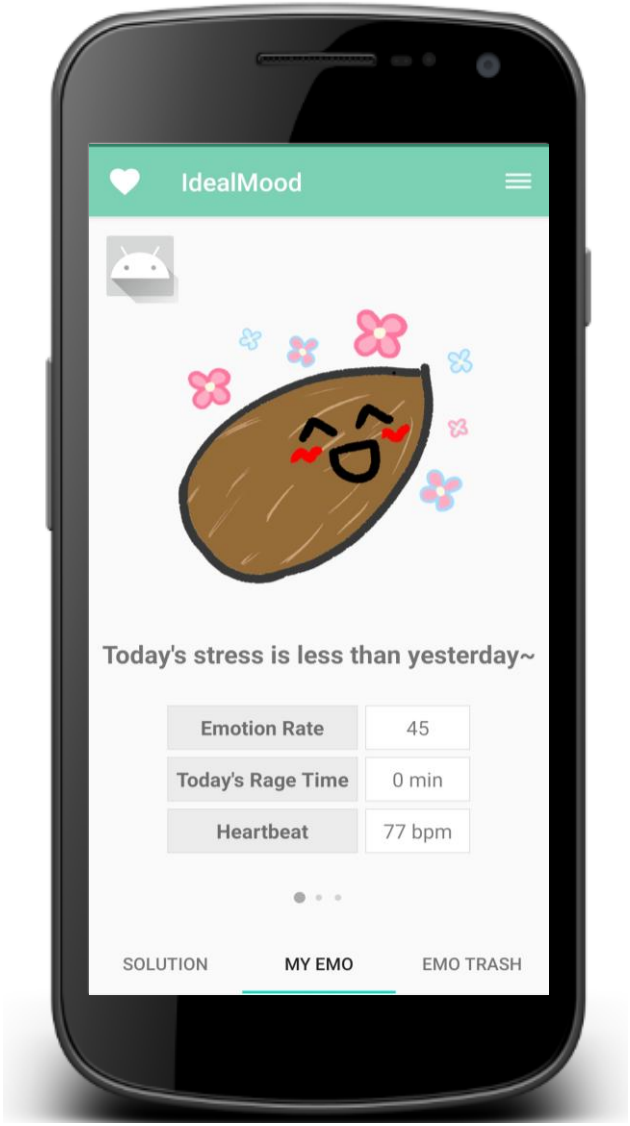
2020 K-Lab Project 2 : 3rd JC Preparing

Ideal Mood

Team 6. Idea!



Project title

"Ideal Mood"

Mental health management Project

Statement of the problem

- No application to **immediately give feedback** in an angry situation
- No application for people with **psychiatric disorders**
- It is a **burden to order a project** from a general institution or facility.
- Need a product that **can be used universally**

Project goals and objectives

- Wearing a smart band, **grasps your emotional changes** in real time

- When **emotions become intense**, **notifications are made** through smartphone notifications and vibration of smart band.

- **Record your feelings**, review yourself, and reflect on yourself

Technical approach – Developing Application

Android Studio

- Integrated Development Environment(IDE)
- Providing Google design patterns
- Simple & Easy development

