



**KIT208 - Virtual and Mixed Reality
Technology**

Design of Interface Application

Group 04

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AR Wood Heater Previewer

Introduction

Working in wood heater installation often presents the challenge of visualising what a wood heater will look like in a location without the physical heater in place. Using an AR application to visualise the heater solves this problem and could save up to four hours on each installation.

Description of the Application

When planning an installation and providing a quote, it is often difficult for customers to visualise how the wood heater will look in a specific location. After placing the heater, customers may want it moved slightly to the left or right, or the heater might be positioned too close to the wall for safety. This could lead to costly modifications, such as removing a beam in the ceiling, which can cost over \$100 in labour, much to the customer's surprise.

The application is an AR program that uses a 2D image as a target to display a 3D model of a wood heater. This program will allow both customers and workers to edit the wood heater model, change its colours, and adjust the flue, significantly shortening the physical design process.

Additionally, the program will track the model's distance from the wall and mark key measurement points. If the wood heater is too close to the wall, it cannot be safely installed without the tracking software. Marking measurements manually can be time-consuming, and AR can streamline the process by eliminating the need for manual measuring.

By using an Augmented Reality (AR) application, this problem can be resolved early in the installation process. With the AR application, customers and workers alike will be able to preview a 3D model of the heater in real-time in the actual space it will be installed. This solution not only enhances the planning and design process but could also save up to four hours per installation. The result is a more streamlined and efficient experience for both the installer and the client, reducing the likelihood of costly last-minute changes and ensuring customer satisfaction.

Description of the Interface Solution

The application harnesses the power of a mobile phone's camera to display AR technology, making it an accessible and cost-effective tool for installers and customers alike. This approach eliminates the need for costly resources like rendered images that are often commissioned by high-end clients and designers. These custom model photos are costly and time-consuming, with prices that make them inaccessible to the average customer who needs immediate results.

With this AR application, the goal is to replicate the quality and detail of those expensive designer images but without the financial burden and within a time constraint. Displaying a wood heater in AR reduces the need for physical representation and manual measurements, which are traditionally done using measuring tape and pencils. Although these methods are effective, they are slow and cannot provide the same immersive and accurate experience that AR offers.

By incorporating a simple, user-friendly interface, the application makes the design and installation process more intuitive. Users can quickly swap between different heater models, adjust the size and positioning, and change the design of the flue—all with just a few taps on their phone screen. For those who want to match the heater to their room's aesthetic, the application also allows for colour customization, enabling a near-instant visual representation of different designs, saving time, labour, and ensuring client satisfaction.

Interaction Design

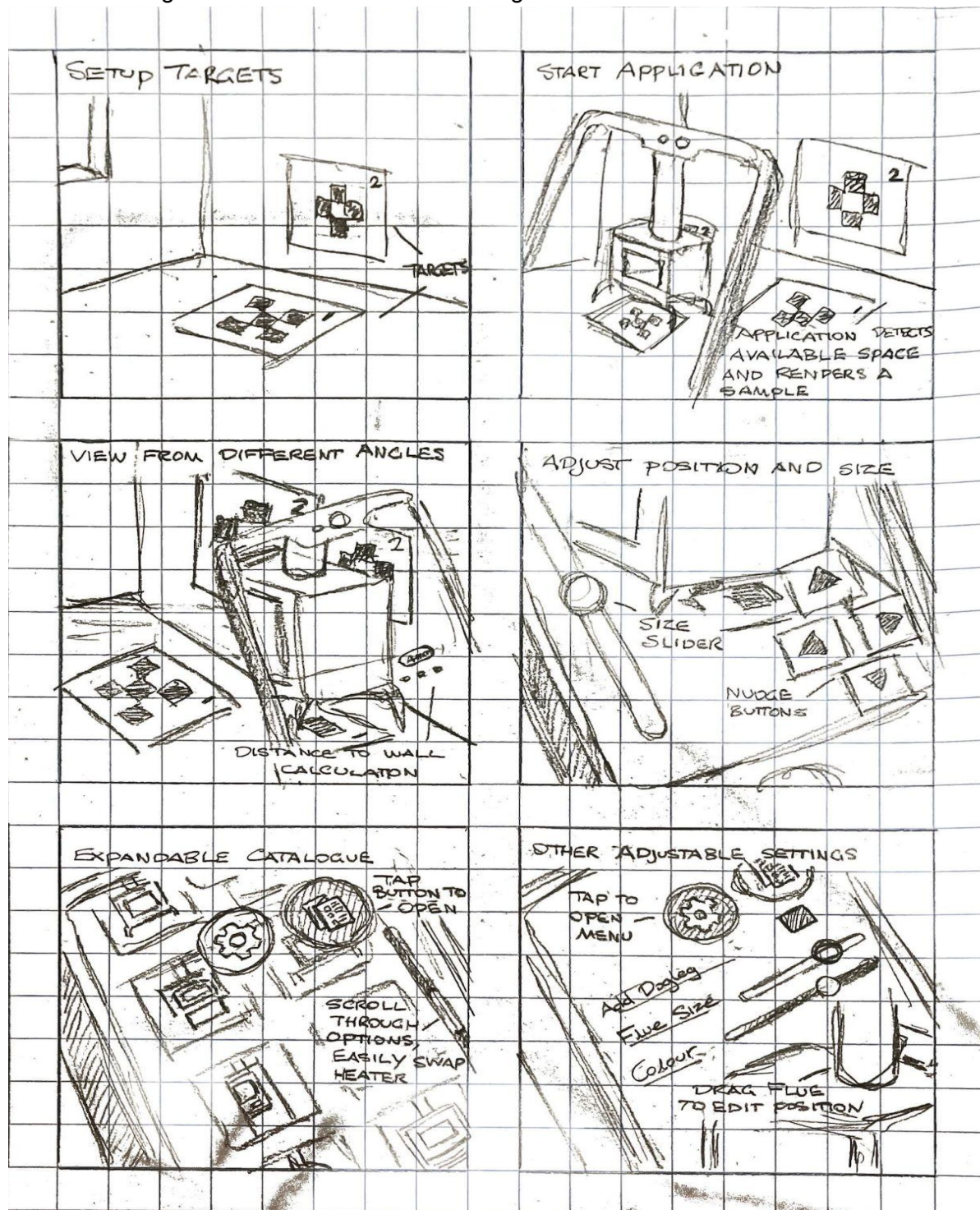
For both customers and labourers, a key aspect of the application would be the ability to view and change the virtual heater in the space before installation. Interactions that allow for quick editing of position, detail, flue shape, colour, etc would be essential to achieve this goal.

