AN ENDEAVOR IN INTEGRATED INNOVATION: "GREEN BUILDING INTERACT"

by

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A Senior Honors Project Presented to the

Honors College

East Carolina University

In Partial Fulfillment of the

Requirements for

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by

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Artist Statement

Over the past year, I have been exposed to a variety of immersive technologies that have the potential to shape the way we as humans interact with each other and the world around us. These technologies – specifically augmented and virtual reality mobile applications – have opened my mind to an entirely new way of conceptualizing the technology the majority of humans interact with on a daily basis. We are no longer confined to the two-dimensional, isolative mobile applications that we once were subject to. We now have the ability to interact with each other and our environments in ways that allow us to feel as if we are truly immersed in these technology-driven experiences. This immersive technology I speak of will be referred to herein as interactive design. The beauty of interactive design can be experienced only through direct exposure to the technological feature itself. In order to fully understand the mobile application I have designed, one must experience it firsthand. It is my goal through this statement to provide a contextual background for the work I have compiled, which has led to the production of an interactive, immersive mobile application in Green Building Design.

In the first semester of my senior year, I had the honor of meeting Marshall Brain - the founder of HowStuffWorks.com. He told me that now is the best time in human history to create something that reaches millions of people. This motivational push led me to begin exploring ideas for the generation of ideas that have the potential to reach the masses. I was inherently drawn to mobile application development, as I spend nearly three hours on my smartphone over the course of a day. Although this time is usually spent reading articles to draw inspiration from and communicating with friends, colleagues, and family, I also find myself often engaging in educational, immersive apps. The past few years have shown tremendous development in the world of mobile applications. New technologies such as augmented and virtual reality, which

allow users to immersive themselves in interactive experiences, were quick to captivate my attention. I was enamored by the thought of creating something that many could learn and benefit from, whilst feeling as if they are truly in touch with experiences derived simply from their smartphones. This led me to begin exploring ideas related to the development of mobile applications that employ the use of interactive design.

Although my research interests have evolved into improving the human experience through a more holistic, hands-on approach, I was very interested in elevating environmental consciousness at the onset of this project. I attended various conferences and workshops, all of which inspired an ethic of environmental stewardship and responsibility within me. At one of these conferences in Wilmington, North Carolina, I was introduced to Green Building through a representative of the U.S. Green Building Council. Here, I learned there was a system of credentialing in which projects revolving around the design of buildings and neighborhoods could become certified by an industry standard in environmental, economic, and social sustainability. This system, commonly referred to as LEED, is a product of the U.S. Green Building Council's initiative in Leadership in Energy and Environmental Design. As a student of psychology, I had little prior exposure to what exactly constitutes a green building project. Because of this, I yearned for knowledge about the processes that go into the creation of the built environment. Here, I also realized that I was certainly not alone; many of the world's people are unaware of the complexities that go into the creation of the buildings they interact with on a daily basis. Taking Marshall Brain's advice to heart, I decided to create a mobile application in which the masses could become aware of the underlying processes that go into the creation of the sustainably built environment.

Through the use of immersive technologies, specifically augmented and virtual reality, I

have designed a mobile app that allows the user to step inside the design process of green buildings. This app, Green Building Interact, was designed through the integration of various innovative technologies, all of which can be combined to create groundbreaking, interactive design-based applications. My intention with this application is to both educate users on the functioning of green buildings as well as inspire them to learn more about green building as an art. Through highlighting the underlying complexities of green buildings, I have sought to educate the general public on what exactly makes buildings sustainable – environmentally, economically, and socially. When the user enters a building that has been programmed to display an augmented reality-based feature, he or she is immediately made aware of various facets of the building by seeing a hologrammatic display on his or her phone. This allows the user to essentially see through walls – highlighting the energy and water usage, indoor air quality, building materials, and the overall sustainability of the site that makes the building certifiable by LEED. Through immersing oneself in the processes that allow buildings to function, one may very likely become more attuned to the complexities of the built environment and eager to learn more about what makes these systems thrive. I have extended the functionality of this application into the realm of virtual reality – enabling users to experience the underlying processes of any green building from any location. Through simply downloading this app to a smartphone and putting the phone into a low-cost virtual reality viewer such as Google's Cardboard, the user can learn about any LEED certified building as if they were in the building itself.

