InterACT

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ECE1778 Final Report

Introduction - What and Why

InterACT is a mobile app designed to enhance an audience's engagement with a performance and create a deeper experience through the use of augmented reality. The app was designed to work in conjunction with the "Death Clowns of Guantanamo Bay" performance.

The topic of the show - torture, death and the need to communicate suffering, while recognizing the impossibility of knowing what actually happened seemed like a good fit with augmented reality. The play was designed with a 20-minute 'museum' experience so that the audience could touch, and explore the theatre space, its sets and the play's props before the action began which was when the app would be used.

We hoped that as the audience investigated using the app they would become more comfortable with the torture devices and holding cells and therefore fell more complicit during the plays' action. Our team hoped that the app would deepen the audience's experience of the performance's themes.
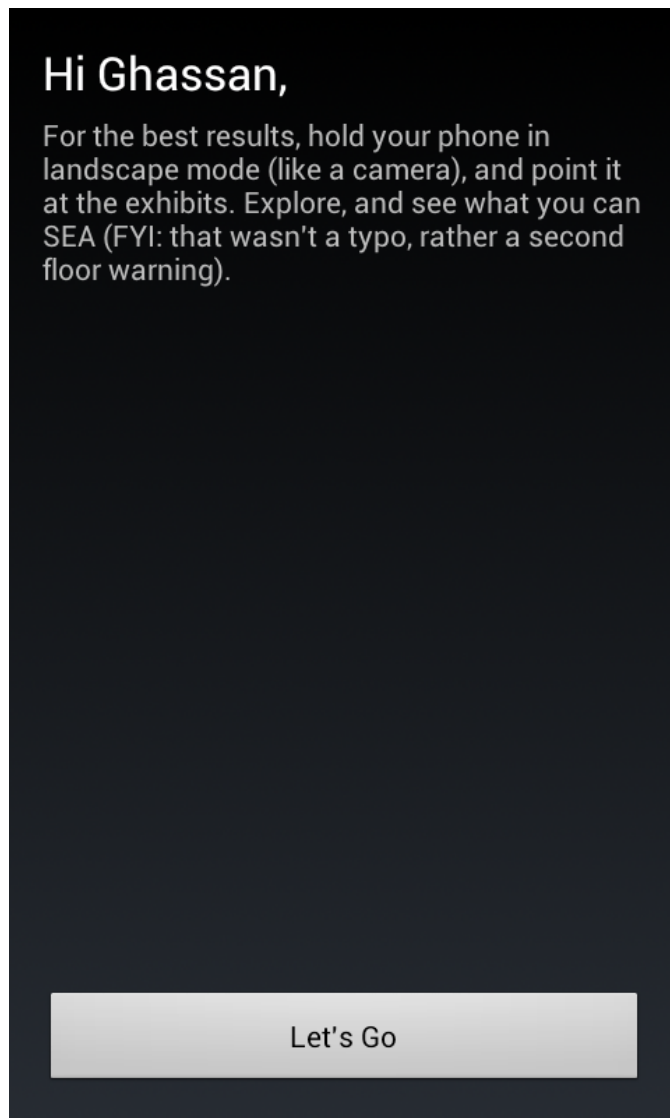
<u>Overall Design</u>:

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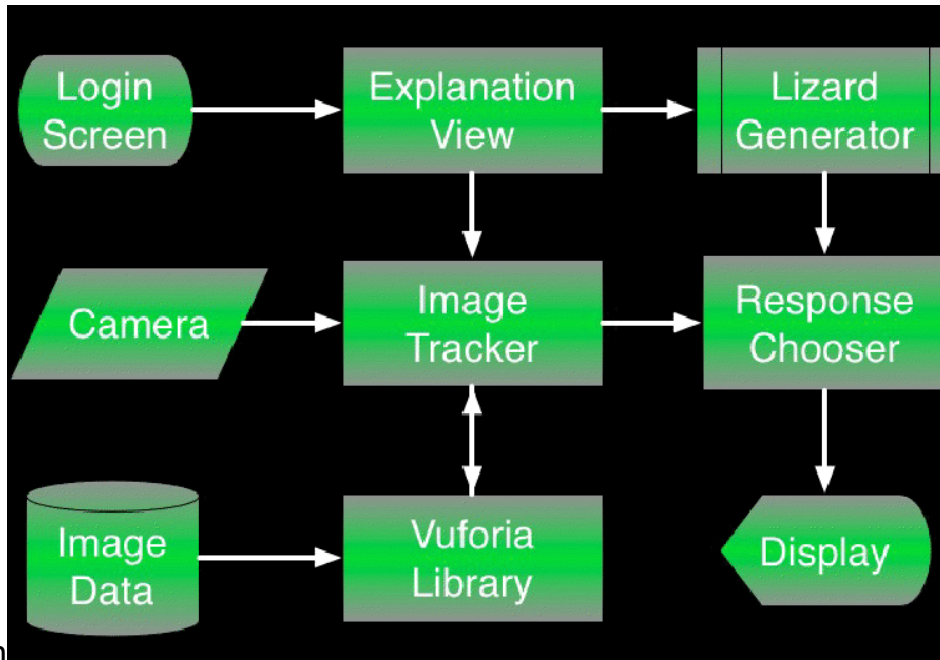
Login Screen: The first screen is the launch screen. The user can enter his or herr name which will be used for the duration of the app. The login screen also has links to the show's website and cast, the giftshop and our privacy policy.

