

An Interactive Qualifying Project Report  
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Developing an Interactive Communication Platform for the Oculus House in the Solar Decathlon  
Africa 2019 – Ben Guerir-Morocco

By:  
Tej Sheth

Project Advisor:  
Tahar El-Korchi

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**WPI**



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## **Abstract**

This Interactive Qualifying Project develops the communication strategy for visitors of the Team OCULUS smart house at Solar Decathlon Africa 2019. Research about the demographic of expected visitors at the SDA competition was conducted and an interactive digital display platform was recommended. This project designed an interactive display prototype using guidelines from interactive media professionals. Anonymous participating users evaluated the interactive display to provide feedback which was used to make modifications to the user interface design and develop recommendations.

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## **Executive Summary**

The goal of this Interactive Qualifying Project is to provide a communication strategy for the visitors at the OCULUS home at Solar Decathlon Africa 2019. The Solar Decathlon is a collegiate competition hosted biennially by the United States Department of Energy. Since it began in 2002, cities all over the globe have hosted the Solar Decathlon, including in Europe, South America, and China. The first Solar Decathlon Africa will take place in Ben Guerir, Morocco in September 2019. Student teams will design and construct residential homes that operate with net-zero solar energy power. Based on the fulfillment of specified criteria, judges award each team points to their score. Team OCULUS is one of twenty teams selected to participate as finalists in Solar Decathlon Africa 2019. This team consists of four universities: Worcester Polytechnic Institute (WPI), l'École Nationale Supérieure d'Arts et Métiers (ENSAM in Meknes, Morocco), l'Ecole National Supérieure d'Informatique et d'Analyse de Systèmes (ENSIAS in Rabat, Morocco), and the African University of Science and Technology (AUST in Abuja, Nigeria). Team OCULUS emphasizes the use of low-cost materials native to the region, natural ventilation and cooling systems, and integrated water collection and treatment. The goal of this project is recommend and develop a platform to communicate the OCULUS House design to the visitors for SDA 2019.

To determine the communication strategy, it is necessary to analyze the demographics of the expected visitors at the OCULUS house. The Solar Decathlon Africa is an event open to the public in Ben Guerir, Morocco so many visitors will be locals from the region. After researching the local demographic, sources report that 18.3 percent of the Moroccan population speaks English, while most are fluent in Arabic and French. (Morocco World News, 2015) Moreover, a 2012 census conducted by the United Nations Educational, Scientific and Cultural Organization (UNESCO) determined the literacy rate of both males and females in Morocco to be 69.43 percent. (UNESCO, 2012) These reports imply that most Moroccan locals would not have a strong scientific background to support their understanding of engineering topics. For this reason, the content I communicate through the medium must not be too technical. Although there will be a diverse crowd of students, I must optimize the content to those that may have trouble understanding the engineering design. Instead, I must highlight key components in the OCULUS design. In addition, I must adapt the communication medium to communicate across the

language barrier so visitors that lack strong English skills can understand the content. As determined by the USAID, “less than 15 percent of Moroccan first grade students are likely to graduate from high school.” (USAID, 2018) Hence, the communication strategy should be engaging to inspire children to learn about the OCULUS design. Lastly, I consider the access of visitors to personal devices. In a 2016 survey, the National Telecommunications Regulatory Agency reported that 59.1 percent of Moroccans between ages 12 and 65 in urban areas own a smartphone with internet access. Since the Solar Decathlon is open to the public, the visitor experience should not exclude visitors without access to a smartphone device or strong wireless bandwidth. Therefore, I must provide a communication medium that does not rely on personal devices. With these specific constraints in mind, I determine the best-fit communication medium.

After researching and analyzing multiple solutions, I determine that an interactive display is the best-fit communication medium. An interactive display is a wall-mounted screen that displays graphics while enabling touchscreen interaction. In many cases, they compare to touchscreen tablet computers, except with much larger screens. While this solution may be somewhat costly for the software to design the interface and the expense of purchasing the display itself, this will provide the qualities I seek defined by the visitor demographic. In a 2016 study completed by Northwestern University’s Center on Media and Human Development, experts found that young children ages 2 to 7 years old are able to make connections in information fastest through touch screen media (Lovato & Waxman, 2016). This research supports the use of an interactive display as a communication medium for children. Yet, this solution will be immersive and intuitive to interact with for all ages because it does not require any previous knowledge to use. Also, an interactive display does not require visitors to use personal devices. Hence, it is feasible to implement the interactive display as a communication medium for the OCULUS house.

Prior to this project, I had no experience with interactive media or the appropriate software to design such technology. I sought out the best practices of professionals in the industry to find design principles to guide my development of the user interface. I used online tutorials and resources to teach myself how to use the IntuiFace Composer software. I discovered a lot about design elements through Mary Stribley’s work in her article, *20 Design Rules You Should Never Break* (Stribley, 2019). She explains that using color and contrast will provide the

user with text and graphics that are easily legible. I learned that I must use contrast in color to make text and images pop from the background into the foreground. Additionally, there must be plenty of blank space between elements, creating separation and reducing clutter. I can improve legibility when I group similar items in simple patterns. To cater the interactive display to users with minimal English skills, I emphasize the use of graphics instead of written text. Furthermore, I create interactive components within the user interface to engage children using the display. I can ensure that these methods achieve my objectives by collecting feedback from anonymous users in an evaluation survey.

I consulted José Linares Fontela's *A Guide to Designing Surveys* to determine how the evaluation survey should appear. I collected anonymous user feedback from 25 random evaluators, including students of different universities within Team OCULUS. To maintain consistency of the evaluation survey, each user would use the interactive display prototype on the same touchscreen for five minutes and then complete the evaluation survey. For the visitors to consider the interactive display an effective communication medium, the display must be intuitive to use, visually appealing, and convey significant content. As explained in Mary Stribley's article, well-designed user interfaces do not need prior experience to use. (Stribley, 2019) Good user interfaces are intuitive and rely on human innate ability. To ensure the success of this interactive display, I assessed each of these characteristics in individual inquiries. I met with Kenza El-Korchi, an architectural student from the Architectural School in Rabat and an OCULUS team member, to seek feedback on the user interface. Lastly, I analyzed the feedback I collected to determine how to improve the interactive display.

The purpose of this Interactive Qualifying Project, is to provide an effective communication platform to convey information about the OCULUS design to visitors at Solar Decathlon Africa 2019. In order to make informed decisions about determining the communication platform, I researched the demographic of expected visitors to cater the communication strategy to the appropriate audience. I explored various ways I could present the OCULUS design content before agreeing with Professor El-Korchi on the interactive display. Despite having no experience with developing interactive media or the IntuiFace software, I researched interactive media design principles. I am excited and proud to recommend this solution for the Team OCULUS visitor communication strategy and I hope Team OCULUS



implements it for the competition in September 2019. If implemented for Solar Decathlon Africa, the feedback from visitors will help shape the improvements for the next Solar Decathlon in which WPI participates. Hence, the interdisciplinary nature of this interactive display makes it a powerful but practical solution for the visitor communication strategy. Based on the feedback from the evaluation survey, I recommend this interactive display as a communication medium for the OCULUS design at Solar Decathlon Africa 2019.

# 1 Introduction

The goal of this Interactive Qualifying Project is to provide a communication platform for the visitors that come to the Team OCULUS house at the Solar Decathlon Africa 2019 in Ben Guerir, Morocco. A communication strategy is essentially a business tool. It helps an organization align a marketing plan to their business goals and focus on reaching predetermined results (Jackson, 2018). The communication strategy is a guide to reach these goals. The Solar Decathlon is a competition sponsored by the United States Department of Energy in which universities design and construct clean energy houses. Based on the satisfaction of predetermined criteria, judges award each team points to their score. Team OCULUS consists of four universities, including the lead school, Worcester Polytechnic Institute (WPI). A verified communication strategy is essential to the success of Team OCULUS at Solar Decathlon Africa. Without it, visitors would feel that their experience at OCULUS is impersonal and we would not properly communicate the OCULUS design. The communication strategy for these visitors conveys the design of the OCULUS home through an engaging and informative communication medium.

There are key differences in the demographics of visitors at Solar Decathlon Africa since the competition takes place in Ben Guerir, Morocco. The event will be open to the public for admission so a large portion of the visitor pool will consist of Moroccan locals and some English-speaking international visitors. For this reason, the approach to this communication strategy needed to cater to those that are not fluent in English. Only a small portion of Moroccans speaks English so the communication strategy needed to emphasize the use of diagrams, images, and other graphics. I intend to incorporate the use of many visuals to communicate without the need for a lot of English text. After exploring multiple types of media and methods of presentation, including mobile applications and augmented reality, I determined that an interactive display would be the most efficient solution to the communication strategy. An interactive display is a touchscreen interface similar to a tablet that is both intuitive and exciting for visitors to interact. Although I had no previous experience with interactive media, I researched the best practices of professionals in the industry to develop an interactive display. In this paper, I explore and evaluate the design of the interactive display.

To evaluate the prototype and determine any shortcomings, I created an evaluation survey to collect user data. With this feedback, I revised the interactive display and provided recommendations for future iterations of the design. After assessment from anonymous participants, I found that the interactive display is a viable solution to the communication strategy for Team OCULUS at Solar Decathlon Africa 2019. In the Background section, I explain the process by which I evaluated the limitations of different presentation mediums. I describe the predetermined considerations of the design as well.