Permissions

- **CALL_PHONE:** guardian, 119
- **Bluetooth:** Device Connection

Technical approach - Device

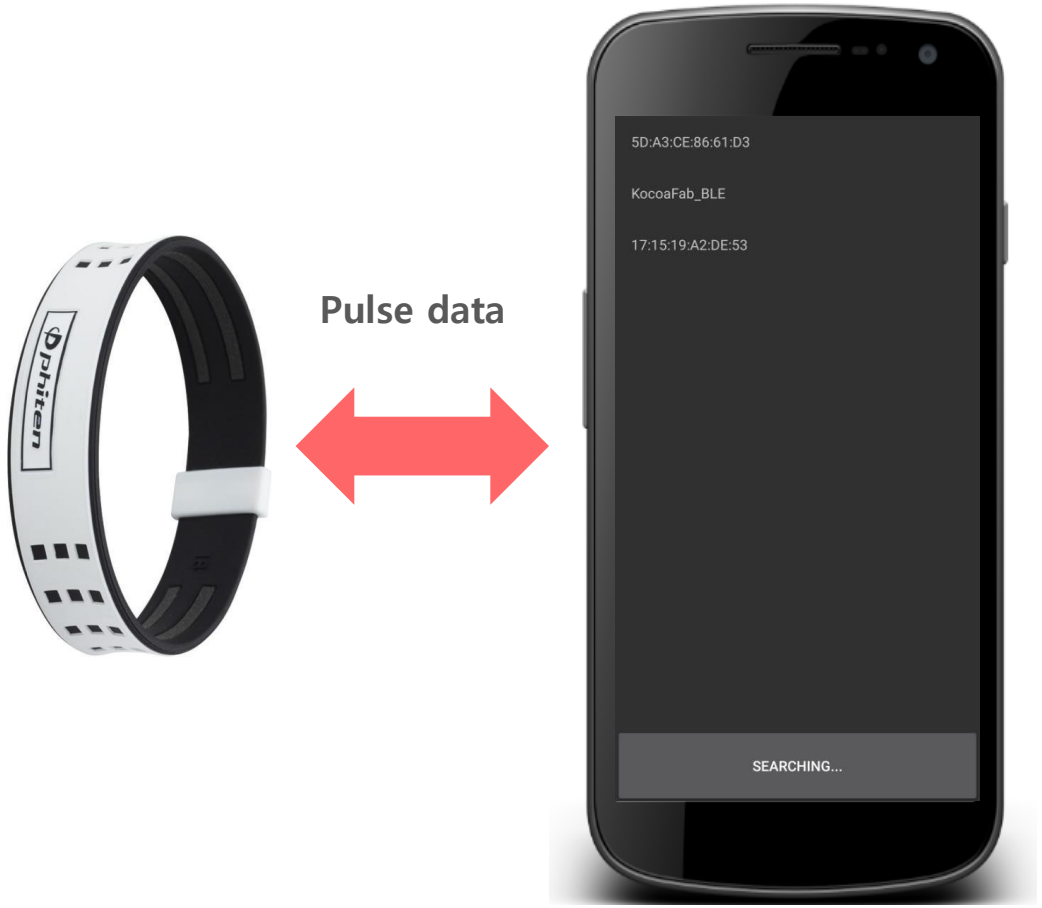
Arduino

- Pulse sensor
- Bluetooth module
- Vibrating module

Fritzing

- **Arduino UNO**

Technical approach



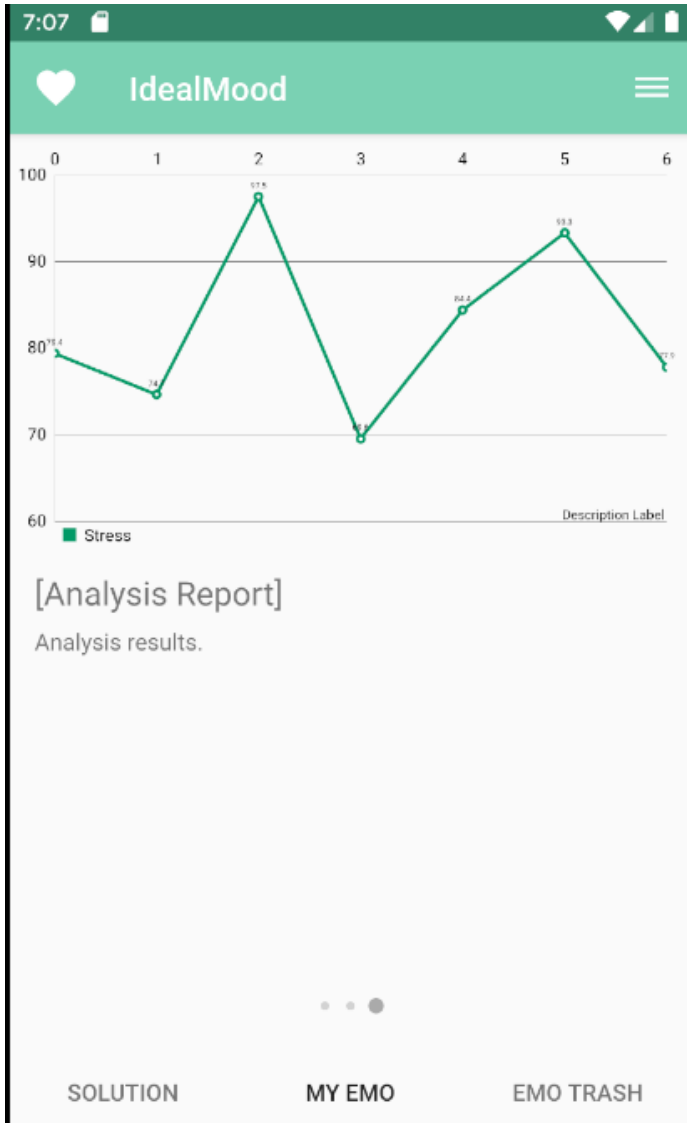
Bluetooth

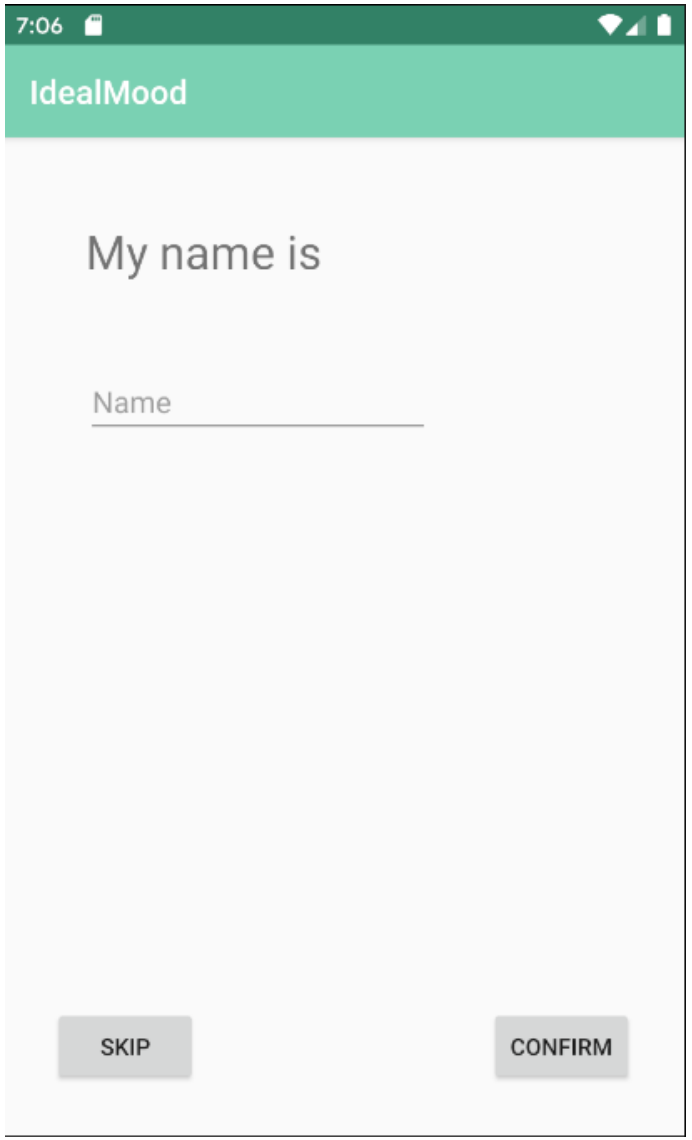
- BluetoothGatt (Kotlin)
- Arduino IDE

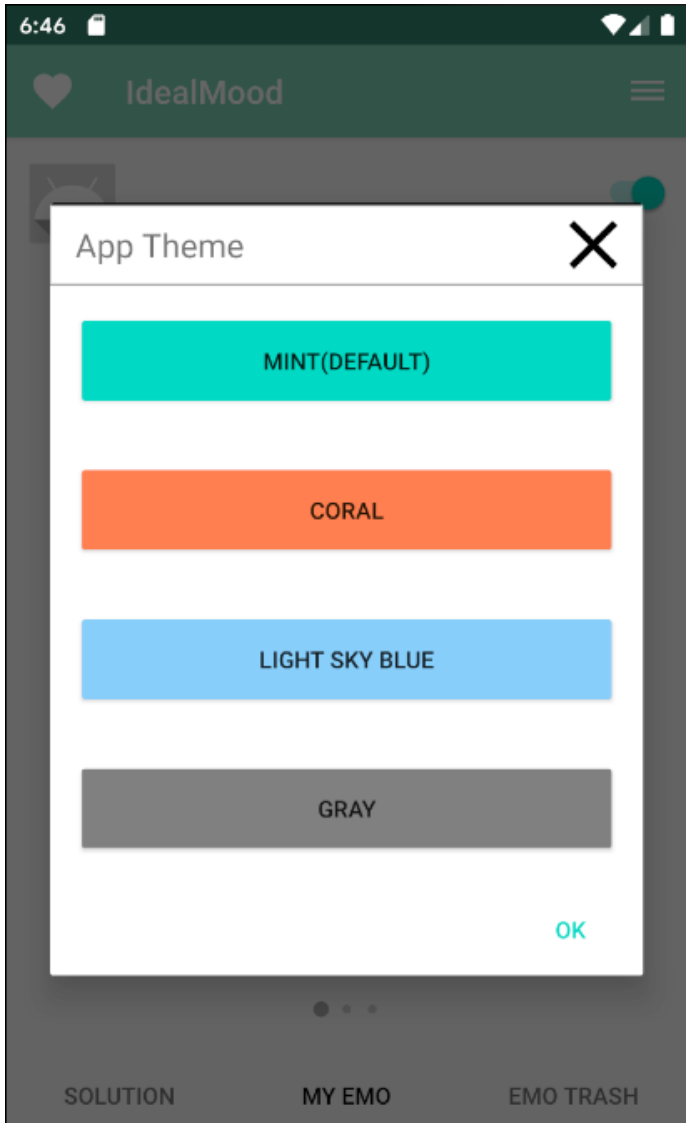
Stress Value

- Developing stress value algorithm
- Major arguments : Pulse data

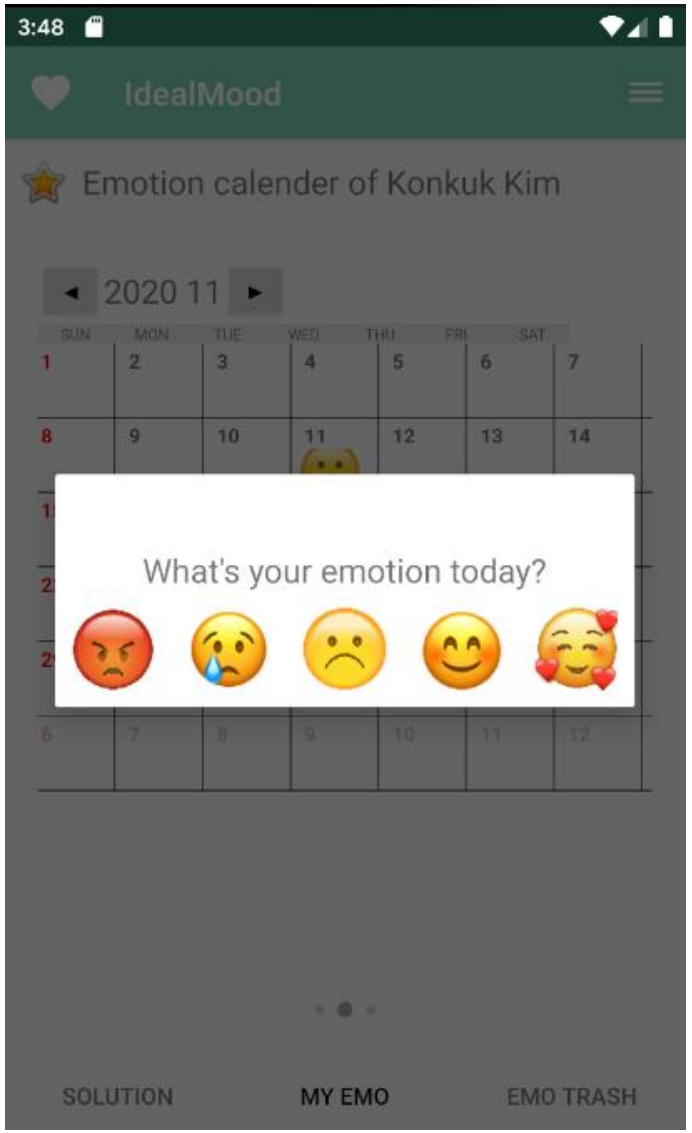
