

# The Moment

Tien-Yun Huang

Massachusetts College of Art and Design  
621 Huntington Ave, Boston MA 02120  
tien-yun.huang@massart.edu

## ABSTRACT

The Moment is an application aimed to help people with depression or bipolar disorder to monitor their emotional ups and downs, reveal their emotional patterns, and eventually find a peaceful way to live with their emotions, rather than fighting with them. The system consists of two main components: A smart-phone application for the users to track their feelings and memories about events, and a sensor recording their physiological response. The data will then be visualized in several ways and available to be shared with their trusted ones or doctors. The system is designed to make the user more aware of their mood swings and the precursors to them; to reveal patterns about what could lead to emotional ups and downs, including physiological data such as arousal and sleep habits; to provide a record for healthcare providers; to build a library of personalized interventions for future use; and to create an effective network of social supports.

### Author Keywords

Well-Being; Emotion; Self assessment; Quantified self; Electrodermal activity; Bipolar; Depression; Arousal; Mobile Application; User Experience; User Interface; Data Visualization

### ACM Classification Keywords

Design

## INTRODUCTION AND RELATED WORK

Living with bipolar for decades, I have tried many different ways to deal with emotions. For a long time, I have been taking various medicines, accepting counseling with the belief that these are the only ways I could do. I have never think of the power I might have with myself, until I was introduced the idea of Positive Psychology. Positive psychology is currently emerging as a new way of behavioral changes by amplifying the positive value in life as opposed to fix the negative experiences [14]. This idea has lead me to think about how I can change the way I live with my emotional episodes with the rapidly improving technology—especially our smartphones and wearable devices, things that we carry with us everyday on the go.

Previous research about behavioral intervention technologies [13] have been showing promising opportunities of psychological intervention strategies by using digital media to target behaviors, cognitions, and emotions in support of physical and mental health[13]. As an example, CalmMeNow[7], which uses mobile devices for stress mitigation based on three types of interventions,

including social networking, has shown great show great potential for interventions. Researches on self-reporting and logging systems has been showing more opportunities with wearable devices integrated into the design of intervention strategies[1] [12]. Researches on emotional expressivity has offered valuable qualities for designing self-reporting interfaces for emotional activities[15][16].

From reported clinical experience of bipolar disorder sufferers, a proper and positive intervention is can be helpful for treating symptoms. From our user studies, however, we found an effective intervention should not be universal because everyone has his/her unique experiences that are different from one another. A personalized intervention based on their annotations and sensor data and their unique experiences will be of significant help to discover what could lead to or improve emotional ups and downs as personalized interventions when needed. In addition to these personalized interventions, forming connections with trusted and/or closed ones is another feature that helps the user when experiencing depression as social interactions play an important role in intervening mental health [7].

## METHODOLOGY

“The Moment” has been designed and developed under iterated revision process and long-term testing as I keep modifying the features to build a more easy-to-use tool for the target users. As this tool requires users’ long-term engagement (self-reporting) to get meaningful analysis, I believe the best way to engage users is to make the tool intuitive and comfortable to use. As the data analysis goes, I have also modified the way I visualize the data, or to include new kind of data or to leave out some kinds of data when I found it would be helpful. Below is a simplification of the description of the steps in the process:

- An ethnographical research was conducted to come up with potential needs and data I need to collect.
- Design and development of data input interface and visualizations.
- Contextual researches on colors and emotions.
- Interviews with medical professionals, therapist and clinical psychologists about factors that should be recorded to create meaningful visualizations that could reveal patterns.

- Consulting with writing professionals on deciding the most understandable language for the interface.
- User studies on description of emotions and other factors, e.g. appetite and sleep quality.
- Usability tests on the interface.

## INTERFACE

### A) Self-reporting

To create a self-reporting log of mood, the user first selects a color that best represents his/her feelings. (Figure. 1, 2)



**Figure 1.** The first version of the interface where the user chooses a color (Left)  
**Figure 2.** The current version(Right)

The color scheme is based on previous research involving the expression of emotions and colors [4, 15, 16, 20 ]. Here, the color represents different emotions while the saturation of the color represents the intensity of the emotions.