## **2. Background**

### **2.1 Competition Overview**

In this section, I explain the Solar Decathlon competition, its sponsors, and its implications. I distinguish how Solar Decathlon Africa is different from past Solar Decathlons and how teams relocate these residential buildings after competition. I describe Team OCULUS and our particular focus in this competition. Lastly, I analyze the demographic of expected visitors at the OCULUS home.

#### **2.1.1 The Solar Decathlon Competition**

Since its inception in 2002, the United States Department of Energy hosts an international collegiate competition biennially known as the Solar Decathlon<sup>®</sup>. The Solar Decathlon takes place all over the globe, including California, Colorado, Europe, South America, and China. More than 160 collegiate teams and 18,000 collegiate participants have competed in this competition since it began. (US Department of Energy, 2018) This unique competition evaluates ten interdisciplinary contests that challenge student-led teams to develop and construct residential structures powered entirely by solar energy. Each team designs their home to operate with net-zero solar energy power while maintaining cost-effectiveness and visual appeal. Students must use the host region's local culture and resources to inspire the interior and exterior features of the houses. As the competition concludes, the winning teams will have the superior blend of the ten contest criteria.

The Solar Decathlon is not merely a competition for those involved. Due to the growing need for renewable energy, teams educate the public about the availability and affordability of clean energy. The event serves as a learning experience for consumers, sponsors, and visitors. The Solar Decathlon encourages a culture for clean energy, environmental awareness, and STEM innovation. For the last eight Solar Decathlons, the teams find a designated community to move the home after the competition. As shown by each colored pin in Figure 1, each team relocates their home for display in communities around the world.



Figure 1 - Map of Solar Decathlon homes after competition (US Department of Energy, 2018)

### 2.1.2 Solar Decathlon Africa 2019

The 2019 Solar Decathlon is Solar Decathlon Africa and will take place in September 2019 in Ben Guerir, Morocco. The Moroccan Ministry of Energy, Mines, Water and the Environment (MEMEE); the Moroccan Institute in Solar Energy and New Energies (IRESEN); and the United States Department of Energy all take part in hosting this competition. This is the first Solar Decathlon hosted in Africa. This competition is different from past Solar Decathlon competitions in that each home must be uniquely adapted to the North African location and climate. In recent years, Morocco's government has stated its strong interest in initiatives towards renewable energy. (Moroccan Ministry of Energy, 2018) The Solar Decathlon competition aligns with Morocco's plan to educate the public about the benefits and accessibility of clean energy.

The ten criteria assessed during Solar Decathlon Africa are Architecture; Engineering and Construction; Market Appeal; Comfort Conditions; Appliances; Sustainability; Home Life and Entertainment; Communication and Social Awareness; Electrical Energy and Balance; and Innovation. Hence, the competition requires thoughtful and thorough planning from students. Due to the interdisciplinary nature of the challenge with both technical and non-technical means of research, the Solar Decathlon is a great way to involve multiple Major Qualifying Projects and Interactive Qualifying Projects at WPI. This IQP will focus on the communication and social awareness criteria to ensure we can convey the OCULUS design to visitors in a meaningful manner.

### **2.1.3 Team OCULUS**

Worcester Polytechnic Institute (WPI) leads Team OCULUS, one of the twenty teams selected as a finalist in Solar Decathlon Africa. WPI is working together with three other universities as part of Team OCULUS: l'École Nationale Supérieure d'Arts et Métiers (ENSAM – Meknes, Morocco); l'Ecole National Supérieure d'Informatique et d'Analyse de Systèmes (ENSIAS – Rabat, Morocco); and the African University of Science and Technology (AUST – Abuja, Nigeria). Since September 2018, students in civil, architectural, and environmental engineering have been working to collaborate on this final design. In order to excel in specific contests, Team OCULUS emphasizes the use of low-cost materials that are native to the region, natural ventilation and cooling systems, and integrated water collection and treatment. The ENSIAS students in Rabat have integrated the use of Internet of Technology (IoT) solutions in the house, effectively providing the concept of a smart-house. The ENSAM students in Meknes have been working in parallel with WPI students on the structure of the OCULUS house. Moreover, Team OCULUS continues to collaborate with rural African communities in Morocco and Nigeria through WPI's global project centers to inspire the house design.

### **2.1.4 Background on Demographics of Visitor Pool**

The visitor experience is the perspective of visitors when they arrive at the Team OCULUS home and walk around the interior of the home. Through their time spent inside the OCULUS home, they should learn about the building's design. This requires analyzing the demographic of visitors in order to produce the most effective communication strategy for the smart-house design and its implications. First, we must define these demographics in question. This Interactive Qualifying Project will be successful if the visitor experience is inclusive of all potential visitors, regardless of their age, native language, ethnicity, or educational background. Furthermore, the communication strategy must be interactive in order to actively engage visitors and create an immersive, informative, and enjoyable experience for each visitor.

## **2.2 The OCULUS Visitor Experience**

The OCULUS house design is contemporary but also heavily influenced by Moroccan culture. The communication medium for the visitors should reflect similar modern qualities to

ensure a fluid and enjoyable experience. The communication strategy should fit into OCULUS house seamlessly to not distract from the features of the buildings. In order to provide a communication strategy that is most appropriate for each visitor, I need to understand the demographic of the average visitor in depth. The Solar Decathlon Africa 2019 competition will take place in Ben Guerir, Morocco. The event will be open to the public, so competitors, sponsors, and the Moroccan locals will visit the house. Therefore, the communication strategy must be diverse in its approach so that it is applicable to all socioeconomic backgrounds. This IQP will only be successful if the communication strategy caters and appeals to every visitor. In the next sections, I describe the different demographics of visitors we can expect to see at the OCULUS home.

### **2.2.1 Visitors with a Non-technical Background**

The communication strategy needs to consider the level of education of the audience. To produce an effective communication strategy, the information conveyed should not be too technical about the specifics of the OCULUS design. Instead, I must summarize the features of the OCULUS home and the implemented technology. This is because many of the Ben Guerir locals are not likely to have a strong scientific education to support their understanding of these engineering topics. Although not all visitors will be locals from Ben Guerir, Morocco, they will represent a large portion of the entire visitor pool. Other visitors will be from participating universities in the competition and have a strong background in science-related fields. For this reason, the visitor experience must be applicable to all levels of educational background.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) conducted a census of Morocco in 2012. As shown in Figure 2, they determined the literacy rate of both males and females in Morocco to be 69.43 percent. While the trend shows that literacy is improving annually due to urbanization, they claim the low literacy rate is a cascading result of the high university dropout rate. Because fewer students are graduating, the educational system is deterring and it is becoming harder to support the increasing demand for primary school teachers. (UNESCO, 2012) I must consider this in the communication strategy.

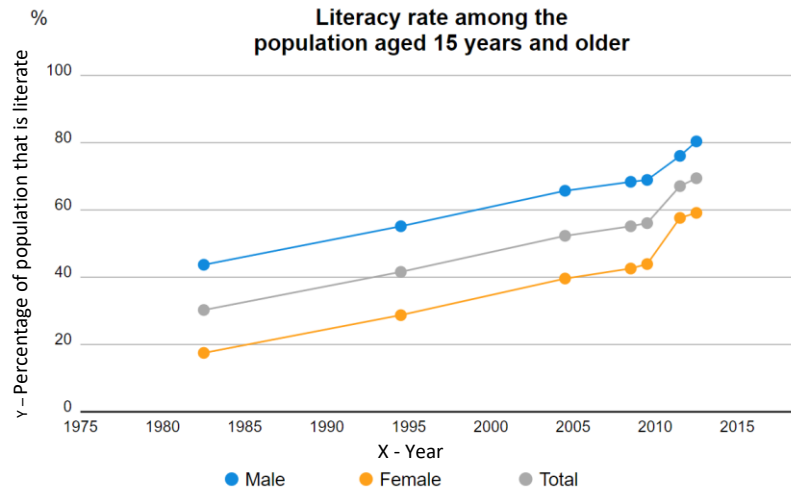


Figure 2 - Literacy Rate of Moroccan Population aged 15 years and older (UNESCO, 2012)

In 2017, a different study by the Morocco’s Ministry of National Education, Vocational Training, Higher Education and Scientific Research reported, “that no more than 42 percent of the students enrolled in Moroccan universities graduate, whereas the majority, an eye-opening 58 percent, drop out before obtaining their bachelor degree” (Morocco Ministry of Education, 2017). The typical period for completing a bachelor degree in Morocco is three years. However, the report from the Moroccan Ministry of Education also shows “only 13 percent of university students in Morocco complete their university degree in the first three years” (Morocco Ministry of Education, 2017). While these statistics do not specifically measure the population of Moroccans with an engineering or science education, this data implies that a less technical presentation of the OCULUS house design would be more comprehensive and enjoyable for the greater portion of Moroccan locals.

**Objective #1 – Develop a communication medium that caters to visitors with a non-technical background.**

### 2.2.2 Communicating Across the Language Barrier in Ben Guerir

Most of the teams competing at Solar Decathlon Africa will be from English-speaking universities. In fact, the official language of Solar Decathlon Africa is English. However, the locals of Ben Guerir and surrounding cities do not speak English as commonly. Therefore, in addition to adapting the content to cater to the visitor demographic, the delivery and communication of this content must consider this demographic as well. Modern Standard Arabic and Amazigh (Berber) are the two official languages of Morocco. About 90 percent of the



Moroccan population speak Darija (the Moroccan dialect of Arabic), in addition to the 26 percent that speak Berber. English is one of the least common recognized languages of Morocco. According to the Morocco World News, 18.3 percent of the country’s population is competent in English, as compared to 66 percent in French (Morocco World News, 2015). The communication strategy will need to engage visitors despite this language barrier.