Update Language for globalization

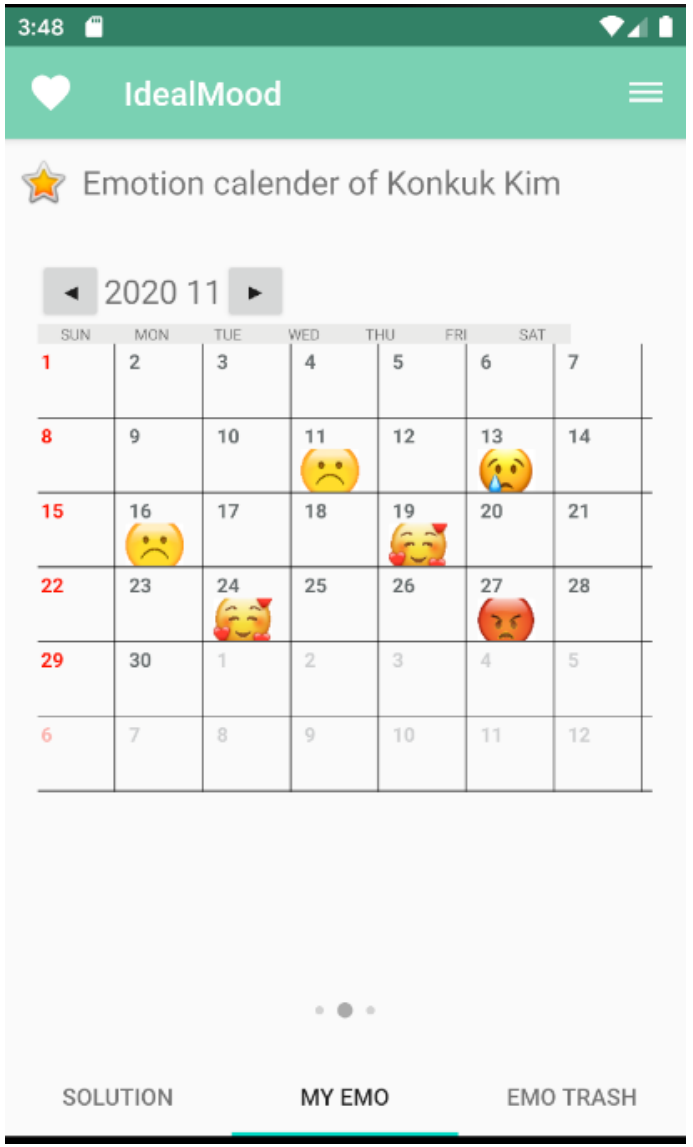




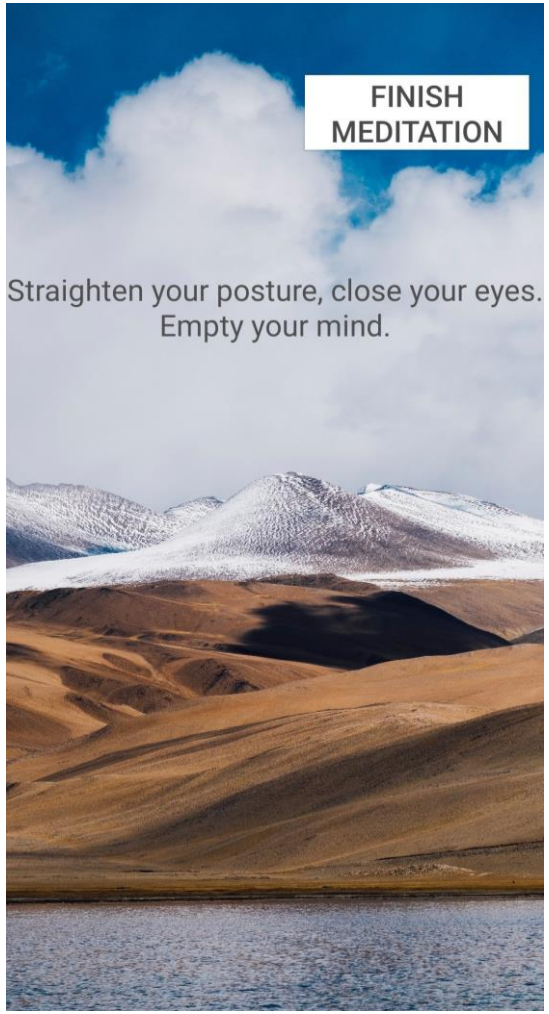


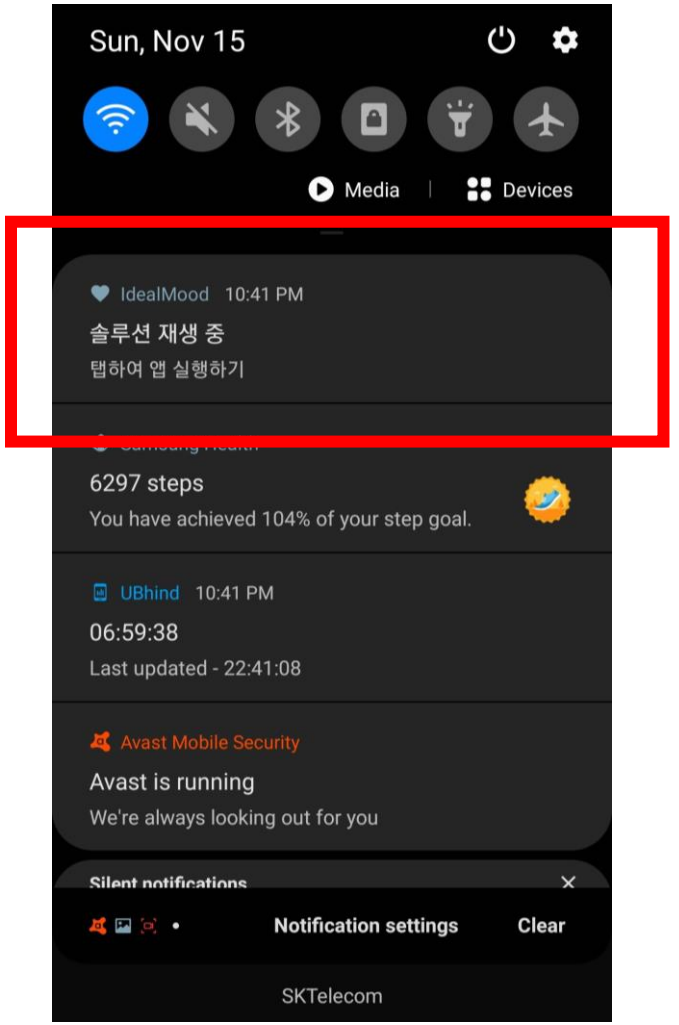
Update Calendar with Emoji



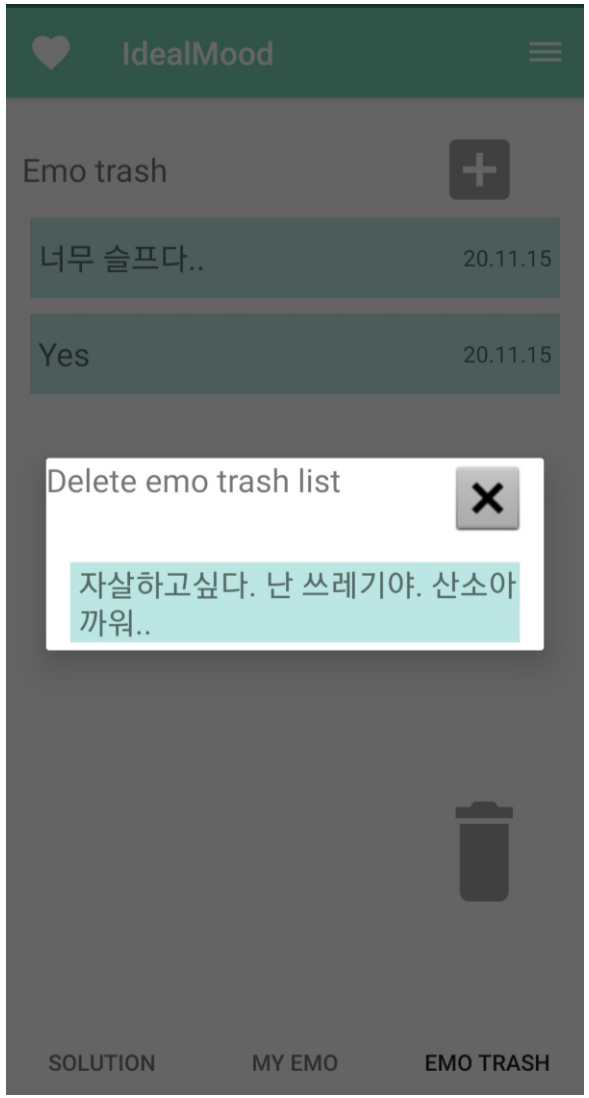


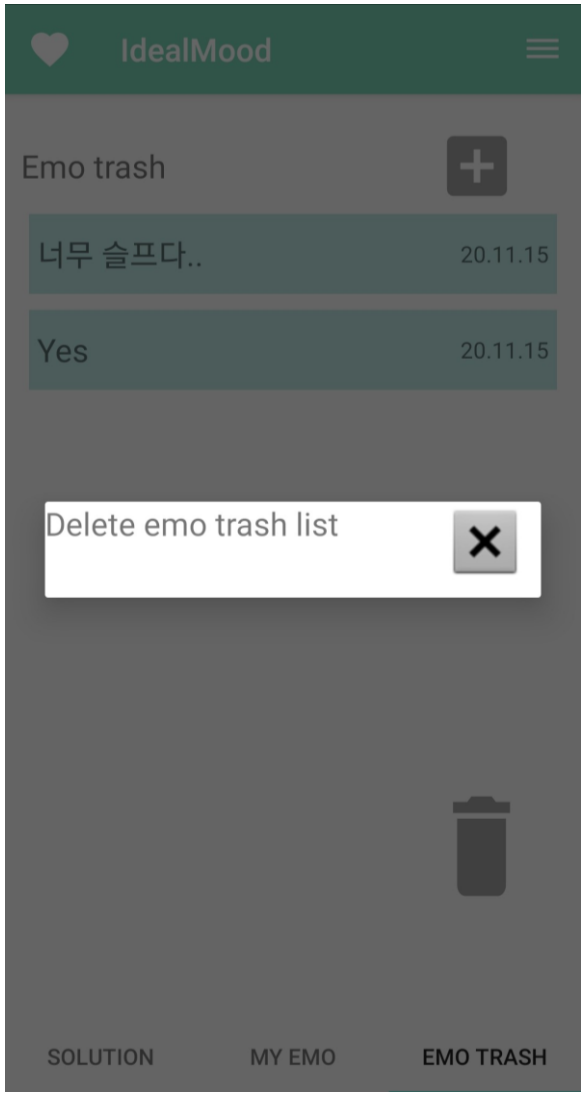
Update UI of Solution Screen





Update Emotion Trash (Diary)





Update Status Bar

- Fixed in **black**
- **Any color of the app bar goes well with it**

Supplementary explanation about Stress Algorithm

- **HRV** is related to interaction between sympathetic nerve and parasympathetic nerve affecting the sinoatrial node