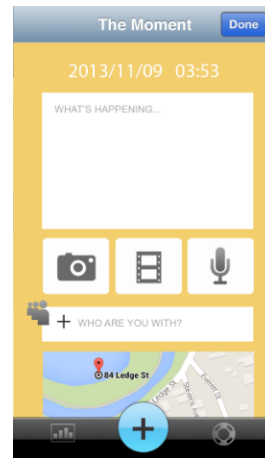
Once the user chooses a color, he/she is led to a screen covered with the chosen color and he/she will be able to put notes including pictures, videos or voice memos (Figure 3). The system also records the time, weather and location data automatically. These information will then be stored into a library and used to create a personalized intervention in the future. In addition, the act to write down one’s emotions and what causes the emotions can be helpful to better understand and deal with the emotions, according to the idea of *Expressive Writing* [8].

After finishing the note and taps the “Done” button at the top right of the screen, the user will be led to the timeline (Figure. 4) where he/she can review all mood records which are shown as color bars. Each bar represents an event. The user can tap on any of the bars to check her notes.

There is also a filter button on the top right, with which the user can tap and choose to see only one category of emotions. (Figure 5, 6)

In addition to moods, the user can also report his/her sleep quality and appetite, which they would very often be asked when visiting a therapist. The user reports his/her sleep

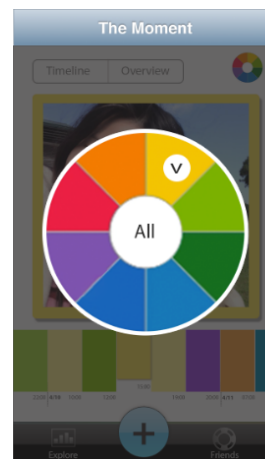
quality by dragging the bar in a battery (Figure 7); and reports his/her appetite by putting the dot with appropriate expression (Figure 8).



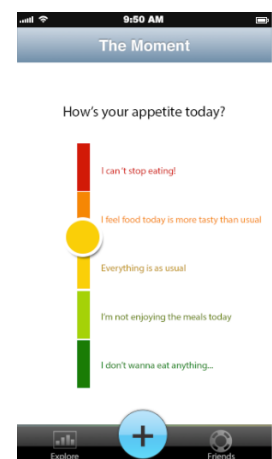
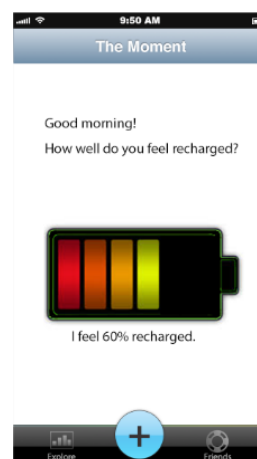
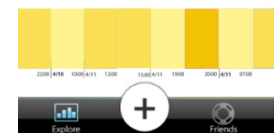
**Figure 3.** The note screen



**Figure 4.** The timeline



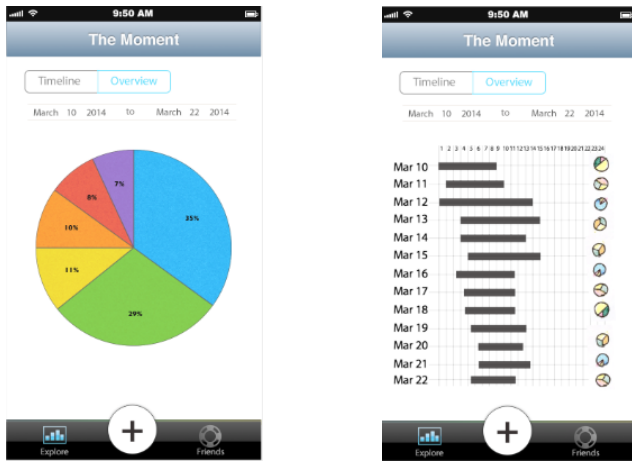
**Figure 5.** By tapping on the top-right filter button, the user can set filter (Left)  
**Figure 6.** Timeline with only happy(yellow) logs filtered.