Although this project has been geared toward the prototyping of this mobile app, it is highly feasible that this idea could be applied to the creation of a fully functioning application that influences many. With any business endeavor – specifically in the development of integrated technology – there are various considerations which must be taken into account. First, the

programming demand of creating this app in its fully functional capacity is no small feat. This would require a team of interactive design artists who understand the complexities of the built environment and what goes on within the walls of buildings and structures. Therefore, this app requires a highly specialized group of designers to bring it to fruition. With any mobile app, revenue generation is a concern. Here, the generation of revenue would likely come from companies that seek to use this application for its marketing potential. With sustainability being a driving force in the competitive differentiation of companies and organizations, this app has the ability to allow businesses and nonprofit organizations to effectively market to groups targeted for supporting sustainable efforts. By sponsoring our design team to feature these companies' buildings in this app, the companies may cater to a vast group of supporters of sustainable practices. Securing initial investment from an angel investor or a venture capitalist would not be a difficult task once the initial developmental stage of this application has been reached. In order to secure financial backing and support, however, a threshold must be met. In this sense, this project may be difficult to start, but quick to gain traction once a benchmark has been reached. Overall, this app has the potential to become something that is used by many in order to learn more about the built environment and to gain an appreciation for green building as a discipline. It is my hope that this app will come to fruition through the work of myself and a dedicated team of designers and programmers.

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An Endeavor in Integrated Innovation: "Green Building Interact"

By Zach Evans

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What is Green Building?

"The Triple Bottom Line in Action"

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An Overview of LEED

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The Value of LEED: Environmental

- In the U.S., buildings account for:
  - 38% of all CO_2 emissions
  - 13.6% of all potable water
    - 15 trillion gallons per year
  - 73% of U.S. electricity consumption

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The Value of LEED: Environmental

- 80 million tons of waste diverted
- 25% less energy consumption
- 34% lower greenhouse gas emissions

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The Value of LEED: People

- Happier and healthier occupants
- Neighborhood development
- Attractive to tenants
  - 20% higher leases
  - Lower vacancy rates

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The Value of LEED: Financial

- Competitive differentiation
  - Branding and Public Relations
- Lower operating costs
- Employee retention
- Huge return on investment

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Adobe Systems, Inc.

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What Makes a Building "Green"?

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LEED Ratings

Quick Video of LEED ed

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Gates Foundation Headquarters

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ARC International Inc.

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The Omega Center for Sustainable Living

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LEED Platinum Home

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LEED Platinum Home

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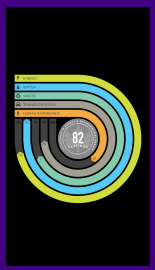
Current LEED Mobile Application



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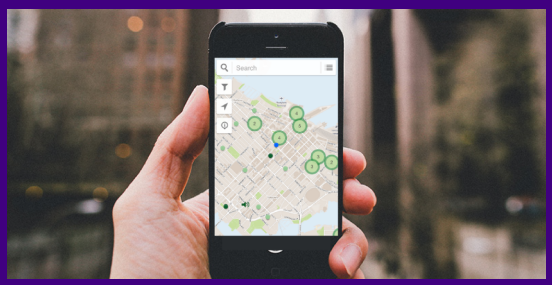
Green Building App



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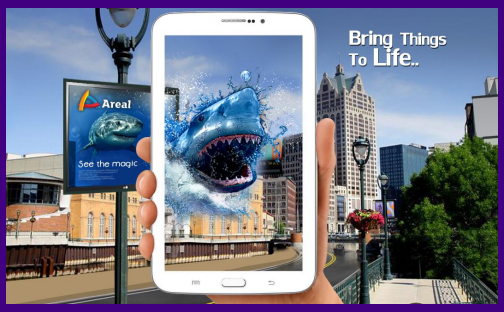
Augmented Reality



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Anatomy 4D App

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Augment App

AUGMENT

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"Green Building Interact"

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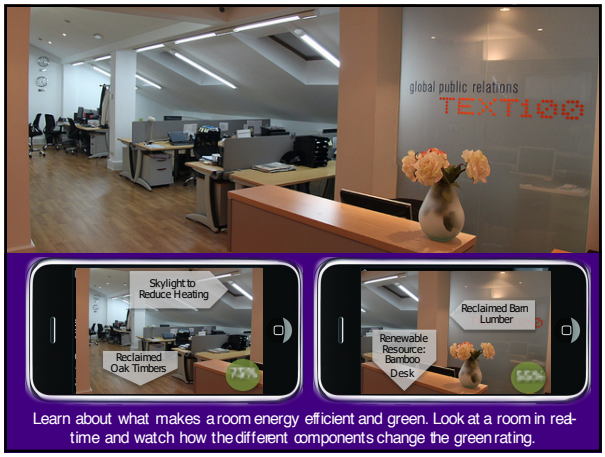
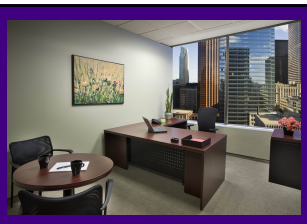
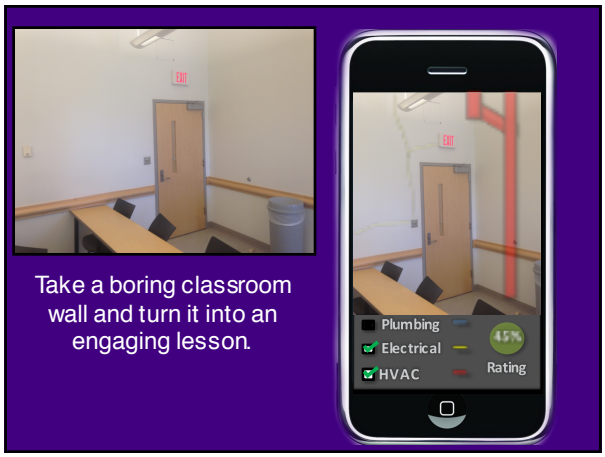