- For **healthy person**, the HRV graph appears irregular and **complex** but for **sick person** the minute changes in the heartbeat appear very **monotonous**
- **RMSSD** is most commonly used variable among autonomic nerves involved in the heart to evaluate the activity of the **parasympathetic nerve**
- **In case of heart failure, RMSSD is degraded compared to healthy people**

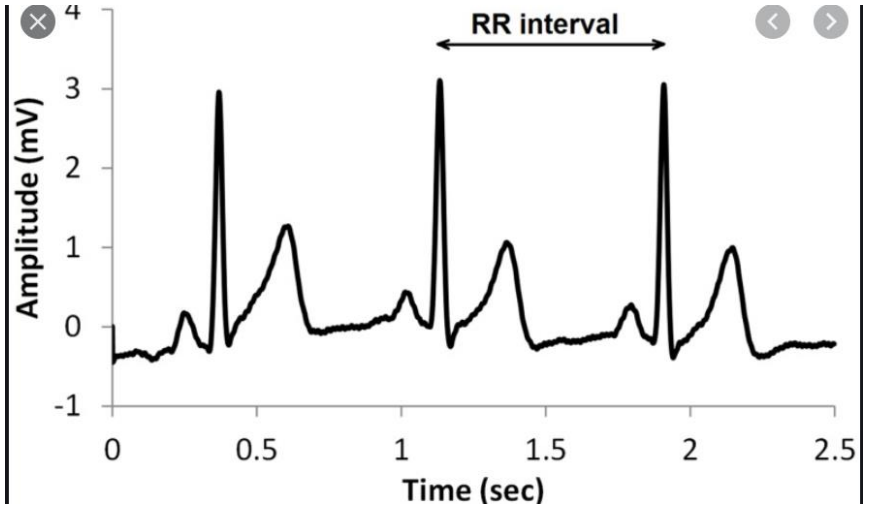
Stress Algorithm

- HeartBeat rate = $\frac{60000}{RR\ interval}$ (RR-interval Unit : ms)

Heart Rate input v_1 -> v_2 -> v_3 -> ...