**Figure 7.** The user reports sleep quality using the battery metaphor (Left)  
**Figure 8.** The user reports appetite using the slider with description (Right)

In the “Explore” page, the user also has an option to see an overview of these data in addition to the continuous timeline view. By switching the page from timeline to

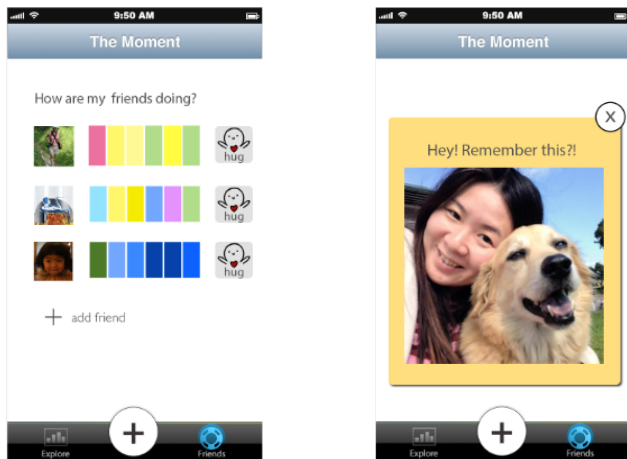
overview, he/she will be able to see an overview chart representing one category of data (Figure 9) or a chart representing the relationship between two different kinds of data that were recorded, for example, sleep quality and mood (Figure 10).



**Figure 9.** An overview of moods in a selected period of time (Left)  
**Figure 10.** An overview of sleep and mood in a selected period of time (Right)

### B) Social Supports

Supports from family and/or close ones can be very powerful. Research has also shown that the sense of being needed can be of great help to depression [21]. Thus, the app is not only trying to have the user get supports from family/friends, but also trying to have them be able to support their family/friends who are in need of supports. In this app, the user can connect with his/her close ones and monitor one another's emotional status and support each other (Figure 11). The system would also monitors the user's emotional fluctuations and notify his/her friends when he/she seems to need supports.



**Figure 11.** The user can check friends' status and give them a hug (Left)  
**Figure 12.** A pop-up notification reminding the user a happy moment (Right)

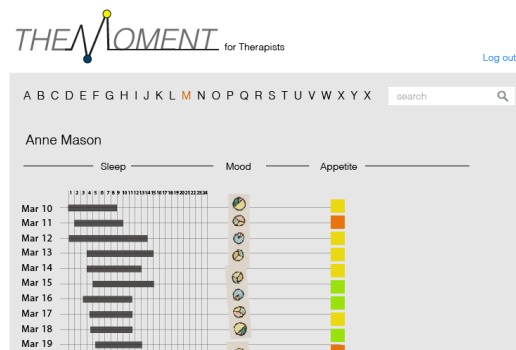
### C) Personalized Interventions

When the system recognized the user's low-energetic status lasts too long or appears too often, it not only sends

notification to his/her friends but also pop a notification window to remind the user of his/her happy moments. In this pop-up window would be a picture the user took or text he/she wrote in a log recording a happy moment (Figure. 12).

### D) Connection with therapists

While these positive memories and social supports could help, it is still recommended that people who are suffering from depression/bipolar should consult medical professionals on a regular basis. In this case, the app is also trying to facilitate the communication between the user and his/her therapist. The user can invite his/her therapist to view the data. The therapist will be guided to a desktop-based page where he/she can review all his/her patients' status (Figure 13).



**Figure 13.** Therapist's view

### E) Connection with wearable devices

The previous version of this app was designed to connect with a Q sensor. Because self-reporting can be subjective but biological data is not. The app also allow the user to connect other wearable devices that he/she is using, for example Fitbit or Up by Jawbone.

### USER TESTING AND LESSONS LEARNED

The interface usability test was done with 15 participants with/without bipolar/depression. A small conclusion from the tests includes:

- Everyone has a different way of describing his/her feelings, which makes the self-reporting interface very a big challenge. It is hard to find one way that fits everyone's scale. For example, the color scale has been evolved 5 versions, although it looks less and less users got confused with the color picking part, there are still users took a relative long time to figure out how it works. Also on the appetite part, everyone describe his/her appetite differently, not just with good/bad. One of a bipolar user said she would prefer the app asks her what kind of food she is craving for right now because that usually correlates to her current mood.

- To understand individual patterns about what can trigger bad or good moods, data from a longer period of time is

required. A big challenge of this app is how to engage the user for as long as possible.

- Although The Internet of Things is becoming more and more feasible, there are still many problems connecting different sensors/systems. It requires strong back-end technology that I did not expect at the beginning.

#### ONGOING WORK

- Following the above problems, I would like to connect existing wearable devices, such as Fitbit or Up to The

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