Mindwave X Sleeping Baby

Team Bebe / #4

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I. Introduction

1. Background

- Child's sleep occupied the largest part of the parenting stress of infants and toddlers.
- Various types of products are currently being tested in the market to solve these problems.

2. Problems and Necessity

- Existing products can only monitor the current state of the baby's sleep.
- The quality of the sleep of the child can be grasped through EEG analysis which has a great connection with the sleep pattern.

3. Goal of the project

"Let's make the child-care experience a joyful emotion!"

3Rs Concept

1. **Relief to Child!**
2. **Rest to Mom!**
3. **Replace Sound to Light!**

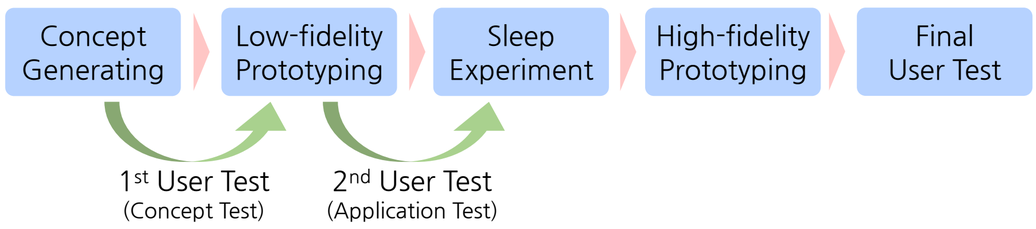
Our Objective?

- Get brain wave information using *Mindwave Mobile 2*.
- Analyze sleeping EEG through sleep experiments.
- Divide the sleep state interval and visualize the sleep state through *Phillips HUE*.

II. Method

1. Research Process

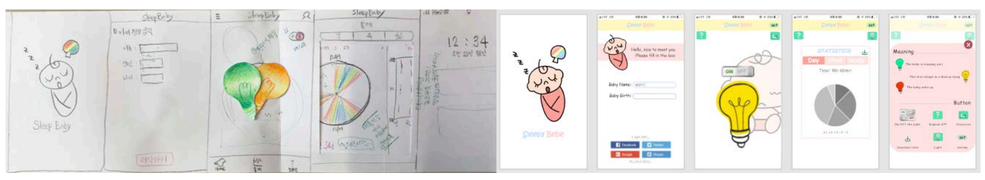
- Using Build-Measure-Learn Method



2. Research Method

Low-fidelity Prototype

- Make paper-prototype and App type prototype using *Adobe XD*.



User Test

- Primary Test: Getting Concept Feedback for 5 people
- Secondary Test: Usability test of Application and getting Feedback for 5 people
- Third Test: Usability test of working prototype and getting Feedback for 5 people

Sleep Experiment

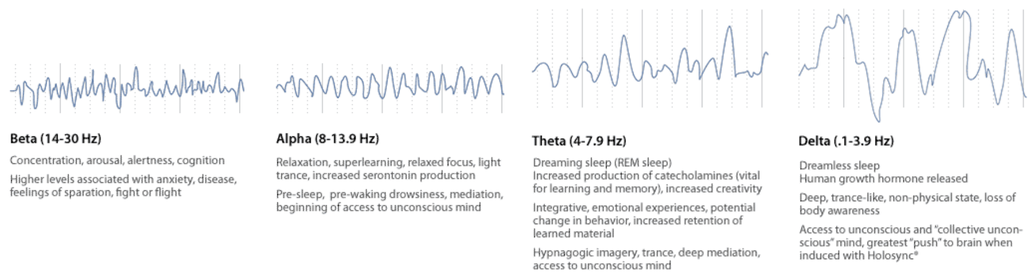
- Preparations: *Mindwave Mobile 2*, Recording Device(Laptop - EEG Data Recording, Camera - Checking Sleeping Condition)
- Measuring EEG data while sleeping for 30 minutes
- Classify sections according to the quality of sleep