RR interval $\frac{60000}{v_1}$ -> $\frac{60000}{v_2}$ -> $\frac{60000}{v_3}$ -> ...

N 1 -> 2 -> 3 -> ...



Stress Algorithm

And we decided to use **RMSSD** measure

- reflecting the elements of heart rate variation over a **short period** of time
- indicating the degree of **parasympathetic nerve activity**

Let's say some value of RR interval is R_i

$$\text{RMSSD} = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N-1}((R_{i+2} - R_{i+1}) - (R_{i+1} - R_i))^2}$$

Stress Algorithm

We set each RMSSD's range differently

=> making **multiple** RMSSDs

We **manipulated** it a little easier to code.

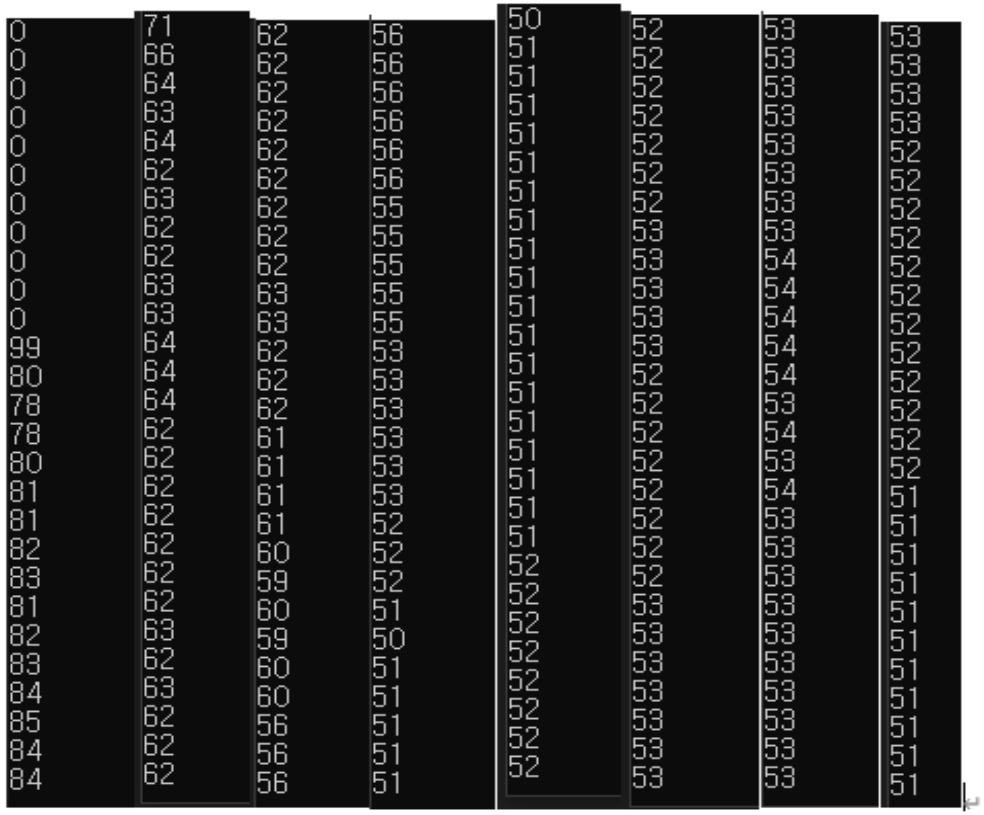
$$RMSSD_N = \sqrt{\frac{(N-1)\times {RMSSD_{N-1}}^2 + ((R_{N+1} - R_N) - (R_N - R_{N-1}))^2}{N}}$$

Stress Algorithm

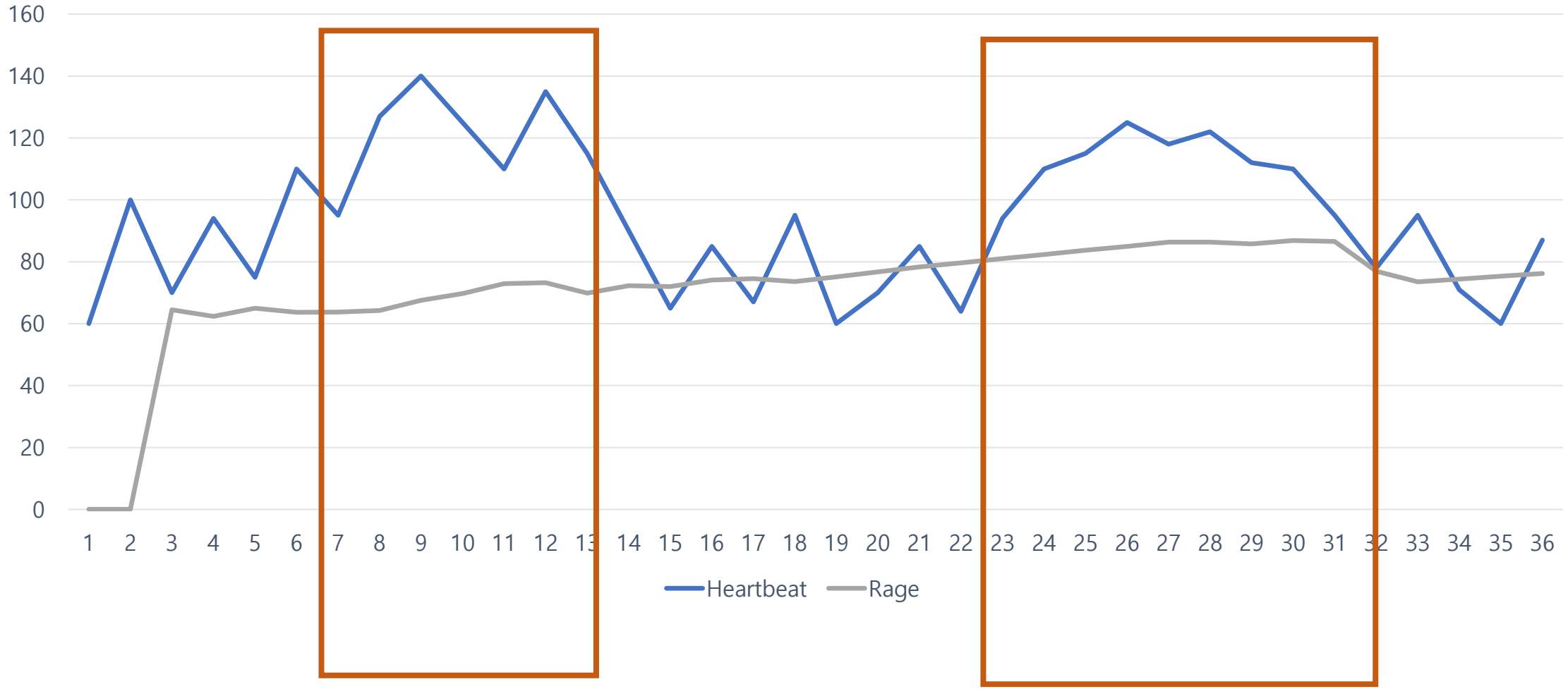
Stress level was determined by applying RMSSD **nonlinearly**

