

SEESAW: An Educational App for Smart Kiosks

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Abstract—This paper discusses the authors’ experience with designing and developing an interactive app for smart kiosk devices. The app implementation uses a layered design approach, with graphical components operating independently in layers, and is designed to deliver an engaging and reliable user experience on smart kiosks. Early feedback indicates that the app provides an effective way for engaging passers-by, and for delivering an informative, educational experience.

Index Terms—user interfaces, prototyping, educational systems

I. INTRODUCTION

Smart, interactive kiosks are commonly used for commercial purposes, such as for directory services in shopping malls, flight information in airports, ordering in fast food restaurants, etc. Less frequently they are used for educational and awareness purposes, *e.g.*, by placing them in areas where the public may interact with them.

This paper summarizes our experience with developing a kiosk app that aims at raising awareness about the challenge of balancing the pros and cons when making decisions in health-related scenarios. The app targets university students, accessing it on smart kiosks in common areas in campuses.

II. DESIGN

A. Motivation and Scenarios

The app targets university students who would normally try out the app during a break at the campus. Interactions are designed to be brief. The app has an educational purpose as it aims to increase awareness about the difficulty of balancing ethics pros and cons in public health related decisions during a pandemic. The kiosk covers two scenarios, with a length of 8-12 minutes each, with the user choosing to complete either or both of them.

The first scenario examines the complexity of choosing how to prioritise emergency cases in hospitals (*i.e.*, apply *triage*) in times of crises, such as during the COVID-19 pandemic [2]. The scenario examines the first-come-first-served protocol and calls for the user to actively participate in the decision making.

The second scenario discusses *human challenge studies*, where healthy participants volunteer to be deliberately infected by an agent to study a disease [1]. In this scenario the

user assumes the role of the research ethics committee, and considers the pros and cons of approving such studies.

B. Requirements

The main requirement for the kiosk app was to *engage* people and *educate* them about how challenging it is to balance the advantages and disadvantages of certain medical decisions, and especially in relation to their ethical implications.

As such, the technical requirements were prioritised as follows: First, the app should be executed on a *kiosk computer deployed in a public space* and thus be suitable for running reliably in an unsupervised environment. Second, it should provide an intuitive *user interface*, which does not require any training for the users. Third, the app should be *interesting* in order to attract users to try it out in the first place, and *interactive* to keep them engaged throughout the interaction.

III. IMPLEMENTATION

A number of kiosk computers were assessed based on their size, weight, form factor, availability, features, and price. The selected kiosks feature 32-inch touch screens, an embedded computer running Android 11, and a WiFi adapter.

For the development we used Flutter for its flexibility and wide support. An early decision was to select between a Web and a native Android app. As the project stakeholders are across countries, we chose a Web app which offered the desired immediacy and consistency during development.

A. App Architecture

While SEESAW is a relatively small app, it had to be designed with an architecture that could adhere to the requirements, and especially to fit kiosk computers. Specifically the architecture should:

- 1) Support *one-direction progression*: As the user interacts with the app, there is only one direction of progression, rather than being able to move back to previous interactions. This provides a more consistent and predictable experience for the user, while also helping keep the interaction within the intended time limits.
- 2) To improve user engagement, a *progress indicator* informs the users of their progress so they can estimate the remaining time in the interaction. Similarly, whenever suitable, users are enabled to *skip* steps when they are already familiar with the presented concept.

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- 3) When the user leaves mid-way through the interaction, the app is *automatically reset to the starting screen*, waiting for the next user to initiate a new interaction.
- 4) Finally, as a means of intriguing more users to try out the app, a custom video plays in a loop when no one is using the kiosk, similar to how a *screensaver* works.

