Section 002: Project Brad
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MEMORANDUM

Date: September 14, 2016
To: EECS481 Software Engineering Teaching Staff
From: Xieyang Liu, EECS481 Current Student
Subject: Proposed Apple iPad-based Specialized Figure & Diagram Editing Application

Overview

Our customer this semester, Brad has been physically incapacitated and has very limited body movability and challenged expression techniques. As an aerospace engineering student, Brad has found himself struggling with current available tools to draw professional figures and diagrams. Therefore, we propose a specialized figure & diagram editing application based on iPad to fulfill his need above. This memo discusses the details of this proposed application as well as its planned development process.

Introduction

In class we met Brad, who has been, unfortunately, physically incapacitated and cannot work like what he would otherwise be able to. The current difficulties with Brad are that he has very limited neck and shoulder movability, and has lost virtually all fine motor skills of his right hand. While other hand activities might still be possible for him to perform, he is only comfortable and confident to use his left hand to interact with touch screens by pointing and pressing buttons. We cannot even start to imagine the frustrations he faced when his brain operates way faster than his common expression techniques ever could, including speaking, typing, drawing, and facial expressions, etc. Though he has been doing reasonably well with the technologies at hand, such as special keyboards, scribe programs and joysticks, he did mention that he cannot properly draw figures, tables and diagrams with current tools on his iPad/iPhone/PCs, which is unfortunately a significant part of his coursework. Therefore, it would be of great benefit to him to have a specialized figure and diagram editing application that would greatly improve his ability to draw such figures as a professional engineer.

Stakeholders

The stakeholders for this projects are listed below:

Stakeholder	Major Value	Attitudes	Major Interests	Constraints
Brad & People who share similar situations	Significantly improve his ability to draw professional figures and diagrams for this aerospace engineering coursework.	Eager to try new applications and programs that would help boost his working efficiency.	Could individually produce professionally looking diagrams and figures.	Require a certain amount of time and effort to familiarize himself with the application.
Project Team	Help Brad improves his ability to draw better figures and	Strong willingness and eagerness to build this	Facilitate the working conditions of people who are	Limited budget on devices and accessories that

	free body diagrams.	application.	physically incapacitated.	could be purchased.
EECS481 Teaching Staff & U-M	Grant students with equal opportunities to learn and work.	Supportive to such projects.	Cultivate such projects and help apply them to the general public.	Potential limitations in funding.

Goals

Project Goal:

The goal of this project is to develop a specialized figure and diagram editing application on iPad for Brad so that he can easily create professional looking figures and diagrams for his coursework, which he wasn't able to do previously. The application would be carefully designed so that Brad can have full access to the functionalities by only pointing and pressing with his left hand.

Key Constraints:

1. iOS development using Swift. Swift is a relatively new language to most of the team members and we have to learn from scratch.
2. Interface design. Balancing between a universal design of the interface that will potentially benefit all users with similar situations as Brad and the individual design that would cater specifically to Brad's need is one of the constraints of the projects. We cannot afford to be too broad or too narrow.
3. The application will only be compatible with iOS. Development of versions that are compatible with other platforms like Windows and Android are yet to be discussed.

Assumptions:

1. Brad, and also people with similar situations are willing to try this new application, even if it means some effort and time commitment in the training process.
2. iOS development using Swift will not be so hard to start that could hinder our progress on the actual design process.

Risks:

1. Brad, and also people with similar situations may not be willing to spend too much time or effort in getting familiar with one thing that they may no long use once they leave school. In fact, we are too early to tell about the projected effort one have to pay to familiarize himself/herself with the application.
2. We may need more than $50 (which happens to be the budget line) to register as iOS developers. Additional budget may not be available.