$$\textbf{S.L}\ (\text{Stress Level}) = \frac{2500}{RMSSD+1} + 30$$

$(0 \leq S.L \leq 100)$



Evaluation Result with weights



Maximum Heartbeat part

Actual Rage part

Change Character used our application

Ideal mood – Almond

: Pronunciation is similar

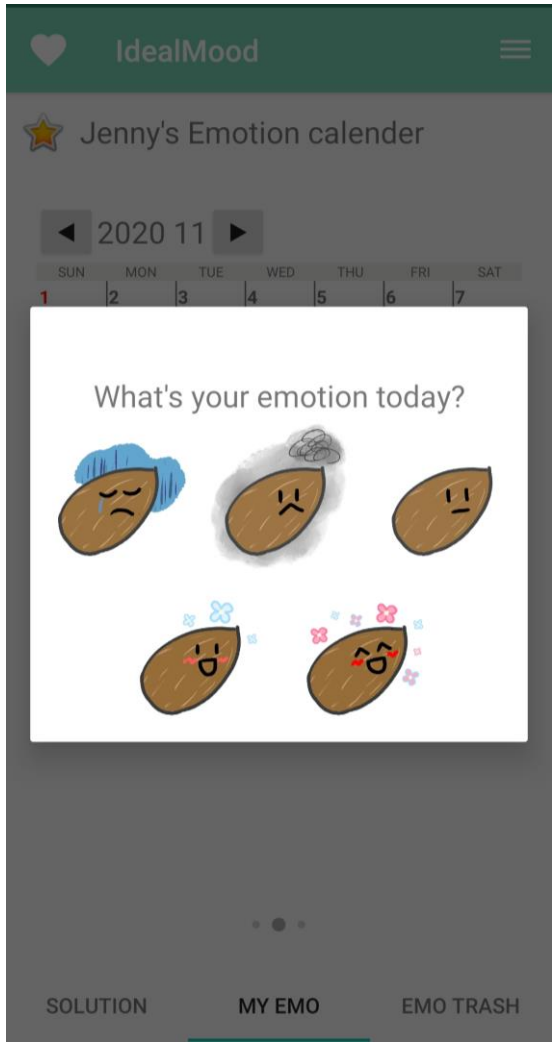
So, we made our own character based in almond.

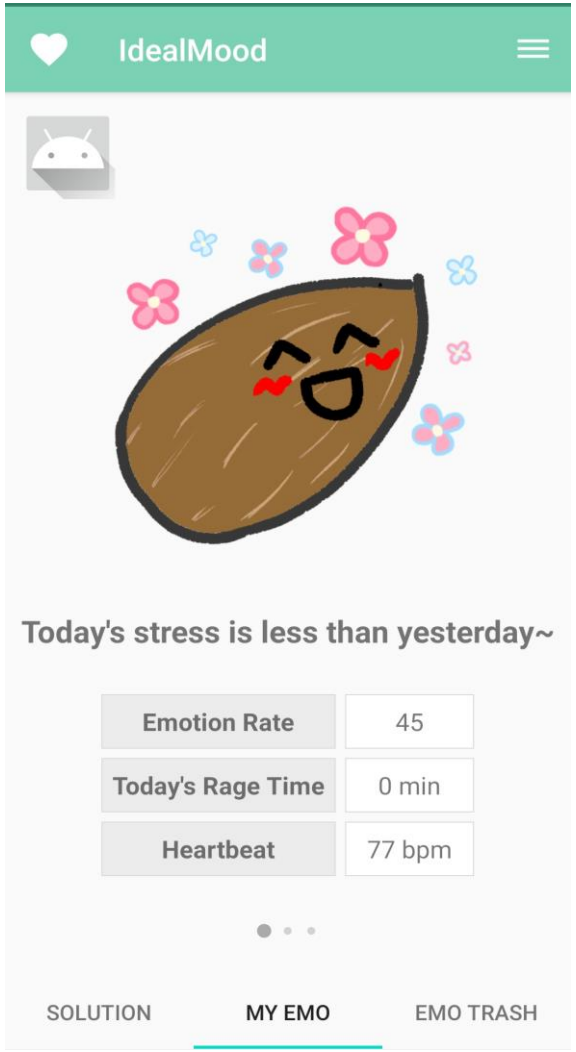
Ideal Mood

Feedback from Dutch Students

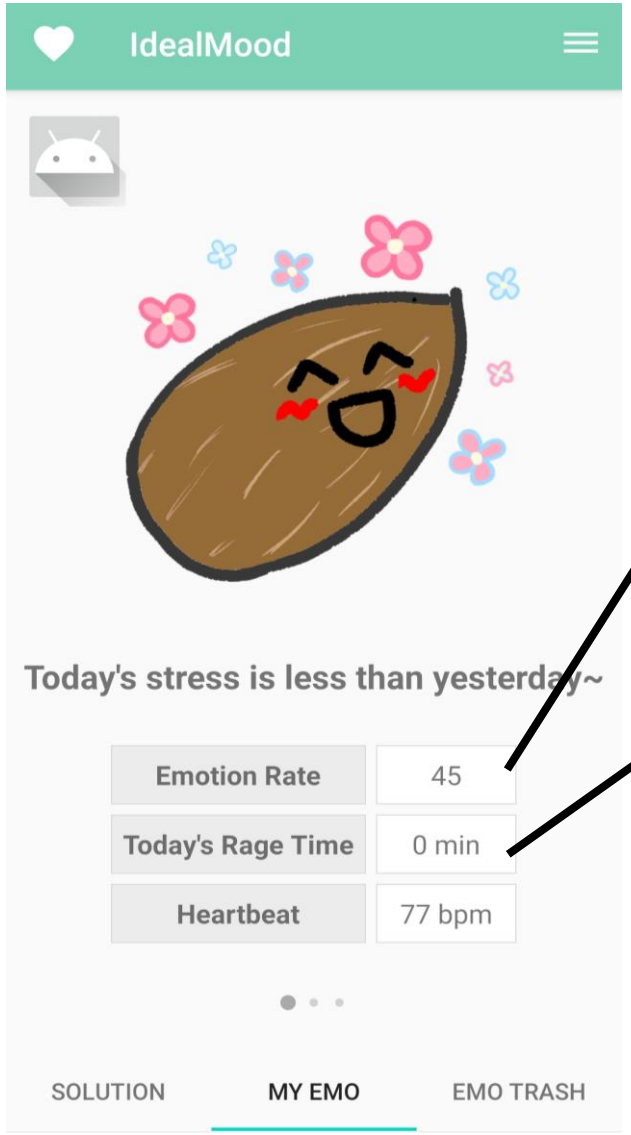
1. Drawing heart to Almond character like emoji before we used
2. Show texts about swiping to delete items
3. Do not allow to cut off our character
4. Add small Almond character in graph screen
5. Adjust position of Play/Stop button to center
6. Change color combinations in solution screen (Ruth recommend some combinations to us!)