Login screen

**Explanation View**: A screen with an explanation of the app for the user.

Explanation view

Lizard Generator: The Cuban Rock Lizard is a protected species and interfering with it in any way can mean incurring a fine of up to 10, 000 dollars. The playwrights felt that having lizard as a prominent feature of the play was a good way to illustrate the inversion of human rights at the camp. The lizard was protected the humans were not.

In order to illustrate this point the set designers put a lizard in the middle of the stage as an obstacle the whole show had to work around. Twice in the show actors 'accidentally' touched the lizard and an alarm went off.

This idea of an interfering lizard was extended into the app. The lizard generator randomly creates a moving lizard while the user is using the app. When the user touched the lizard the phone vibrated to indicate that the user had done something wrong
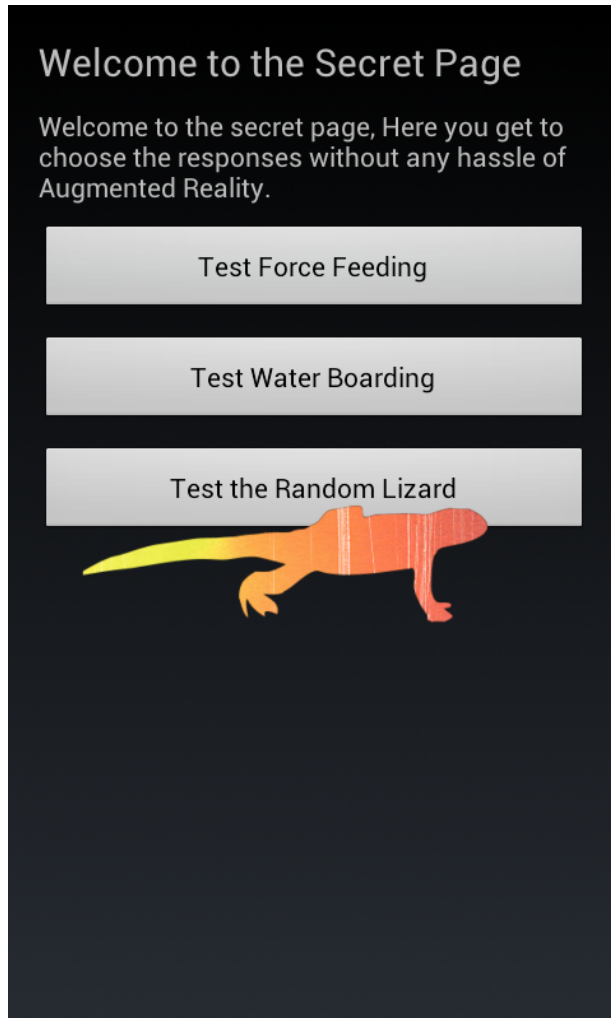
Random Lizard showing up on the secret menu.

Vuforia Library: Third party component used to facilitate image tracking. This library provided us with functions to detect if any of the images we have chosen to track are visible in the camera view.

Image Data: A database containing the images that the Vuforia Library should be tracking.

Camera & Image Tracker: The main screen of the app. The image tracker shows what the phone's camera is seeing. It also continuously checks if any of the image targets are in the frame.

Response Chooser & Display: Once the image tracker identifies a target the module chooser determines which target was found, and executes the appropriate app reaction. The reactions supported in the final app are:

- **Force feeding chair** - The force-feeding chair was used at the camp to make detainees on hunger strikes eat against their will. They were strapped down and fed a milkshake through a nasal drip. When the force feeding chair is detected the app prompts the user to select a milkshake flavour. Once a flavour is selected the screen fills up with the a color corresponding to that flavour until the user can no longer see through the camera

Camera view filling up red when the user selects a strawberry milkshake.

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    Teeter totter - The waterboard-teeter totter was used in the play's final scenes by which time the play has slide from the wild and clownish to the studied and macabre. The app when pointed at the board created a blurred, swirlyunderwater effect – like being drowned.

