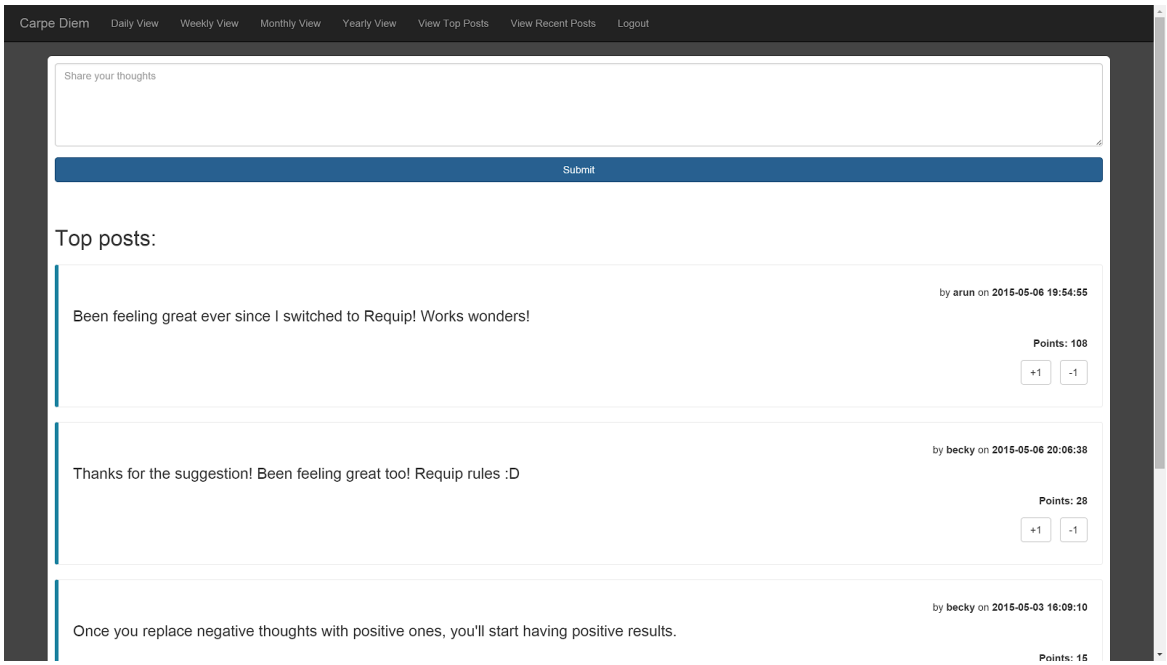
Logout
2015
January
February
March
April
May
June
July
August
September
October
November
December


Carpe Diem
Daily View
Weekly View
Monthly View
Yearly View
View Top Posts
View Recent Posts
Logout
Share your thoughts
Submit
Top posts:
by arun on 2015-05-06 19:54:55
Been feeling great ever since I switched to Requip! Works wonders!
Points: 108
+1
-1
by becky on 2015-05-06 20:06:38
Thanks for the suggestion! Been feeling great too! Requip rules :D
Points: 28
+1
-1
by becky on 2015-05-03 16:09:10
Once you replace negative thoughts with positive ones, you'll start having positive results.
Points: 15