Change Character used our application





Update Emotion Rate & Rage Time

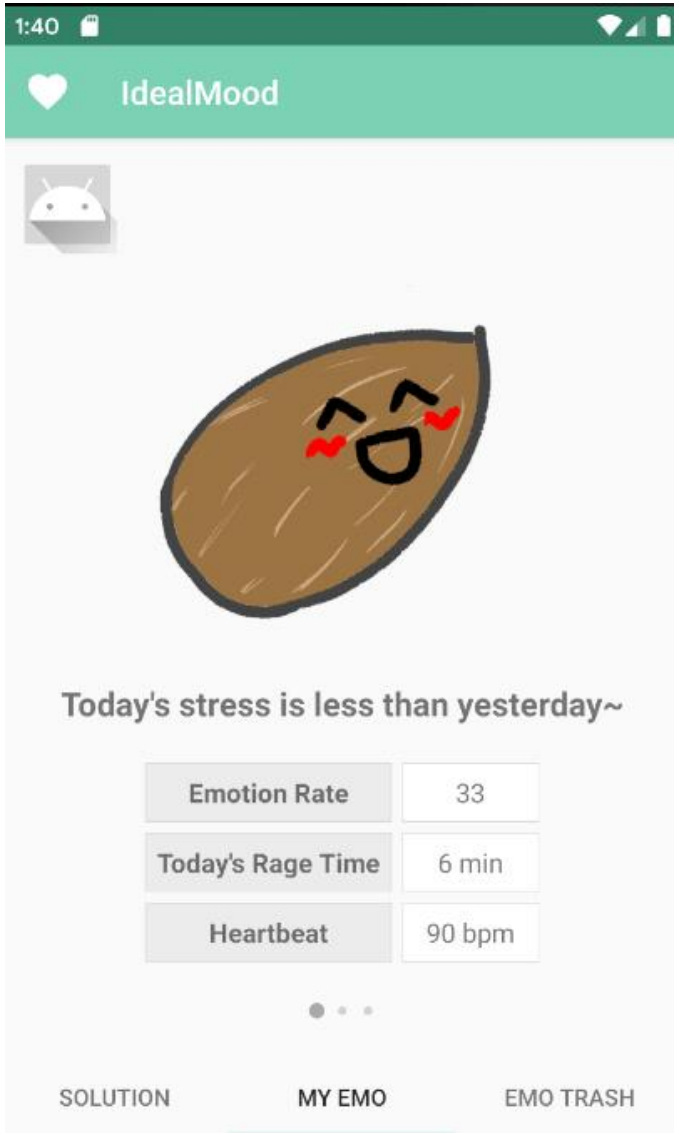


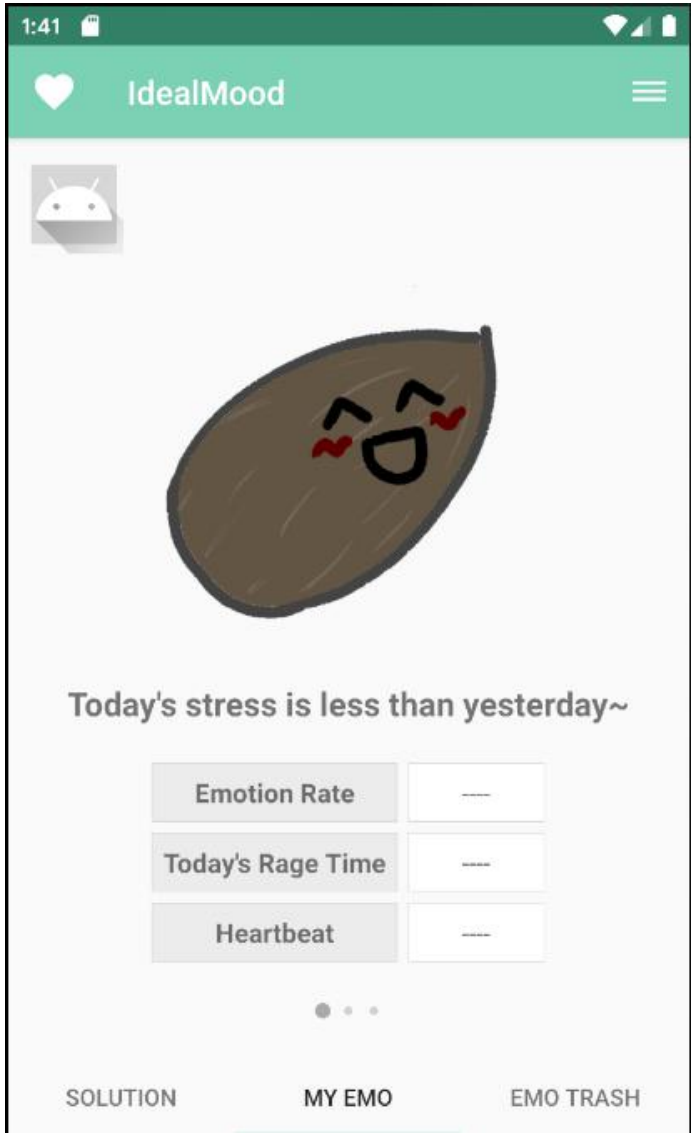
- **Emotion Rate (0 ~ 100)**
- **Calculated with algorithm**

- Today's Rage Time

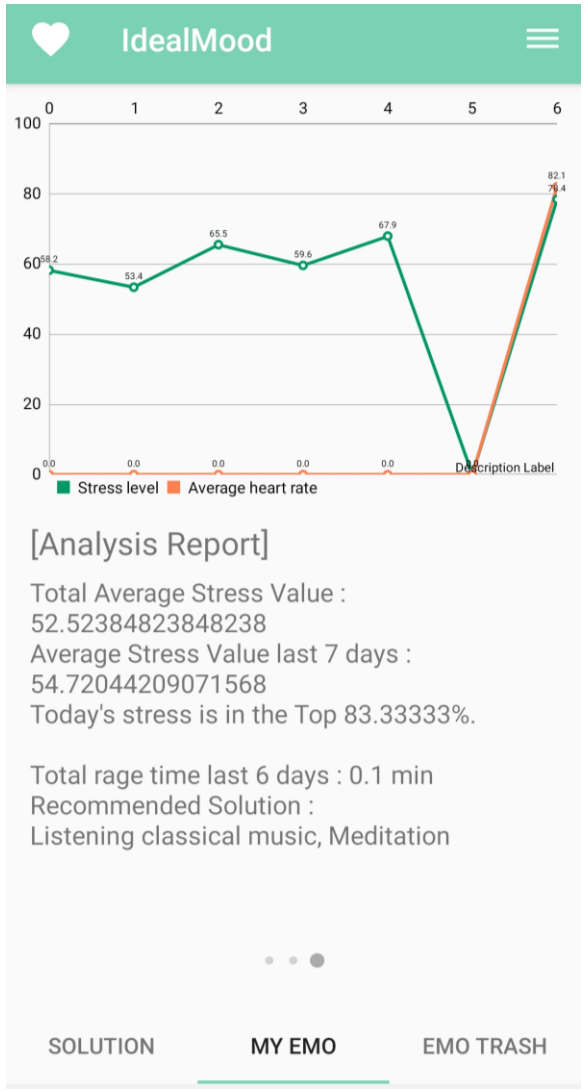
  (Emotion Rate over 75)

Connect & Disconnect by touching Emoji



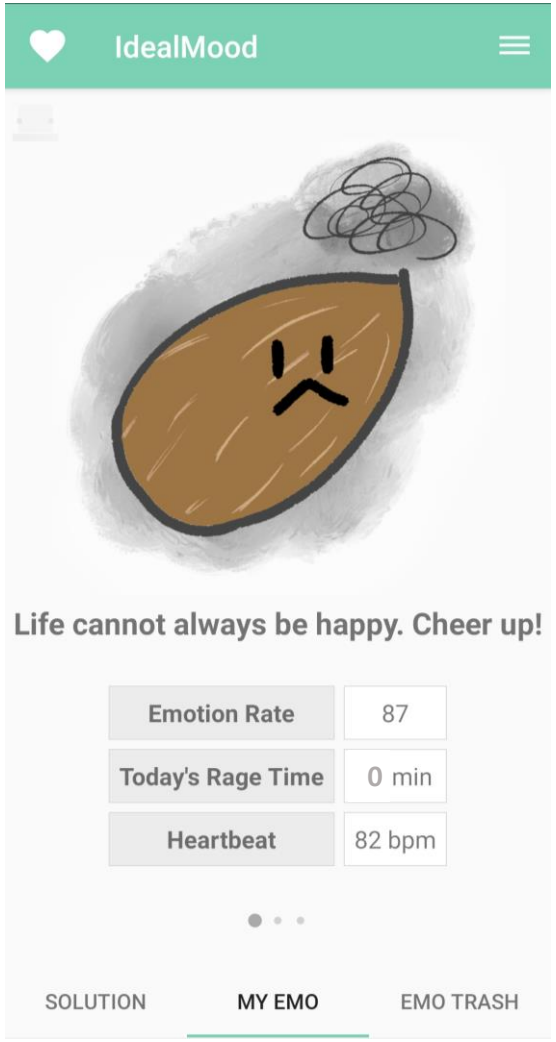


Analysis screen



- Graph : Average Stress value, Heart rate of Day by day
- Total average stress value
- Average stress value last 7 days
- How high today's stress value is (compared total stress value)
- Total rage time
- Recommended Solution