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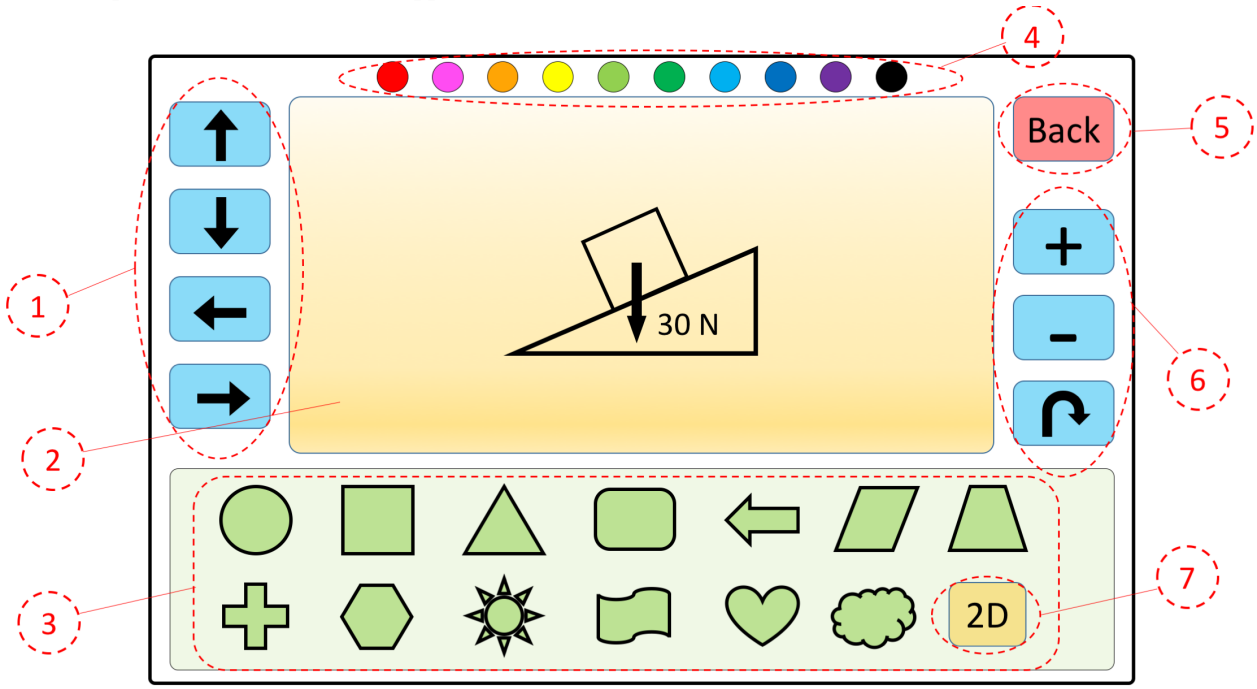
Scope

Below is a preliminary design of the application interface:



The different components in the interface is described in detail below:

1. Buttons to move a certain object up/down/left/right.
2. Canvas that the figures are created.
3. Object panel that lists the potential choices of objects that might appear in the figure. Pressing each object will bring up more objects of the same type but slightly different shape.
4. Color panel that defines the color of the current object.
5. Back button that undoes the last step.
6. Size and rotation panel that controls the size of the rotation of the selected figure.
7. 2D/3D/Scientific figure/unit selection button that will enable switches between different figures available.

Note that the above design is expected to benefit Brad by providing him with ample choices of objects and the ability to adjust object shapes, positions, and sizes. Previously, such functions can only be realized using a mouse, or by directly drawing strokes on a touch screen, which is not possible for Brad to accomplish.

Project Plan

Deliverables:

A specialized figure and diagram editing application on iPad for Brad so that he can easily create professional looking figures and diagrams for his coursework, as described in the above section.

Programming Languages:

Swift 3 will be the main language used for this project, as it is an open-source programming language used to develop iOS applications. Objective-C may be the backup plan as it was once the predominant language used for iOS

development.

Work Partition:

Assuming there are 4 members on a team, member A would ideally be in charge of the design of the application interface. Member B and C would be in change of testing the application with Brad. Member D would be the main programmer to write the code and debug the application on iOS. All team members, however, will have to familiarize themselves with iOS development as this is an essential part of this course. The reports and other other paper work will also be shared among team members. Members will be in charge of the sections of the reports and the paper work that correspond to their respective responsibilities.

Timeline:

Time	Milestone
Sept 19 – Sept 30	Team assembled. All members will be reasonably familiar with iOS development. Interact with Brad. Figure out details of the design. Agree on a preliminary design of the interface.
Oct 1 – Oct 15	Coding of the project. Alpha build of the software is released at the end.
Oct 16 – Oct 31	Debugging. Have Brad try the application out. Find out potential improvements to the application. Beta build of the software is released at the end.
Nov 1 – Nov 30	Further refinement to the application. Draft final reports. Final build of the software is released at the end.
Dec 1 – Dec 15	Final report due. Design Expo.

Conclusion

Brad, who has been physically incapacitated and has very limited body movability and challenged expression techniques, has found himself struggling with current available tools to draw professional figures and diagrams for his aerospace engineering coursework. To address such needs of Brad, we propose a specialized figure & diagram editing application based on iPad. The application is carefully designed so that Brad can have full access to the functionalities by only pointing and pressing with his left hand. We have planed the roadmap of the project in detail in the proposal and proved that the project is actually feasible and desirable from the standpoint of Brad.

By finishing this project, we would be able to develop applications in iOS. We would also be able to address more concerns of people in various need. In future, if additional funding is allowed, we would be able to continue the project and release more bug fixes and improvement according to Brad's need.