Building a Multi-Modal Habit Reward System

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I hereby declare that this dissertation is all my own work,
except as indicated in the text:

Signature _____

Date _____/_____/_____

1 Research Question

Can we use Multi-Modal rewards to improve users habit automaticity (with a progressive web app).

2 Executive Summary

2.1 Aims and Objectives

The aim of this project is to create a habit formation system, that focuses on encouraging user habit automaticity, through use of rewards from multiple modalities.

- Create multimodal habit reward system requirements list
- Build multimodal habit reward system
- Build a system that improves users habit automaticity when compared to control group

2.2 Motivation

The motivation for this project is to see if we can improve habit automaticity
- Can we improve habit automaticity
- Benefits of habit forming apps

2.3 Project Type

- 60: Building system
- 40: Research, producing recommendations for building reward focused habit forming systems

2.4 Methodology

- Generate requirements
- Design apps
- Test apps in studies
- Test automaticity studies using @TODO Kathys, how to measure automaticity
- Compare with control group, who didn't receive multi-modal reward

2.5 Deliverables

- Recommendations for building reward focused habit forming systems
- Requirements paired with multiple modalities
- Habit reward system
- Web app

2.6 Added value

- Can we use mutli-modal rewards to improve users habit automaticity (with a progressive web app)
- HCI community improve habit automaticity ??
- Test if multimodal rewards improve habit automaticity

OLDTesting lallys study results again with positive reinforcement / rewards, how does this affect things after 66 days? Different types of rewards.

Building a Habit Formation app that focuses on Rewards. Current Habit Formation apps are not grounded in habit formation/behaviour change theory, so when people stop using them, they don't continue with the habit. [Reward theory is mainly based on a single modality,] Using Kathys research I will test several theories [that use multiple modalities] in an implementation to test their effectiveness. Resulting in an app that assists you with habit formation, for 18 to 254 days to create the habit, and has the ability to give you different type of rewards based on different theories. When the app is removed, you will continue to do the habit. I will run [x] studies for (18 to 254) + 7 days, to test the [x] reward system implementations, and see if the habit is continued for a week after.

Habits are actions we do with almost no conscious thought. Building a positive habit requires a methodical process, from a trigger to a reward. For example, when you eat breakfast, you might write in a journal about your life. Daily actions are often easier to sustain than longer ones, although the process of creating a habit takes up to 66 days of repetitive use. Technology can change peoples behaviour and encourage them to form a habit by guiding users through a series of experiences. Trigger, Action and Reward. Theories have explored different methods of providing people with rewards, however, literature shows that these implementations are never as affective as the theory states.

This project focuses on habit reward systems and how theoretical methods of sustaining habits are put into practice. This project aims to implement different types of reward deliveries through different modalities and also provides a set of design recommendation for building habit forming systems.

TODO: Delete Systems to assist with habit adoption are intended to begin new behaviours and try to maintain the same behaviour even when users disengage with the system. Prior research evaluates habit adoption with single modality constructs to enforce habit behaviour, like visual cues or vibrating alarm reminders. However, prior research has established a dependency between on-going habit adoption system use and lasting change. In this paper, we propose and evaluate three systems that use different modality configurations for habit adoption. The is for users to keep engaged with the habit adoption when the system is removed. A 30 day user study will be conducted to evaluate the use of each system and test how users compliance with conducting the habit improves when the system is in place and then again when the system is removed. We conclude with an implementation and evaluation of the three proposed systems for habit adoption and present a set of implications for the design of a system in this domain.

Contents

3 Introduction

3.1 Aims and Objectives

3.1.1 Create multimodal habit reward system requirements list

- 3 Modalities, requirements based on kathys and taxonomy of...

3.1.2 Build multimodal habit reward system

- Web app, wearable

3.1.3 Build a system that improves users habit automaticity when compared to control group

- Test using study
- Test using @TODO kathys measure atomicity test

3.2 Deliverables

4 Habit Formation

- What is a habit
- What does it mean to form a habit
- Examples

4.1 Benifits

- How can we benefit from knowing how to form this?
- How does CS benefit
- Health benefits
- Problems with forgetting thing @TODO kathy

4.2 Theory

- General theory for forming habits
- Time to form, 66 days, @lally

4.2.1 Trigger

- What is this
- Kathys research

4.2.2 Action

- List of habits
- Types of habits that are effective
- Using this?