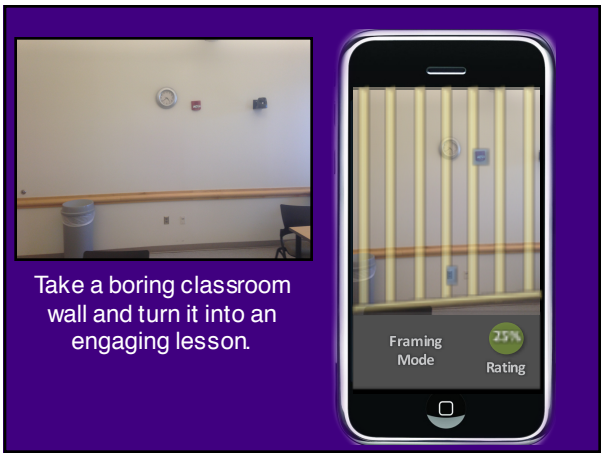
Learn about what makes a room energy efficient and green. Look at a room in real-time and watch how the different components change the green rating.

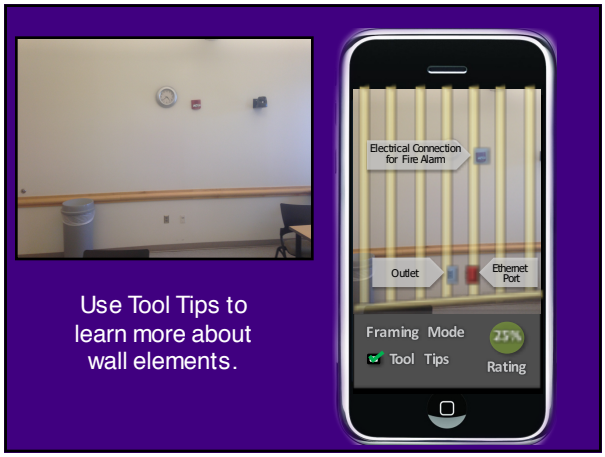
Look inside a wall or floor to see framing and other construction materials.

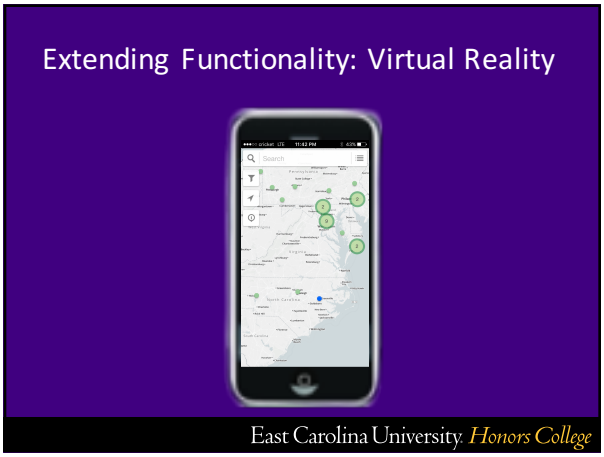



Take a boring classroom wall and turn it into an engaging lesson.
Plumbing
Electrical
HVAC
25%
Rating


Take a boring classroom wall and turn it into an engaging lesson.
Plumbing
Electrical
HVAC
45%
Rating


Take a boring classroom wall and turn it into an engaging lesson.
Framing Mode
25%
Rating


Use Tool Tips to learn more about wall elements.
Electrical Connection for Fire Alarm
Outlet
Ethernet Port
Framing Mode
Tool Tips
25%
Rating


Extending Functionality: Virtual Reality
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Immersive Technology

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Immersive Technology

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360Fly Demo

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Feasibility of the Idea

- Would you download it?
- Programming demand
- Potential Revenue Sources
- Patenting Process