Aside from linguistic differences, there exists plenty of traditional Moroccan influence in the design of the OCULUS house. Moroccan artisanal methods inspire everything from the furniture and décor to the envelope and structural material. One of the many objectives of this IQP is to connect with the Moroccan audience to show our appreciation and gratitude for their cultural influence in our work. Such similarities and analogies drawn across cultures will help communicate many of the features of the house design.

**Objective #2 – Adapt the communication medium to communicate across language barriers.**

### **2.2.3 Engaging Young Visitors and School-aged Children**

The success of the communication strategy is contingent upon its inclusion and effectiveness for all visitors, including young visitors as well. One of the key initiatives of the Morocco Ministry of Energy and the US Department of Energy in organizing the Solar Decathlon Africa is to inspire the youth to pursue education and careers in STEM fields (Morocco Ministry of Energy, 2017). In Morocco, this has been a continued challenge for its people. As reported by the USAID, “less than 15 percent of Moroccan first grade students are likely to graduate from high school” (USAID, 2018). The UNESCO study mentioned prior also describes this impact on the Moroccan educational infrastructure. For this reason, the communication strategy should be engaging to attract children to learn about the OCULUS design. The final product of the communication strategy should entice the attention of young visitors so they are more inclined to be enthusiastic about these topics.

**Objective #3 – Attract young visitors with the communication medium.**

### **2.2.4 Technological Considerations in Design**

There is a lot of contemporary design influence in the OCULUS house. Naturally, the communication medium should follow the same aesthetic theme to maintain consistency. I will

consider multiple ‘tech savvy’ solutions in order to find a communication medium that fits the smart house theme. Visitors should feel like the communication medium is part of the home. Yet, it is important to consider the limitations and constraints of the communication strategy’s implementation of technology and devices. Displaying content on a digital screen will likely be a considered communication strategy merely due to its visual appeal. However, we must exclude any proposed concepts utilizing personal devices, like iOS or Android applications, to ensure all visitors have equal access to the content. In a 2016 survey, the National Telecommunications Regulatory Agency (ANRT) found that 54.7 percent of Moroccans between ages 12 and 65 own a smartphone with internet access. Moreover, 59.1 percent of Moroccans in urban areas of the same age group own a smartphone (ANRT, 2016). Since this event is open to the public, all visitors without access to a smartphone or strong wireless bandwidth should be able to enjoy the experience. In order to provide a visitor experience inclusive of all demographics, the content must not depend on the use of personal devices.

**Objective #4 – Provide a visitor experience that does not rely on personal devices.**

### **2.3 Researching and Analyzing Communication Mediums**

Before I select a communication medium, I analyze and contemplate multiple proposed solutions. I will select the best match after identifying the visitor demographic and fulfilling the objectives mentioned in the section above.

**Printed Posters** – Printed paper posters in selected locations on interior and exterior of the OCULUS house was the first idea I considered. This concept has many negative qualities in that the posters would seem outdated in the modern design of the house and its presence would not be interactive nor would it lure visitors to learn about Team OCULUS. Also, the printed posters would take up a lot of space within house.

**iOS/Android Mobile Application** – A mobile application would save space within the OCULUS home. However due to the limited portion of about half of locals with smartphone internet access, this idea is unlikely to appeal to the average visitor. Moreover, the development needed for this solution would be too academically intensive and match the qualities of a Major Qualifying Project more so than an Interactive Qualifying Project.

**Augmented Reality Application** – I considered this concept largely because of its attractive implications and its growing popularity in recent years. Augmented reality is a

technology that superimposes a computer-generated image on the user's view of the real world, in many cases through a mobile application, providing a composite view (Reality Technologies, 2018). If properly implemented this concept would have high potential in that users could navigate the inside of the OCULUS house and information could display with respect to their location. In actuality, developing such an experience would be impractical and an inefficient use of time during this IQP. An augmented reality application would rely on visitors having a smartphone device as well.

**Interactive Display** – An interactive display is a wall-mounted screen that displays graphics while enabling touchscreen interaction. In many cases, they compare to tablet computers, except with much larger screens. While this solution may be somewhat costly for the software to design the interface and the expense of purchasing the display itself, this will provide the qualities we seek defined by the visitor demographic. The interactive display will be able to engage users and lure visitors into learning about the OCULUS design (Cassidy, 2017). If I design the interface well, the final product has a lot of potential to be entertaining and fun to use. In a 2016 study completed by Northwestern University's Center on Media and Human Development, experts found that young children ages 2 to 7 years old are able to make connections in information fastest through touch screen media. (Lovato & Waxman, 2016) This research supports the use of an interactive display as a communication medium for children. Young visitors are likely to be the most enthusiastic about this communication strategy, as opposed to the other proposed solutions. Yet, this solution will be immersive and intuitive to interact with for all ages because it does not require any previous knowledge to use. Nor does an interactive display require visitors to use their personal devices. Hence, it is feasible to implement the interactive display as a communication medium for the OCULUS house. I determine the best-fit communication medium and design its implementation in the following Methodology.

### **3. Methodology**

#### **3.1 Selecting the Interactive Display as a Communication Medium**

After evaluating the potential communication mediums, I determined that the interactive display is the best fit for Team OCULUS. Through a touchscreen interface, I can achieve all four of the objectives identified in the background research. I can design the content and media in the interactive display to appeal to users without a technical background or strong English skills. The touchscreen interface will attract and engage children visiting the OCULUS house, as supported by Lovato and Waxman's study at Northwestern University. The engagement with young visitors will fulfill Objective #3. In addition, the interactive display does not rely on personal devices, satisfying Objective #4. In this Methodology, I research the best practices of interactive media design and use these guidelines to produce the prototype for the interactive display.

→ Objective #3 – Attract young visitors with the communication medium.

→ **Method – Implement touchscreen interface.**

→ Objective #4 – Provide a visitor experience that does not rely on personal devices.

→ **Method – Implement the interactive display without use of other devices.**

##### **3.1.1 Background Research of Digital Media Design**

Interactive media and web design go hand in hand, as they share many key qualities in making them effective means by which we can communicate. Media design has massive implications. The appearance of media online determines your prejudice of the subject, whether positive or negative, almost immediately. (Stribley, 2019) The visual appeal of a retail website will often bias your opinion of their product whether you realize it or not. The same principle applies to the interactive display. The design has to be striking while maintaining a professional appearance. I tasked myself with learning about the fundamentals in media design theory and its impact on its communication of content. As someone with minimal web design and graphics experience, I researched the themes and guidelines of effective design and used them to craft the interactive display and its content.

##### **3.1.2 Background Research of Effective User Interface Design**

The most effective types of interactive media are often those designed for commercial purposes, like retail store kiosks. You can learn a great deal from them. The best practice is to

use different features to your advantage to provide an intuitive and seamless experience. I discovered a lot about design elements and principles through Mary Stribley's work in her article, *20 Design Rules You Should Never Break*. (Stribley, 2019) She explains that using color and contrast will provide the user with text and graphics that are easily legible. I must use contrast in color to make text and images pop from the background into the foreground. Additionally, there must be plenty of blank space between elements, creating separation and reducing clutter. I can improve legibility when I group similar items in simple patterns. To solve Objective #2, I implement graphics to do the majority of the communication, instead of written text. After researching media design principles, I can suit the user interface to visitors that do not have strong English skills. I achieve this by using icons in the user interface for navigation buttons. I design each scene with many graphics and minimal text. This approach serves as the method for Objective #2.

→ Objective #2 – Adapt the communication medium to communicate across language barriers.

→ **Method – Use graphics to communicate the content with little written text.**

Stribley describes that it is important to make the user feel comfortable. Only once the user is comfortable with the interface, then you will have good user interaction. The user should feel in control of the experience and be aware of where they are and where they can go before interacting further. When designing the layout of the interactive display, I use consistent branding to mitigate confusion and provide a more informed experience. Consistent branding is the use of the OCULUS team logo and the same arrow buttons on each page to create a sense of familiarity for the user. When users tap the team logo in any scene, the Team OCULUS scene appears. If a user taps the home button, the Home scene appears. Stribley explains that this continuity provides clarity for the user interface. The users should feel that all icons and scenes in the interface have a uniform aesthetic. It helps to minimize the number of clickable items on a single page. This is because the user will be able to spend more time viewing the content on the page, rather than looking at the options for the next page to navigate. In addition, during navigation, users are usually more attracted to animated menu components so it is good practice to create separation and lure attention to menu items with contrast.

### 3.1.3 Determining the Layout of the Interactive Display

To address all aspects of the Team OCULUS house design, I developed 20 unique scenes for interaction. I determined the number of scenes in the interface by organizing the content that needs to be included. For example, the topic of architecture is not very in depth so only one scene is necessary. I titled this scene as “Architecture.” In contrast, the materials Team OCULUS uses to construct the building needs a lot of explanation. Thus, there are four individual scenes to describe the application of different materials in the home. I labeled these scenes respectively as “Hand Woven Wicker, Light Control, Local Craftsmanship, and Membrane Panels.” I separate all the content into scenes in a similar manner. To satisfy Objective #1, I use this organizational structure to summarize the content. By giving an overview of the OCULUS design, the content in the interactive display is not too technical and is easy for the visitors to understand. This approach will allow visitors without an engineering education to understand the house design.