- *Camera view simulating an underwater effect.*

- **Poster** - When the camera is pointed at a poster of the Performance the app goes into a secret menu. In this menu the user is able to see all the available reactions and test them out. Useful as both a debugging tool as well as for users to experience all reactions if the props have difficulty being detected.

Statement of Functionality

Our original plan was to have many more reactions available for the user to see. The two reactions we were able to add in time for the show are described in the previous section. The missing functionalities are:

- Display a fire when the user points the camera to a garbage can used in the play. The fire would be displayed on top of the garbage can. This was not added due to time constraints.
- When the user points the camera at an empty cage the app displays a detainee's image. The cage's repetitive pattern did not make a good image target and could not be recognized by the app.
- A message would be triggered when the user went to the balcony of the

theatre prompting him to look through a peek hole. This functionality was cut because the phone's GPS was not accurate enough to detect whether the user is on the first or second floor. A possibility we later considered was to use the barometer to detect if the user is on the first or second floor, but this was after the show had already finished its run.
- Creepy message. Send the user a creepy message a week after the show finished. This feature was dropped mainly due to time constraints.

What did you learn? What would you do differently?

While Vuforia is a great tool to detect 2-D images it is not well suited for 3-D objects. The change in perspective and lighting when the camera moved made objects hard to detect. If we had to start over again we would spend more time researching alternative tools. A possible alternative would be Open CV which while not as nice to use might be more appropriate for 3-D object detection. We also would spend more time looking at the drawbacks of the selected technology, and work with the prop designers on ways that they could be more easily detected. If we had to use markers we would try to find a way to incorporate them into the prop instead of adding them at the end.

Group Member Contributions
Ashley - Apper

- Vision and requirements of the app, broken down as small as possible
- Graphics for the Lizard
- Reactions of the app when detecting different props
- Access to the props and the Drama Centre for testing
- Pictures to be used for image detection

Ghassan - Programmer

- Reactions for the force feeding chair and water boarding
- Explanation view, login screen, Privacy Policy view.
- Secret Menu
- Response Chooser
- Bug fixing

Ergin Babani - Programmer

- Project setup (source control, integrate vuforia)
- Image detection for image tracker and camera
- Random Lizard Generator
- Bug Fixes
- Image data database for image detection

Apper Context:

My doctoral research investigates the way the presentational techniques of theatre and museums can be integrated to create and more active and engaged audience. My recent work in this area this was an alternative narrative performances audio-guide for the ROM's Egyptian Gallery that I developed as part of my Master's thesis. I have also published two reviews discussing the way performance techniques have been successful (or not) in art galleries and theatre lobbies. The first was for the *Canadian Theatre Review* about *Drama and Desire* at the AGO and the other was for *Rare Visions* at The Stratford Shakespeare Festival for the Museum Studies website for the iSchool. I am continuing to explore the theatre-museum relationship in my PhD at the Centre for Drama, Theatre and Performance Studies where I am researching the history and methodology of Living History Museums, performers, and especially the role of audience participation within the exhibition framework.

I was interested in taking ECE 1778 because it was interdisciplinary. Since my research straddles performances studies and museology I am aware of how fruitful interdisciplinary exchange can be. I was also interested in finding out how to build a new tool that would bridge the gap between the audience and the exhibit. On both accounts this course was helpful. I found it both frustrating and satisfying to negotiate the language, and almost cultural barrier, between Theatre and Engineering. I think that the more academic 'languages' I learn to speak the more useful my research can be. Technically, this course was helpful in fostering in me a better understanding of what the strengths and limitations of programmering are. I was not expecting that Ghassan or Ergin would be able to realize such sophisticated renditions of my ideas, like the waterboarding reaction. However, Vuforia's inability to recognize 3D objects was unexpected – I was unprepared for how exactly the same the images had to be to work.
Working on my app this term has motivated me to learn how to code. I have no illusions that I will be able to program my own app soon but I would like to use programming languages to help me better express myself on future projects. And I intend there to be a future project: my research has always been praxis based and I intend to design another app intervention to use as a case study in my dissertation.

I found this class to be both useful for my current research and inspiring toward future projects.

Future Work

The main focus in the future should be on getting the image recognition to work better. As such there should be a focus on switching from Vuforia to OpenCV or another more appropriate library.

The next step after image tracking performance should be to create a more

general/templated version of the app which can be easily customized and used in other performances. The changes to be done should be:

- Allow easy customization of the login/explanation screens.
- Easier adding/removing of trackable objects

<u>Would you be interested in having a Business School class on marketing/entrepreneurship take it up?</u>

Yes. We would like to develop a template or generic app in order to help theatre companies develop reactions, or overlays relevant to the current productions. It would be excellent to get advice on how to market it to theatres.

<u>Open Source:</u>

All three of us feel strongly about making our code open source.