How to change Emotion

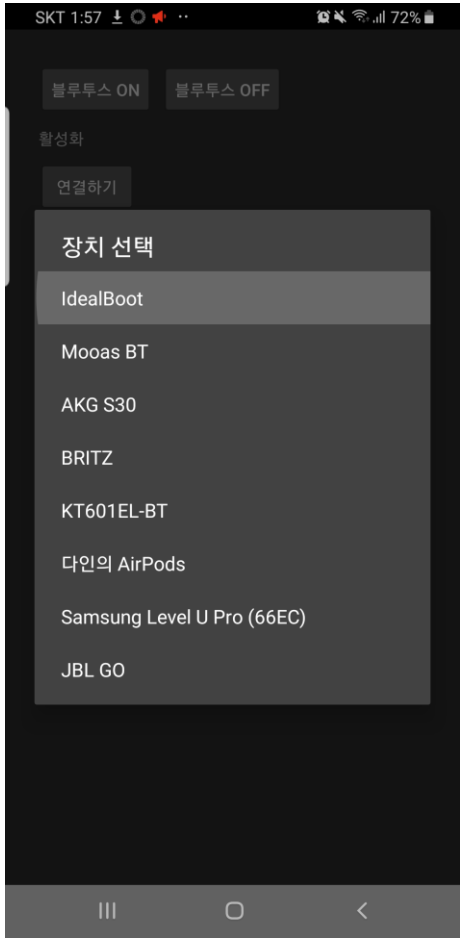


App Launcher Icon

Good points, Parts to be supplemented, Future plans

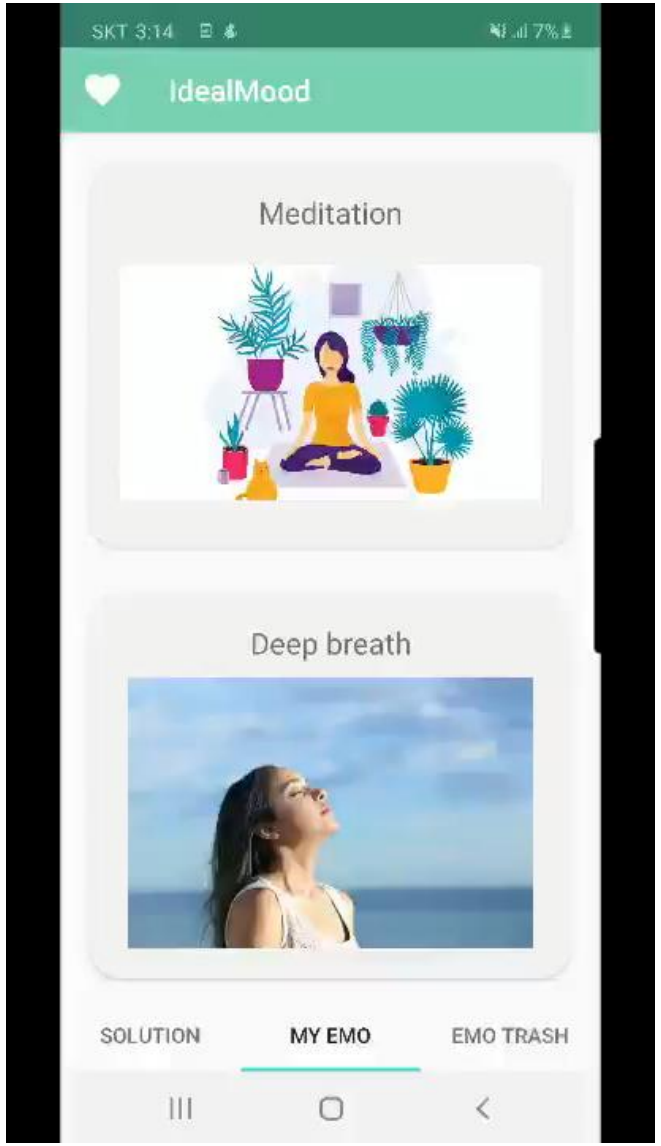
- **Good points**
  - We tested stress level calculation and fixed many times for better result.
  - We controlled heart rate check interval with better stability
- **Parts to be supplemented**
  - Personalization part is weak. We need more personalization parts (like average heartrate, age, gender etc).
  - Some solutions are simple. It can be better to add more steps.
- **Future plans**
  - Add more personal informations
  - Make solutions more specifically

Demo

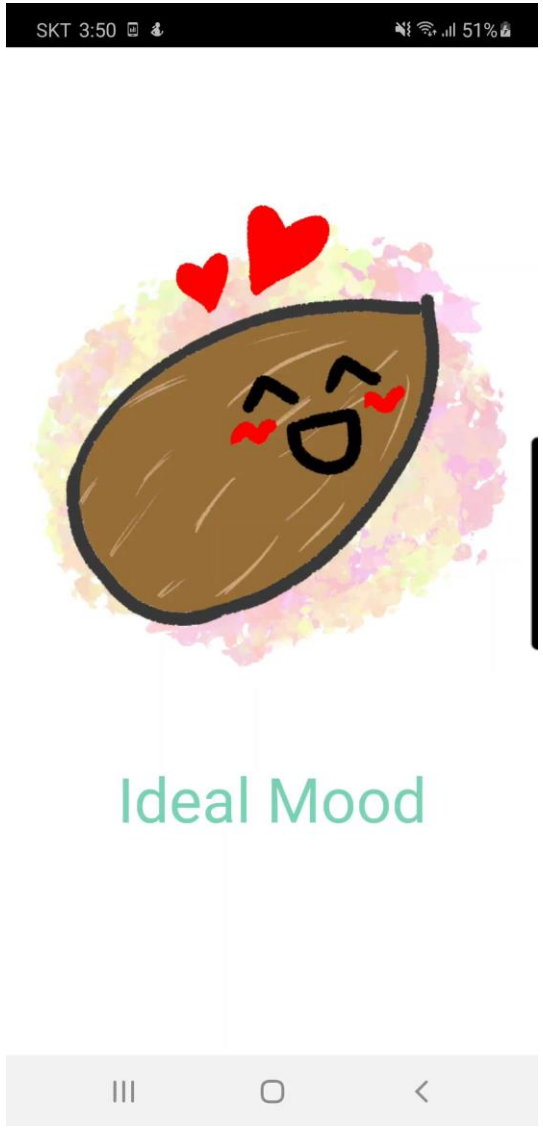


- Bluetooth Connecting
- Receiving Initial Unstable Data
- Receiving Stable Data

Demo Video


SKT 3:14
IdealMood
Meditation
Deep breath
SOLUTION
MY EMO
EMO TRASH

Demo Video : when I angry, app notify alert



Demo Video : with device