→ Objective #1 – Develop a communication medium that caters to visitors with a non-technical background.

→ **Method – Summarize content to highlight key design components.**

The graphical interface allows the visitors to navigate scene-to-scene and connect the ideas in an interdisciplinary manner. The focal point of each scene’s layout is as follows:

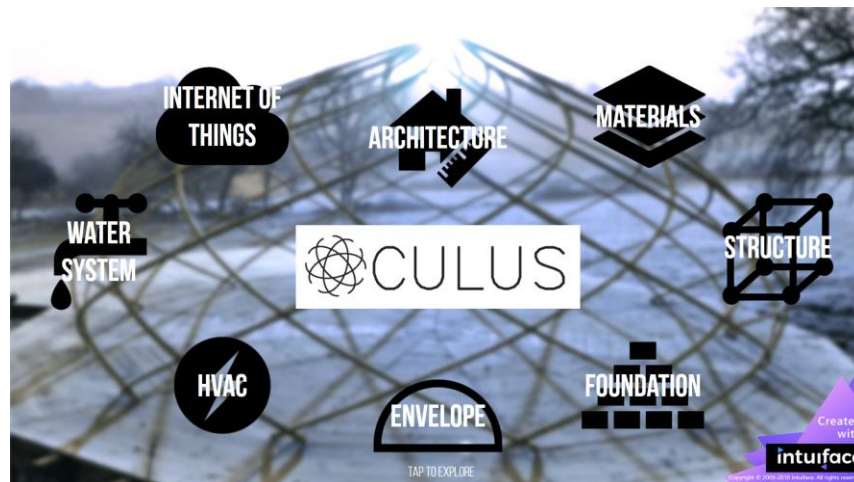


Figure 3: Home Scene in Interactive Display

**Home** – Provides a central location for navigation to all modules within the interactive display, as shown by the Home scene in Figure 3.

**Team Oculus** – As shown in Figure 4, provides an interactive map of the four universities that make up the Team OCULUS consortium and includes an image of each university.

**Meet Team Oculus** – Displays images of each group within Team OCULUS and formal head shot of all students involved in the OCULUS house design.

**Instagram Portal** – Serves as a portal to interact with the Team OCULUS Instagram account.

**Architecture** – Discusses key aspects of the overall architecture and includes rendered models.

**Materials** – Serves as a carousel gateway to the individualized material subjects, as show in Figure 18 of Appendix A.

**Hand woven wicker** – Discusses the heritage of wicker and its implications for design.

**Light control** – Summarizes how artisans can modify wicker to suit specific needs.

**Local craftsmanship** – Reviews artisanal crafts that decorate the house.

**Membrane panels** – Elaborates on the strength of wicker and its use for OCULUS.

**Structure: Geodesic Dome** – As presented in Figure 20 of Appendix A, explains the implication of the geodesic figure and its importance.

**Foundation** – Summarizes the foundational structure of OCULUS and its use of concrete, as displayed in Figure 19 of Appendix A.

**Envelope** – Reviews the materials used and the layer design for insulation and comfort, as shown in Figure 20 of Appendix A.

**HVAC** – Explains the HVAC design and the impact of the geodesic shape on airflow to keep energy costs low, as presented in Figure 22 of Appendix A.

**Water System** – Explains the sources of water consumption and the use and treatment of greywater, as shown by Figure 23 of Appendix A.

**Internet of Things (IoT)** – Serves as a carousel gateway to the individualized IoT subjects, as presented by Figure 24 in Appendix A.

**CPU** – Describes the importance of the CPU and how the system processes data.

**Sensing** – Elaborates on the power meter and combined sensor node designs.

**Actuation** – Explains how the system actuates devices.

**Visualization** – Discusses how users can view real-time environmental parameters.



Figure 4: Team OCULUS Scene shows an image and the location of each of the four universities

### 3.1.4 Using IntuiFace Composer®

IntuiFace Composer® is a complex platform software for creating, deploying, measuring, and managing interactive digital experiences. Designers can develop high functioning multi-touch applications for any touchscreen with minimal coding. I designed the entire user interface in the IntuiFace Composer software. I formatted all the text, graphics, and animations through this software. Although designing 20 scenes was quite time-consuming, I accelerated the development of the interface by using the IntuiFace Composer software. Prior to this IQP, I had no experience with IntuiFace but I found that online tutorials were helpful in creating specific modules as I learned the full potential of the software. For the purpose of this IQP, I used a free version of the IntuiFace Composer® software. (IntuiFace, 2018)

### 3.2 Designing the Assessment of the Interactive Display

In order to assure the quality of the interactive display experience for each user, I must measure the success and appeal of each feature individually. Thus, I designed the evaluation survey to be particular about the individual modules of the interactive display. I wrote the evaluation survey by carefully selecting questions to ask each user via a Google Forms assessment. I used José Linares Fontela's *A Guide to Designing Surveys* to decide how the survey should appear. (Fontela, 2002) Fontela emphasizes the need to assess attributes of a



product in individual questions. I collected anonymous user data from 25 random evaluators including students of different universities within Team OCULUS. Within the timeframe of this project, 25 evaluators is the most I could get to test the interactive display and answer the evaluation survey. Ideally, I should have collected this user data from locals of Ben Guerir in order to better resemble the opinions of expected visitors at Solar Decathlon Africa. However, many of the visitors at Solar Decathlon Africa will be students from English speaking universities anyway. I could not transport the interactive display prototype to Morocco for user evaluations so I collected the data on campus at Worcester Polytechnic Institute. To maintain consistency of the evaluation survey, each user would use the interactive display prototype on the same touchscreen for five minutes and then complete the interactive display survey. I determined the time limit to be set at five minutes because each user would need about 15 seconds to look at each of the 20 scenes. For estimation, if users did spend 15 entire seconds at each of the 20 scenes then users would need five full minutes to interact with all scenes in the interactive display. However, I must first define the qualities of a good interactive display before I assess them.

### **3.2.1 Defining the Qualities of an Effective Interactive Display**

For the visitors to consider the interactive display an effective communication medium, the display must be intuitive to use, visually appealing, and convey significant content. As explained in Mary Stribley's article, well-designed user interfaces do not need prior experience to use. (Stribley, 2019) Good user interfaces are intuitive and rely on human innate ability. The content of text, images and other graphics must pertain to the visitor's understanding of the OCULUS design. To ensure the success of this Interactive Qualifying Project, the evaluation must assess each of these characteristics individually. Therefore, I must collect feedback through qualitative and quantitative means to ensure the evaluation is thorough. Quantitative data is information about quantities. Essentially, information that I can write down and measure with numbers. In contrast, qualitative data is information that I cannot describe with numbers. Qualitative feedback relies on describing the qualities of the information. Experts in survey analysis such as Kelly Reiser, stress the importance of combining quantitative and qualitative feedback to get the whole picture about a product. (Reiser, 2014) In the next section, I explain how I design the evaluation survey to include both.

### 3.2.2 Designing the Evaluation Survey

I use quantitative questions in a five-point scale to measure the satisfaction the user felt towards certain attributes of the experience including ease of use, visual appeal, significance of information, depth of information, user interaction, and readability of text and images. As shown by Figure 5, each question will be answered with either a 1, 2, 3, 4, or 5 with 5 representing the user was *very satisfied*. In addition, I utilize quantitative questions in a four-point scale to quantify the relevance of each topic within the interactive display. Each of these questions will be answered with a 1, 2, 3, or 4 with 4 indicating the user thought the content for that topic was *very relevant*. I use both the four-point and five-point scales intentionally. In a five-point scale, the evaluator has the ability to answer the question by asserting no opinion when selecting 3. In a four-point scale, I force the user to have an opinion because there is no intermediate option available. The use of both scales subjects each user to some sort of opinion, thereby resulting in a more accurate evaluation. Moreover, qualitative queries encourage the users to write candid feedback. The evaluation inquires about each user’s favorite and least favorite part of the interactive display. Furthermore, I ask the evaluators if they felt any additional information about the OCULUS design should have been included and suggestions about changes to the interactive display. The transparent and diverse approach to this evaluation survey provides a better likelihood of accurate user data. In the Results section, I analyze the data I collected from the evaluators.

**IQP Interactive Display Evaluation**  
 Thank you for using the Team OCULUS Interactive Display for Solar Decathlon Africa!  
 Please submit anonymous feedback regarding your experience after using the Team OCULUS Interactive Display.  
 \* Required

1. How satisfied were you with the overall experience using the interactive display? \*  
 Mark only one oval.

1 2 3 4 5  
 Not very      Very much

2. How satisfied were you with the interactive display? \*  
 1 = Very dissatisfied 5 = Very satisfied  
 Mark only one oval per row.

	1	2	3	4	5
Ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual appeal of images	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual appeal of design (not including images)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Significance of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depth of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Readability of text and images	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. How relevant did you think the information was in the interactive display? \*  
 Mark only one oval.

1 2 3 4 5  
 Not very      Very much

4. Which topics did you find most relevant to understanding the Team OCULUS house design? \*  
 Mark only one oval per row.