High-fidelity Prototype

- Preparations: *Mindwave Mobile 2*, *Philips HUE*, Router(for Internet network)
- Operating smart bulb(*HUE*) with EEG data using Python language
- Update data through Google Sheet and make smartphone application using App Inventor

III. Results

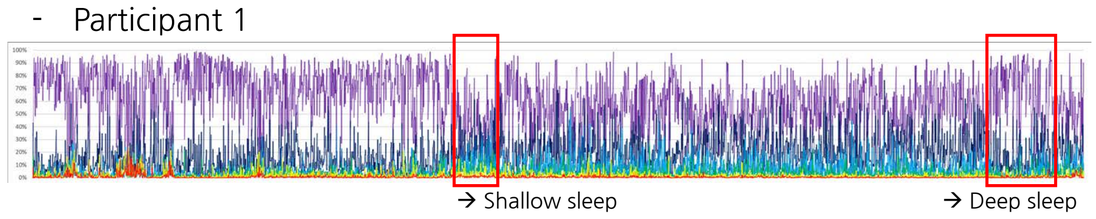
1. Four Categories of Brain Wave Patterns



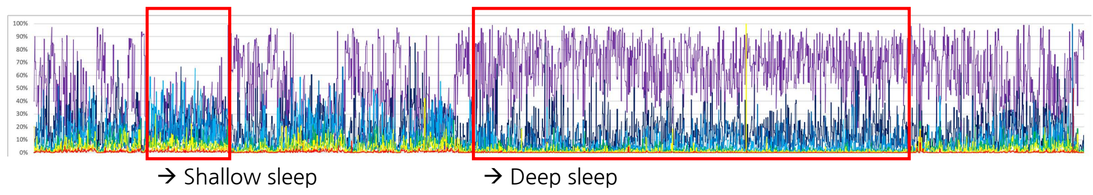
2. Graph of EEG Data during Sleeping

- Category

- Participant 1

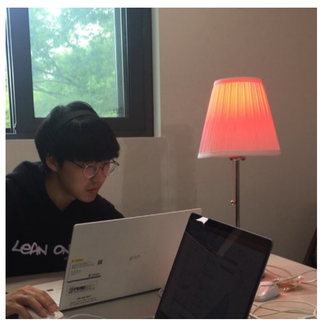


- Participant 2

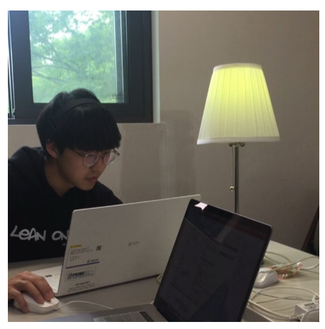


3. Data Visualization

- Matching EEG Data with color of lamp

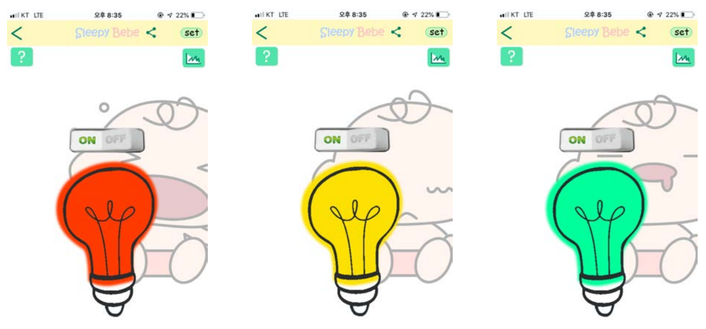


Arousal state



Relaxation state

- Matching EEG Data with smartphone application



Arousal state

Relaxation state

IV. Conclusion & Future study

1. Expectations and Effects

- The quality of sleep of the baby can be improved.
- Parents can have a rest.
- The difficulties of hearing-impaired people in child care can be solved.

2. Limitations

- There is no experimental data for young children.
- The prototype did not reflect accurate EEG data.

3. Future Study

- Equipment that is not inconvenient for actual sleeping is necessary.
- Need more research on the child's EEG