4.2.3 Reward

- General info
- Types
- When users stop doing this automaticity is reduced

4.2.4 Automaticity

- What is it
- Why is it needed
- Big up needing technology for this process, 'if only we could do this automatically'

4.3 Technology

- How can we use tech for this problem

4.3.1 State

- Current apps available
- Kathys Research

4.3.2 Problems

4.3.3 - Not grounded in science

- Kathys research, state

4.3.4 - Lack of automaticity

- Doesnt develop when you remove the system

4.3.5 - Dependant on tech

- To do with lack of automaticity

4.3.6 Existing Research

- Trigger, Action, [Reward]

4.3.7 - Kathys Resaerch

- Design requirements

4.3.8 - Taxonomy of...

- Reward focused

4.3.9 Requirements for Habit Reward system

- List of combined requirments
- However still lack of retention, but, there is hope,
¡
table of requirements
- Foucs on just rewards
- I will use kathys reqs for tracking requirements
¿
- @TODO multimodal research says using multiplemodalieis improves retention / automaticity

5 Multi-Modal

- What is a Modalitiy
- Research into how multiple modalities improve retention
- Different types, most common and @TODO research says these are most effective

5.1 Types

5.1.1 Audio

- What is it
- Why are we choosing it
- Examples

5.1.2 - Why is it good?

- What does it give to us
- @TODO research

5.1.3 - Reward

- Cross check with my requirements

5.1.4 Visual

- What is it
- Why are we choosing it
- Examples

5.1.5 - Why is it good?

- @TODO research

5.1.6 - Reward

- Cross check with my requirments

5.1.7 Vibration

- What is it
- Why are we chosing it
- Examples
- Wearables, Fitbit

5.1.8 Why is it good?

- @TODO research

5.1.9 Reward

- Cross check with requirements

5.2 Table of multimodal reward implementation strategies

- Table of requirements matched with modalities
- If you could implement this, you could increase users automaticity for habits

6 Building the System

6.1 Design Implications

- Trigger:
- Either A, certain configured time of the day
- B: No trigger
- C: Around a specific time
- Action:
- Choose habit from list of habits
- Perform
- Use app to track the action
- Reward:
- You get one of these rewards, based on modalitiy selected
- Vision
- Through Web app
- Could be: App, or message
- Audatory
- Through phone
- Could be: App
- Tactic
- Through wearable
- Could be: App

6.1.1 Example user flow

- Pre-Start
- Choose daily habit type from list of X, e.g. 1 press up before breakfast
- Enable notifications or fitbit if chosen
- Time action / reward, variable rewards, e.g. then work out average time to send, or none
- Start:
- New day
- @ trigger time, send reminder, if set, notification
- Open notification, do habit, press tracked
- Get reward type

6.2 Implementation

- Web app chosen because easiest and achievable

6.2.1 Technology

- React JS
- Android/iOS specific notifications from web app
- Save to home screen

6.2.2 Reward Modality implementations

- Vision
- Send notification
- Show nice visuals
- Audio

- Send notification
- Play uplifting music
- Tactic
- A.P.I. sets wearable alarm
- Wearable (fitbit) issues and tracks alarm times

6.3 Component overview

[app] ——-¿ (Database) —¿ at certain time —¿ Send notification to trigger type of reward
[big button that says track]
taskname textbox

7 Implementation old

Habit formation, Don't Kick the Habit [1], stopping the behaviour when one stops using behaviour change apps.
Measuring Habit strength [2] [3].

Multi-Modal interaction, using multiple modalities for habit formation [], using wearable devices, such as a Fitbit device is plausible for a study [4].

Gamification elements [5], can we use any elements from Free-To-Play games?

8 Evaluating the System

8.1 User studies

8.2 Testing automaticity

9 Conclusion

Will this be a successful project?
Can we obtain the value that this project adds?