	Not relevant	Somewhat relevant	Relevant	Very relevant
About Team OCULUS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Architecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Foundation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Envelope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HVAC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet of Things (IoT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

5. What was your favorite part about the interactive display?  
 \_\_\_\_\_

6. What was your least favorite part about the interactive display?  
 \_\_\_\_\_

7. Was there any additional information that you feel should have been included?  
 \_\_\_\_\_

8. If you could change something about the interactive display, what would it be? Why?  
 \_\_\_\_\_

9. Any overall feedback for the interactive display?  
 \_\_\_\_\_

Figure 5 – Screenshots of the Interactive Display Evaluation Survey

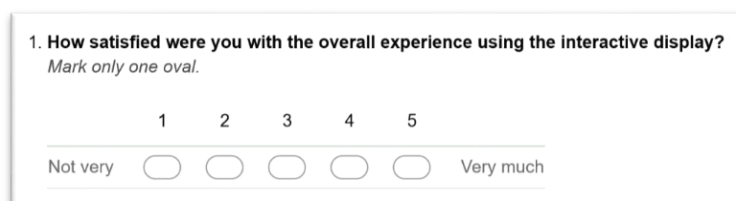
## 4 Results

### 4.1 Discussing the Evaluation Survey Feedback

In this section, I review and analyze the data collected by the evaluation survey. I used different methods to achieve specific objectives in the communication strategy. After implementing these methods, I collected data to evaluate the satisfaction of these methods. I summarized engineering topics in the OCULUS design to appeal to visitors with limited scientific background. I applied graphics and minimal text to communicate the OCULUS design across the language barrier. I designed the user interface to have interactive features to engage young visitors. In addition, I implemented the interactive display as communication medium to include all visitors that do not have access to personal mobile devices. Now that I have applied these methods, it is time to evaluate the satisfaction of these methods. After anonymously surveying the 25 random participants, including students of all four universities in Team OCULUS, I consolidated the evaluation data. Both the quantitative and qualitative data indicated that most users had an enjoyable and informative experience when using the interactive display for five minutes. Because I designed the evaluation survey to measure the satisfaction of components in the interactive display individually, I can pinpoint areas in the user interface that need improvement. In this section, I break down the evaluation data for detailed analysis.

#### 4.1.1 Analyzing Quantitative Feedback of the Interactive Display

As shown by Figure 6, the first question of the evaluation asked each user about their overall satisfaction in using the interactive display. Nearly half of the users surveyed, 48 percent, reported that they were *very satisfied* with their experience using the interactive display. As visualized by Figure 7, an additional 36 percent of evaluators indicated they were *satisfied* with their experience. A total 84 percent of users reported they were satisfied to some degree with the interactive display. None of the users selected option 1 or 2. Only 16 percent of users reported they were *moderately satisfied* and none were *unsatisfied*.



1. How satisfied were you with the overall experience using the interactive display?  
Mark only one oval.

1   2   3   4   5

Not very                  Very much

Figure 6 - Evaluation Survey Question #1 inquiring about overall experience satisfaction

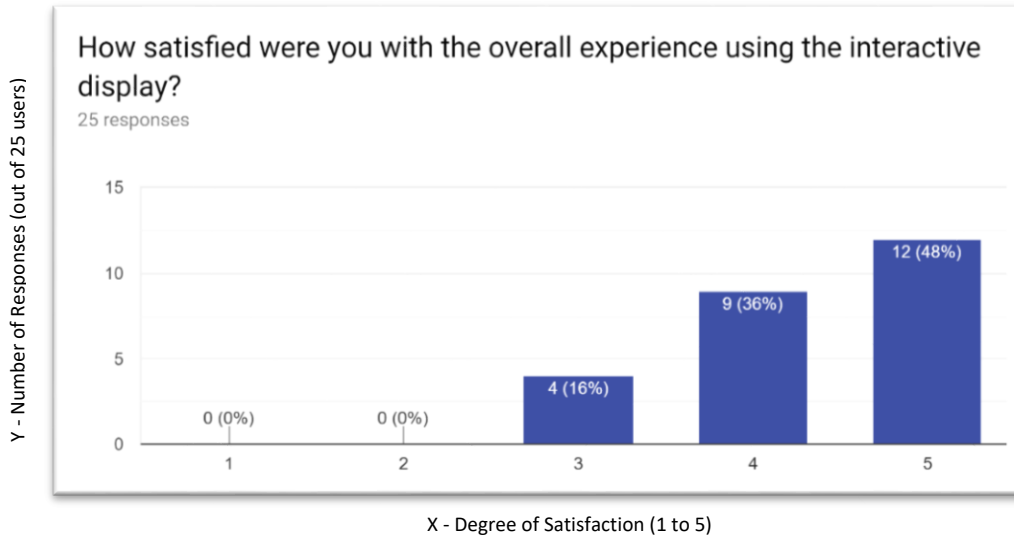


Figure 7 - User satisfaction of 25 users collected through the evaluation survey

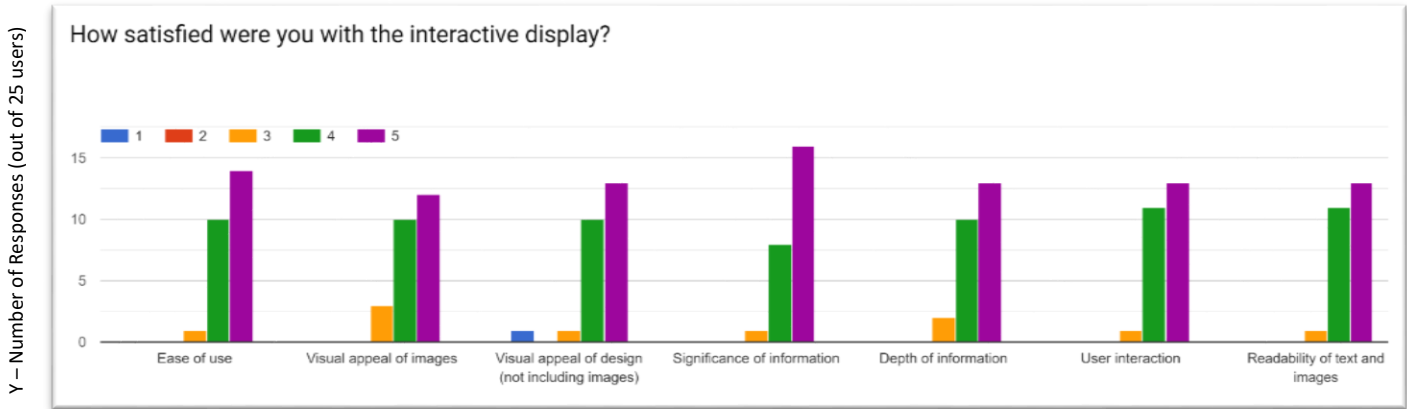
**2. How satisfied were you with the interactive display? \***  
 1 = Very dissatisfied 5 = Very satisfied  
 Mark only one oval per row.

	1	2	3	4	5
Ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual appeal of images	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual appeal of design (not including images)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Significance of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depth of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Readability of text and images	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 8 - Evaluation Survey Question #2 inquiring about satisfaction of individual components

The second question of the survey inquired about each user's satisfaction with various characteristics and attributes of the interactive display, as shown in Figure 8. On a five-point scale, the *ease of use*, *visual appeal of images*, *visual appeal of design (not including images)*, *significance of information*, *depth of information*, *user interaction*, and *readability of text and images* were all scored individually. I show the data I gathered for Question #2 in Figure 9. For each of the seven aspects measured, users marked *very satisfied* more than any other option. No more than six users reported that they were *moderately satisfied* with any of the individual attributes. There was only one reported instance, shown in blue in Figure 9, in which a user

reported that they were *unsatisfied*. This particular instance regarded the visual appeal of design. All other response data shows overall satisfaction of the interactive display.



X – Individual Attributes Organized by Level of Satisfaction in Color

Figure 9 - User satisfaction of individual attributes in the interactive display

3. How relevant did you think the information was in the interactive display? \*

Mark only one oval.

1    2    3    4    5

Not very                        Very much

Figure 10 - Evaluation Survey Question #3 inquiring about relevance of information in the interactive display

The third and fourth questions in the assessment inquired about the relevance of the content and information presented in the interactive display. I gauged this feedback through a collective inquiry in Question #3 and an individualized inquiry in Question #4. I show Question #3 in Figure 10. These questions evaluate the ability of the interactive display to cater to the visitor audience at Solar Decathlon Africa. As shown by Figure 11, of the 25 users in this evaluation, 14 reported that the information in the interactive display is *very relevant* and 8 selected that the information is *relevant*. In contrast, only 3 of the 25 users reported that the information is *somewhat relevant*.

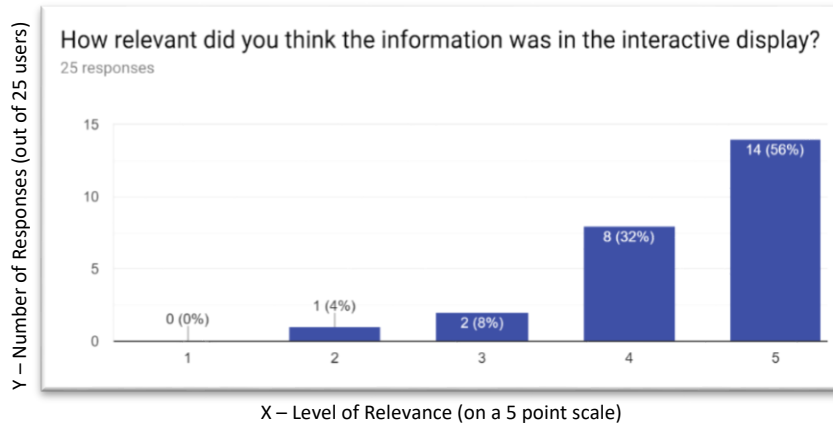


Figure 11 – Survey responses of the relevance of the information in the interactive display

4. Which topics did you find most relevant to understanding the Team OCULUS house design? \*

Mark only one oval per row.