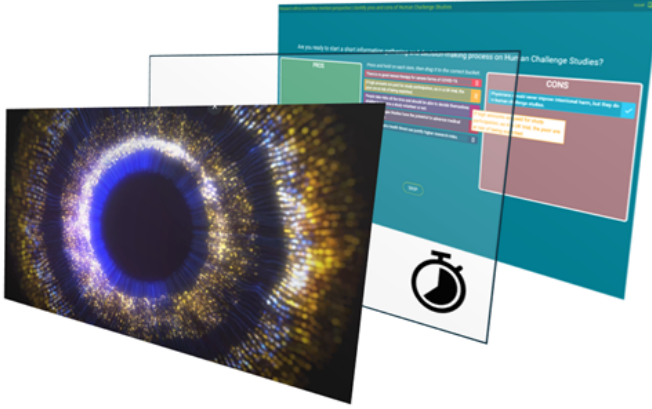


Fig. 1. The SEESAW app layered architecture.

For implementing these features, we utilised a layered UI design, with Flutter’s widgets. Specifically, we used 3 layers of independently functioning components, as shown in Fig. 1:

- At the top, a *screensaver* component covers the app, delegating all touch events, displaying a video animation loop when no interaction is detected for a set interval, otherwise showing the layers below.
- A second layer realises a *watchdog* component, delegating all touch events, while keeping track of a timeout interval, after which it triggers a reset of the app.
- The main UI is realised in the last layer. An app bar at the top describes the current content and displays a progress bar that informs the user of the progress within the selected interaction. This layer displays different pages, controlled by a one-direction finite state machine realised with the Flutter app state management mechanism.

B. Interactive Elements

To realise the requirement for an engaging and reliable user experience, we use multiple interactive elements. As illustrated in Fig. 2: The *welcome* screen includes an animated seesaw and a large *START* button, to invite users to try it out. The app also makes use of short *videos* as our experience has showed that they increase user engagement. At certain points, the users are asked to think about the questions, *vote* for or against a decision, and later *reflect* on them by seeing how their response compares to others’. Finally, a *sort-in-buckets* activity triggers users to think about individual concepts and sort them in pros and cons buckets, while receiving feedback for their choices.

C. Backend

The implementation uses Firebase, which provides a popular, easy-to-use *Backend-as-a-Service*. The backend is needed

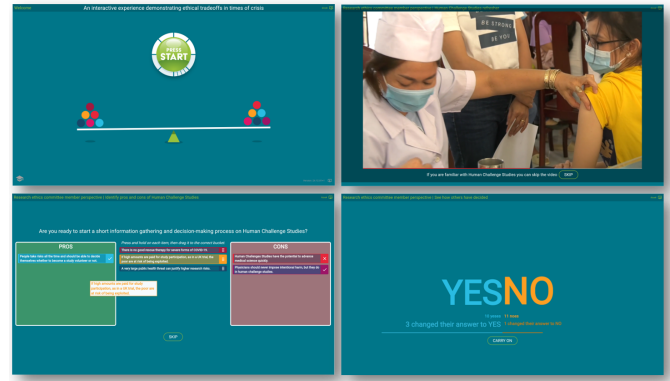


Fig. 2. App screenshots, clockwise from top-left: the welcome screen’s animated seesaw, video player, poll feedback, and a sort-in-buckets activity.

for implementing the voting mechanism. When the users submit their responses to the polls, their choices are recorded anonymously by the backend. With that data, the app shows aggregated results from all users, so they can reflect on their choice in light of what the majority has answered.

IV. CURRENT FINDINGS AND CONCLUSIONS

This paper describes our experience with designing and implementing a mobile app targeting smart kiosks. Its main contributions are: A mobile Web App designed for *smart kiosks*. A *layered design architecture*, with graphical components operating independently, as layers within the UI. And the use of a mobile Web App as a means for a distributed team to effectively design, develop and distribute a smart kiosk app.

A prototype version of the app has been tested during a two-day research meeting: First, two kiosks were deployed and 25 ethics specialists were asked to try it out. Then, their feedback was collected in an informal Q&A plenary discussion. The feedback was positive with suggestions for small changes in the content, as well as shortening the interactions to make them more appealing for passers-by.

In the future, the app will be deployed on two smart kiosks and tour medical school campuses, aiming to engage with students. Using in situ observations and surveys, we will assess the App aiming to understand whether it can successfully engage students passing by it. Additionally, we will continue assessing its usability, and aim to improve its accessibility, e.g. in terms of enabling a UI suitable for people with visual, auditory and motor disabilities.

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