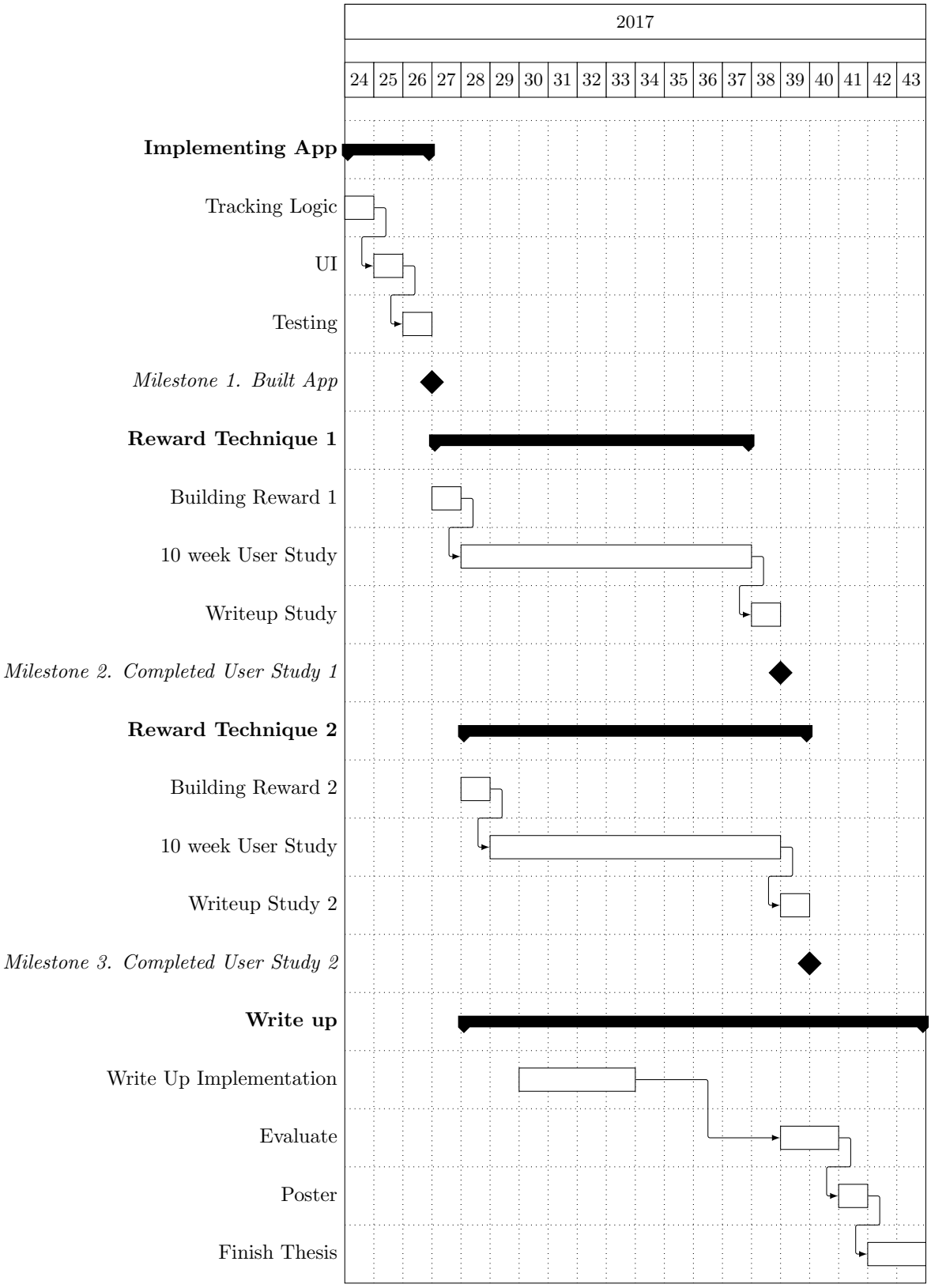
10 Work Plan

For this project there are X number of milestones to achieve.

Scope

Expected Timeline

The app is to be built, then two 30 day user studies will test the effectiveness of the app techniques.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Implementing App
Tracking Logic
UI
Testing
Milestone 1. Built App
Reward Technique 1
Building Reward 1
10 week User Study
Writeup Study
Milestone 2. Completed User Study 1
Reward Technique 2
Building Reward 2
10 week User Study
Writeup Study 2
Milestone 3. Completed User Study 2
Write up
Write Up Implementation
Evaluate
Poster
Finish Thesis

Deliverables

10.1 Risk Analysis

Table of risks and mitigation techniques.

11 References

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