	Not relevant	Somewhat relevant	Relevant	Very relevant
About Team OCULUS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Architecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Foundation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Envelope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HVAC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet of Things (IoT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 12 - Evaluation Survey Question #4 inquiring about relevance of individual topics in the interactive display

In Question #4 of the evaluation survey, users scored each topic on its relevance to the OCULUS design. I show Question #4 in Figure 12. On a four-point scale, I asked users to select how relevant they felt each of nine topics were to their understanding of the OCULUS design. The nine topics are as follows: *About Team Oculus*, *Architecture*, *Materials*, *Structure*, *Foundation*, *Envelope*, *HVAC*, *Water System*, and *Internet of Things*. I measured each of these topics with four options: *not relevant*, *somewhat relevant*, *relevant*, and *very relevant*. As presented in Figure 13, this question has more mixed responses than in previous parts of the evaluation survey. Users reported that 8 of the 9 topics has content *very relevant* to the OCULUS design. For only a single topic, *HVAC*, did users select *relevant* over *very relevant*. In addition, for only one topic, *About Team OCULUS*, did users report an instance when they felt the content was not relevant. In the cases where I analyzed the negative responses in the evaluation data, I learned about the effectiveness of individual aspects of the interactive display. This reflection on the design of the interactive display and its content is both introspective and reassuring.

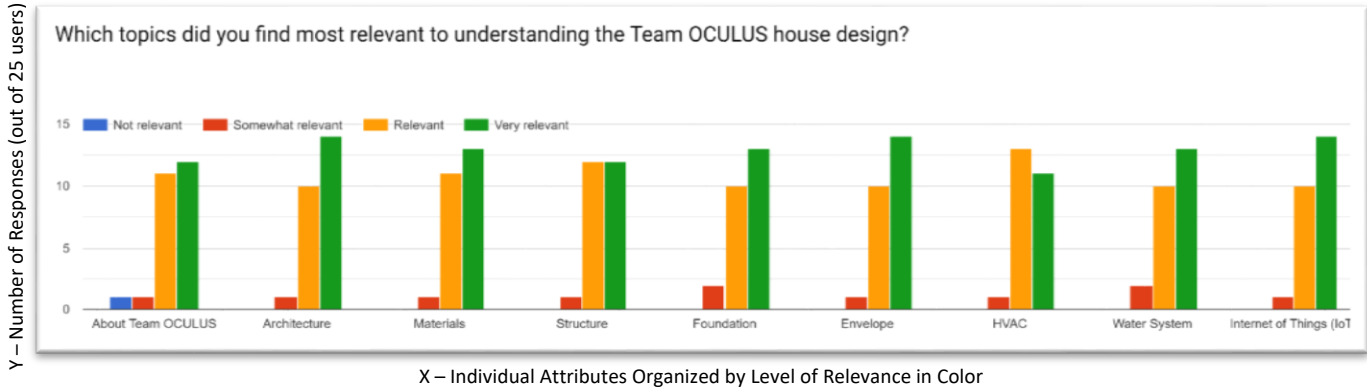


Figure 13 – Survey Responses Measuring Relevance of Individual Topics in the Interactive Display

#### 4.1.2 Analyzing Qualitative Feedback of the Interactive Display

The qualitative feedback I collected in the evaluation survey resembles the support shown by the quantitative feedback. In the first free response question, Question #5, I ask users about their favorite part of the interactive display. The anonymous responses to Question #5 are shown in Figure 14. Of all three qualitative inquiries, this one has the most responses by far with 14 of the 25 evaluators. In general, the evaluators seem to think the user interface is professional, easy to use, and fluid in its presentation of content.

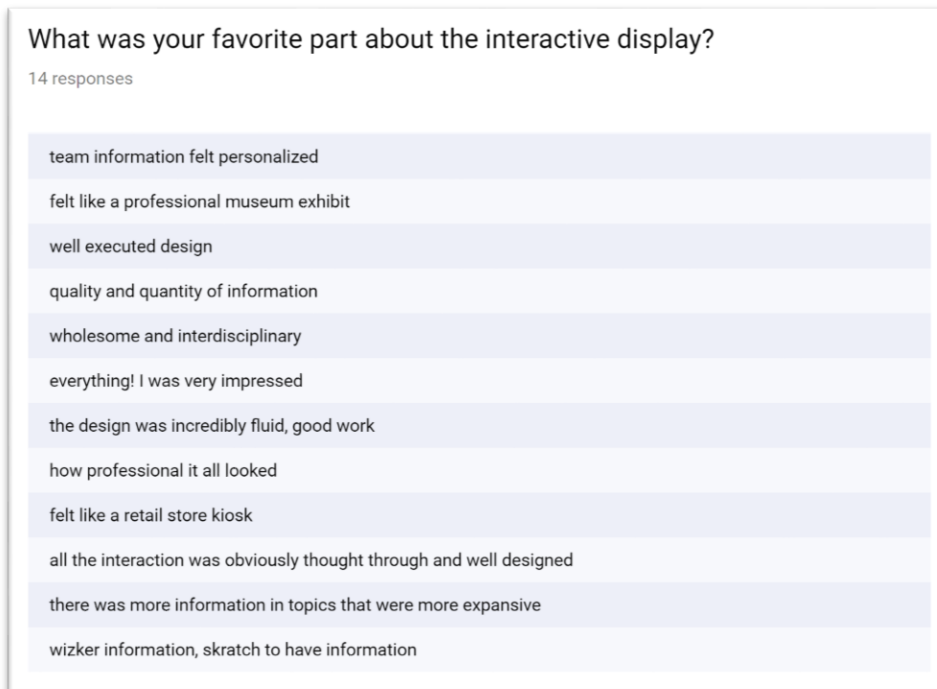


Figure 14 – Responses to Question #5 asking users about their favorite part of the interactive display

In the second qualitative question, I ask evaluators about their least favorite part of the interactive display. The responses to Question #6 are depicted by Figure 15. This question is essential to understanding the shortcomings of the quality of the visitor experience. The responses are mostly positive, although a few are unspecific and are not constructive in understanding the perspective of the users. In summary, a few points for improvement included unprofessional design, excess use of images, and content that was uninteresting. While I will consider these comments future improvements in the interactive display, the magnitude of the positive quantitative feedback and the answers to the preceding question outweigh some of the negative feedback in these responses. Yet, I recognize these shortcomings and I will use them to improve the interactive display in future iterations.



Figure 15 – Responses to Question #6 asking users about their least favorite part of the interactive display

In the final qualitative question, I ask users to provide any other feedback about their experience using the interactive display. I show the anonymous responses to Question #7 in Figure 16. Due to the nature of this question, I can expect to receive mixed suggestions about improving the interactive display. As expected, the responses to this inquiry had little correlation with each other. Some users mentioned that the interactive display resembled something they would likely see in a museum exhibit. This is a supportive notion for the interactive display’s professional design as I had contemplated this in the design process. Hence, these responses are quite encouraging for the quality of this Interactive Qualifying Project.



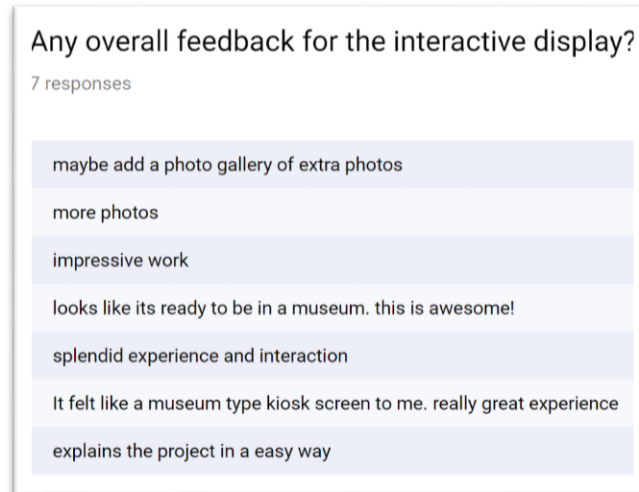


Figure 16 - Responses to Question #7 asking evaluators for overall feedback on the interactive display

## 4.2 Discussing Improvements to the Interactive Display

In order to determine particular revisions for the interactive display, I met with Kenza El-Korchi, an architectural student from the Architectural School in Rabat and an OCULUS team member. Kenza has been a key leader for the OCULUS house design. Through our meeting, it was clear that Kenza has a strong understanding for visual appeal in graphics and design given her background in architecture design. In this meeting, Kenza made insightful recommendations about additional content and features that I could add to enhance the interactive display experience. Likewise, she advocated for slightly less intensity of neon colors to draw more focus to images instead of the graphics. We discussed the use of contrast to highlight points of interest within the graphics and established more similarity among scenes in the display. She liked the use of the scratch feature in the *Structure* scene and requested that I implement the feature in a few other instances. I modified each university's image in the *Team OCULUS* scene to implement the scratch feature. Kenza also mentioned that including a scene for the OCULUS webpage would help promote visitors to view the site. Since this meeting, I have made all these changes to the graphics of the interactive display.

This meeting was instrumental in understanding the feedback on content through one of Team OCULUS's key engineers. Kenza had proposed changes in the content regarding the innovation component of Solar Decathlon Africa. In the rubric based scoring system, judges will award points categorically based on the fulfillment of each of the ten areas of the competition.

To support the innovation component of Team OCULUS, the team implemented a house design to support the ecotourism industry in rural areas of Africa. The design meets the needs of ecotourism because the house is suitable for both Moroccan and Nigerian communities through its diversity, consideration of the natural environment, and by advancing their socioeconomic status. In the preliminary iteration that Kenza tested, there was no mention of ecotourism in the interactive display. I revised the *Architecture* overview scene to include text that explains the implementation of ecotourism in the OCULUS design. In retrospect, meeting with Kenza was very helpful to this Interactive Qualifying Project.

## 5 Conclusions & Recommendations

In this Interactive Qualifying Project, the goal was to provide an effective communication medium to convey information about the OCULUS design to visitors at Solar Decathlon Africa 2019. In order to make informed decisions about determining the communication strategy, I researched the demographic of expected visitors to cater the communication strategy to the appropriate audience. I explored various ways I could present the OCULUS design content before agreeing with Professor El-Korchi on the interactive display. Despite having no experience with developing interactive media or the IntuiFace software, I sought out design guidelines used by professionals in this industry. As mentioned in the Methodology, I developed the interactive display with respect to these guidelines to produce the prototype. To understand the effectiveness and appeal of the interactive display, I created an anonymous survey evaluation to collect user data from 25 random evaluators. To conclude the goals of this Interactive Qualifying Project, I revised the interactive display based on recommendations made by the evaluation survey data.

I designed the interactive display for a specific competition, Solar Decathlon Africa 2019. For this reason, the interactive display does not have any particular long-term implications. However, the implications and successes of this interactive display can be adapted to suit future communication strategies. Based on the tremendous support demonstrated by the evaluation survey data, I recommend this interactive display as a suitable and effective communication medium by which Team OCULUS can communicate the house design to visitors. Members of Team OCULUS can modify the interactive display content as the date for Solar Decathlon Africa approaches. For this reason, all content and features in the interactive display are flexible to change. This implies the continuity of this project beyond the limitations of this Interactive Qualifying Project. I am excited and proud to recommend this solution for the Team OCULUS visitor communication strategy and I hope Team OCULUS implements it for the competition in September 2019. If implemented for Solar Decathlon Africa, the feedback from visitors will help shape the improvements for the next Solar Decathlon in which WPI participates. Hence, the interdisciplinary nature of this interactive display makes it a powerful but practical solution for the visitor communication strategy. Based on the feedback from the evaluation survey, I recommend this interactive display as a communication medium for the OCULUS design at Solar Decathlon Africa 2019.

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## Image References

The sources of images used in the interactive display are provided below. By the Creative Commons license, I modified some of these images, as necessary.

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## Appendix A – Interactive Display Scene Screenshots

The following are full screen captures of the starting nine main scenes in the interactive display.

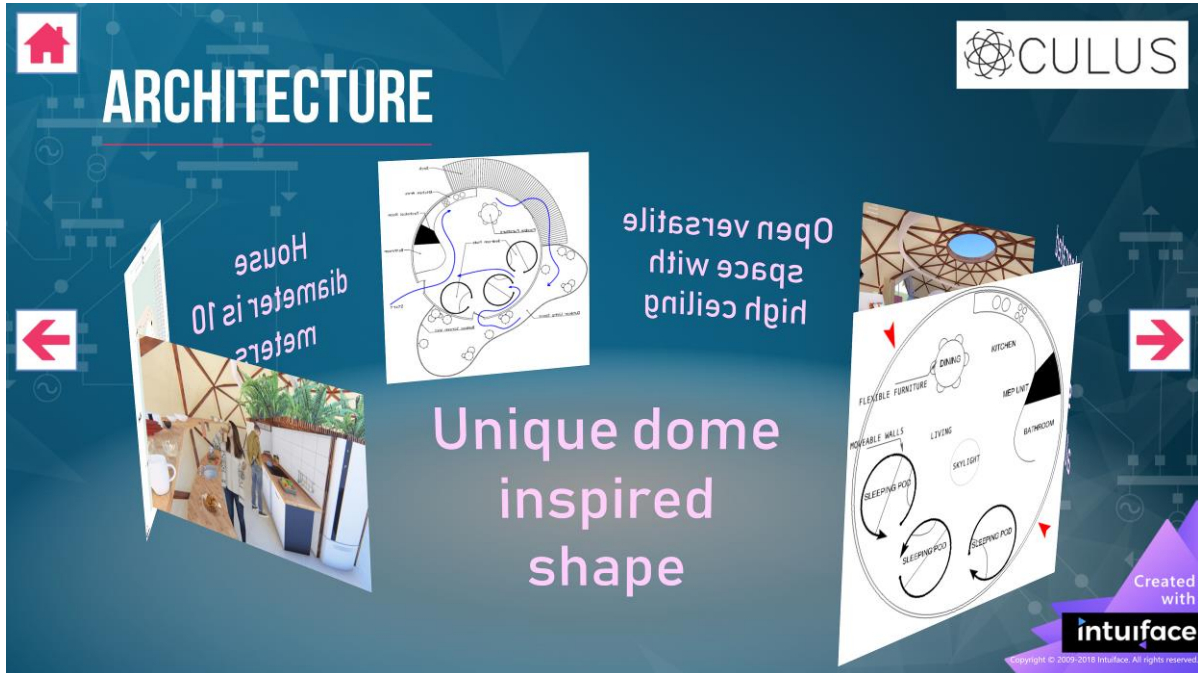


Figure 17 - Architecture scene shows computer model renderings of the OCLUS design and floor plan diagrams

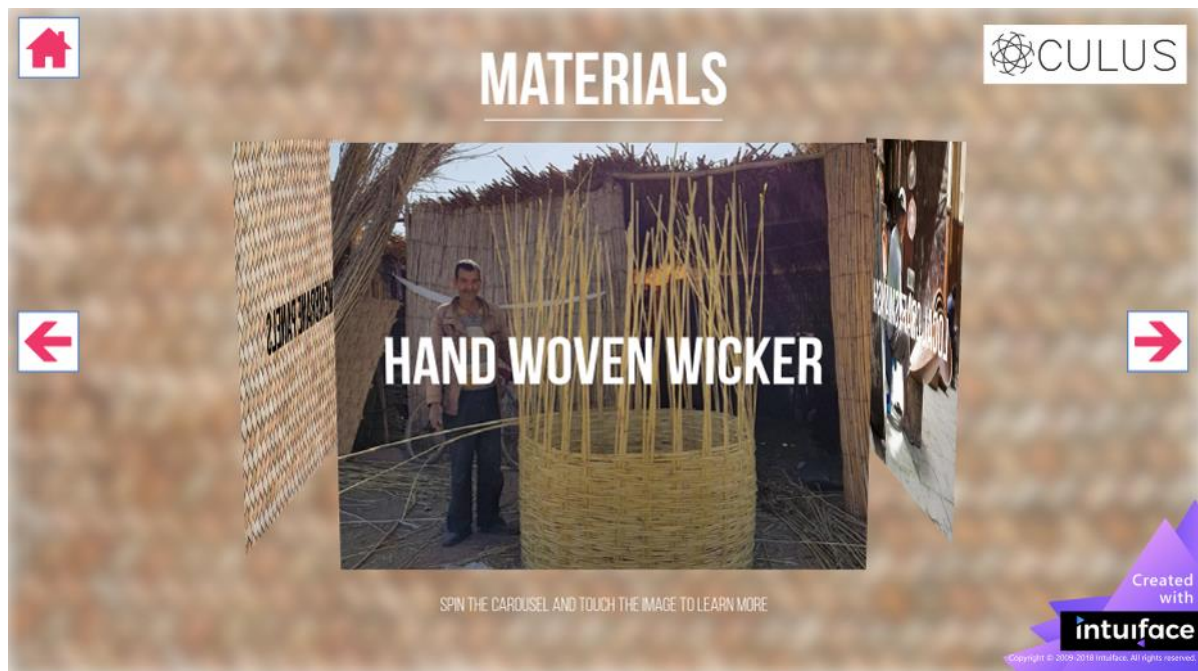


Figure 18 - Materials scene provides a carousel menu for each of the individual Materials scenes

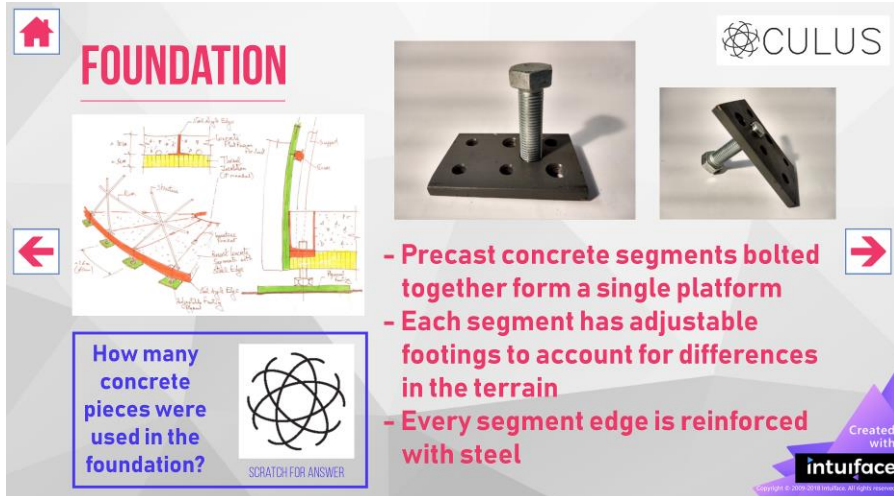


Figure 19 - Foundation scene presents the concrete segment design and an interactive "Scratch" feature

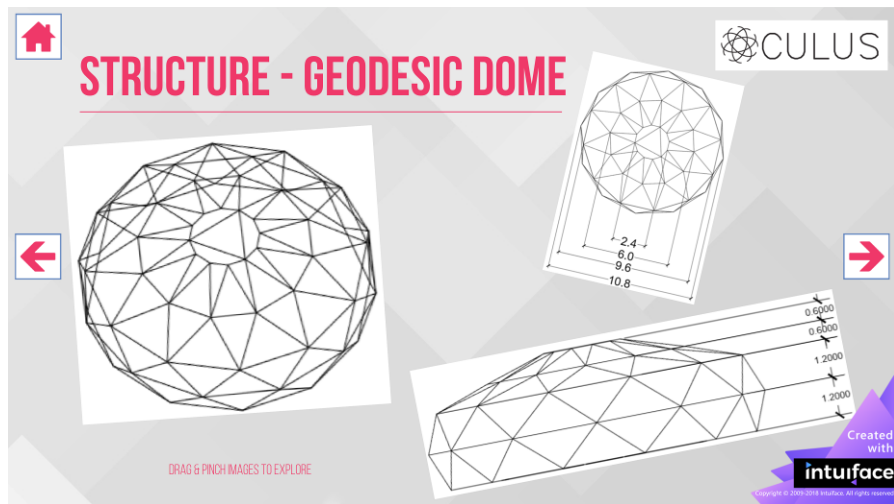


Figure 20 - Structure scene presents computer drawings of the Geodesic design and text behind each of the movable images

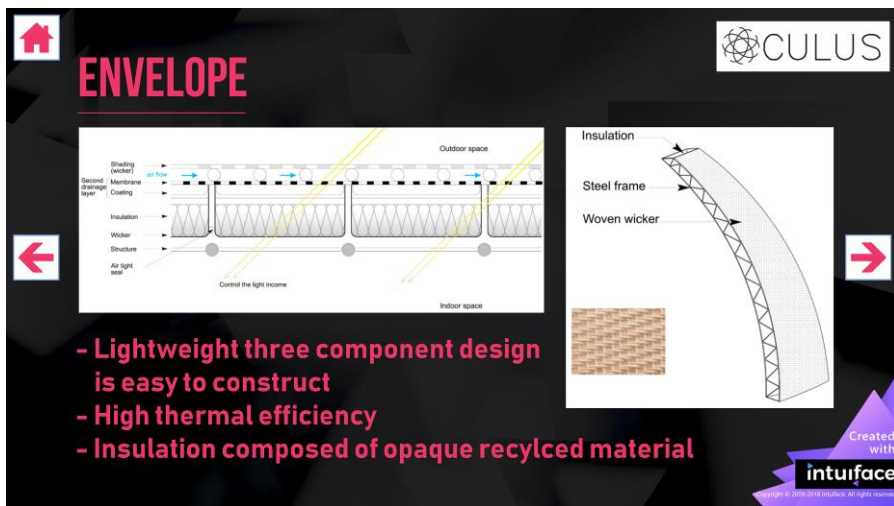


Figure 21 - Envelope scene displays the inner envelope structure with diagrams of the insulation



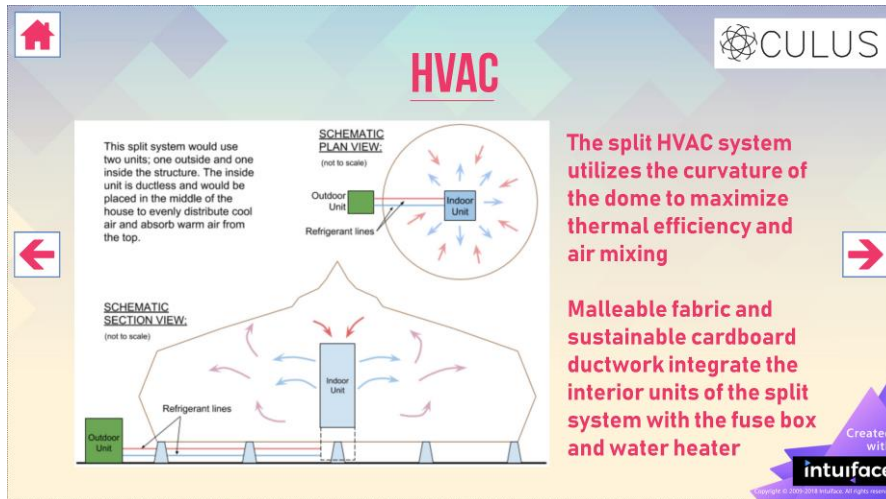


Figure 22 - HVAC scene explains the air mixing within the OculUS home and how the ductwork affects temperature

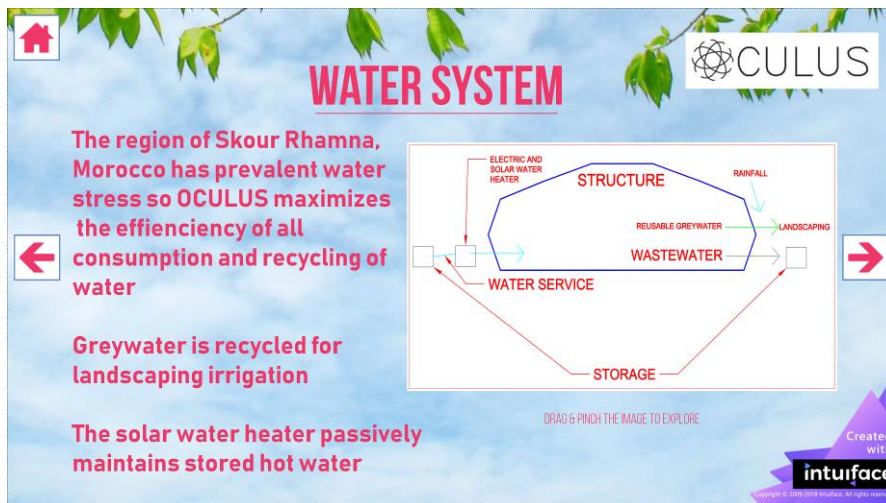


Figure 23 - Water System scene shows how the system recycles waste water and stores hot water

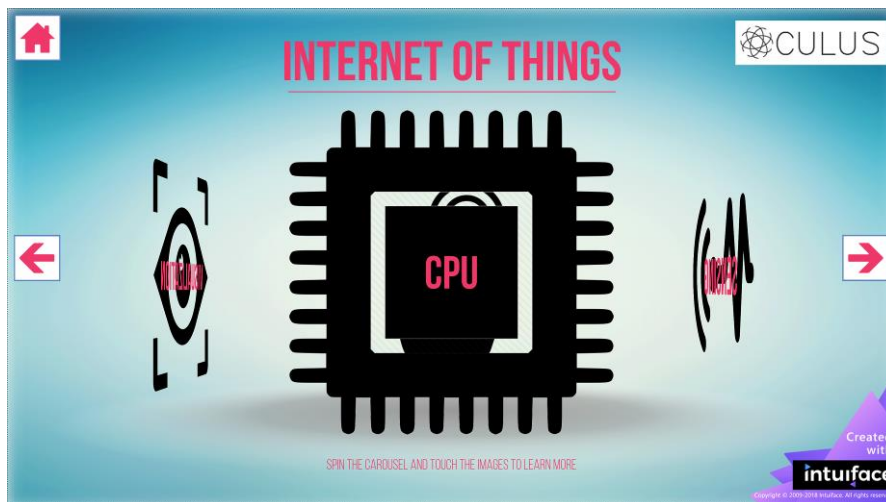


Figure 24 - Internet of Things scene serves as a carousel menu for the individual components of the electronics

- A demonstrational video of the interactive display is available [here](#).

# Appendix B – Evaluation Survey

## IQP Interactive Display Evaluation

Thank you for using the Team OCULUS Interactive Display for Solar Decathlon Africa!

Please submit anonymous feedback regarding your experience after using the Team OCULUS Interactive Display.

\* Required

1. How satisfied were you with the overall experience using the interactive display? \*

Mark only one oval.

	1	2	3	4	5	
Not very	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very much

2. How satisfied were you with the interactive display? \*

1 = Very dissatisfied 5 = Very satisfied

Mark only one oval per row.

	1	2	3	4	5
Ease of use	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual appeal of images	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Visual appeal of design (not including images)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Significance of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depth of information	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
User interaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Readability of text and images	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

3. How relevant did you think the information was in the interactive display? \*

Mark only one oval.

	1	2	3	4	5	
Not very	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very much

**4. Which topics did you find most relevant to understanding the Team OCULUS house design? \***

*Mark only one oval per row.*

	Not relevant	Somewhat relevant	Relevant	Very relevant
About Team OCULUS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Architecture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Structure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Foundation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Envelope	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
HVAC	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water System	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet of Things (IoT)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**5. What was your favorite part about the interactive display?**

\_\_\_\_\_

**6. What was your least favorite part about the interactive display?**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**7. Was there any additional information that you feel should have been included?**

\_\_\_\_\_

**8. If you could change something about the interactive display, what would it be? Why?**

\_\_\_\_\_

**9. Any overall feedback for the interactive display?**

\_\_\_\_\_