The natural interaction of being able to move around the room and view the heater from different angles is most useful for the customer but is also useful for the labourers to check how well the heater fits in the space. To this end, a simple slider or “nudge button” could allow a user to move the heater in a direction a small amount without needing to move the target image.

Changing the heater model displayed would also be necessary, and the process should be straightforward so that the user can easily swap between and find the best option for them. An easily accessible button that opens a catalogue of available heaters, as well as options to narrow the selection through manual or automatic detection of the available space and

constraints. If there is a flue, the shape and size could be changed, as well as the ability to add features such as a dogleg when necessary.

For the customer, it would help if the application provided options to customise the appearance of the heater. Details could be added or removed from the heater model, or the colour of various elements changed in the interest of interior design.



Technical Development Planning

As with the other projects in this unit, this application will be developed in the Unity game engine, specifically version 6000.0.0.5f1. The major package this project is built upon will be Vuforia's provided AR Packages. After importing the package, several key systems must be implemented to achieve the intended application functionality:

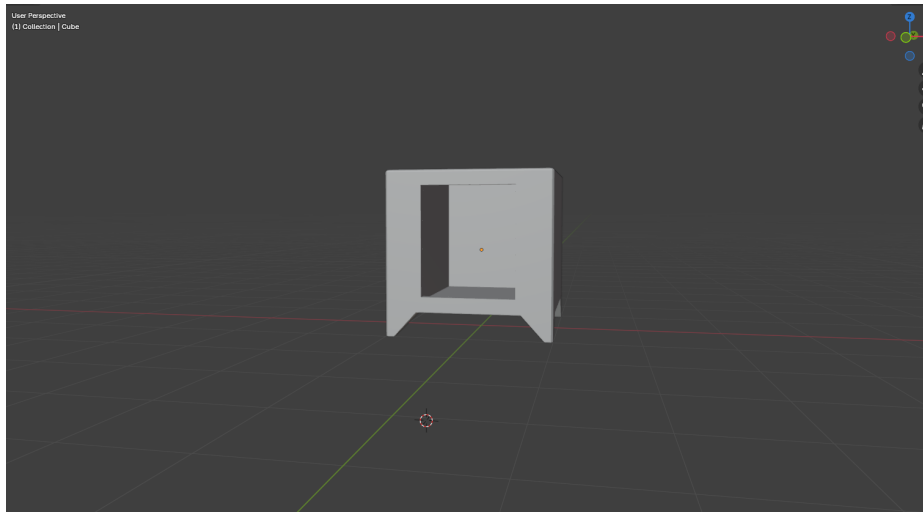
- a) The Vuforia AR system creates a virtual object, and anchors it to one or more marking(s) in the real world. This builds the foundation for our application
- b) A system to choose between several models of wood heaters at any point.
- c) A system to offset the position of the heater from the marking for finer adjustments. This will require an interactive UI for an ideal implementation.
- d) A system to create a path for the flue of the heater (within certain parameters). The user will be able to create a path for the flue, and the application will generate the best fit.
- e) A system to record information about electrical outlets, wiring, etc. In the event that features must be cut for the sake of cutting down scope, e) and f) will likely be the features cut.
- f) A system to save this layout for future reference or modification. Again, may be cut if the need arises.

Outside of creating the main functionality, making an intuitive user experience is crucial. An important element of this is ensuring that user input on a mobile device is correctly handled and parsed. Additionally, the user interface must be easy to learn and simple to navigate, to minimise user frustration.

Lastly, while not a necessary function of the application, the ability to save a wood heater layout would be massively beneficial and will prevent the need to perform all the finer actions and modifications from previous configurations.

Initial 3D Models

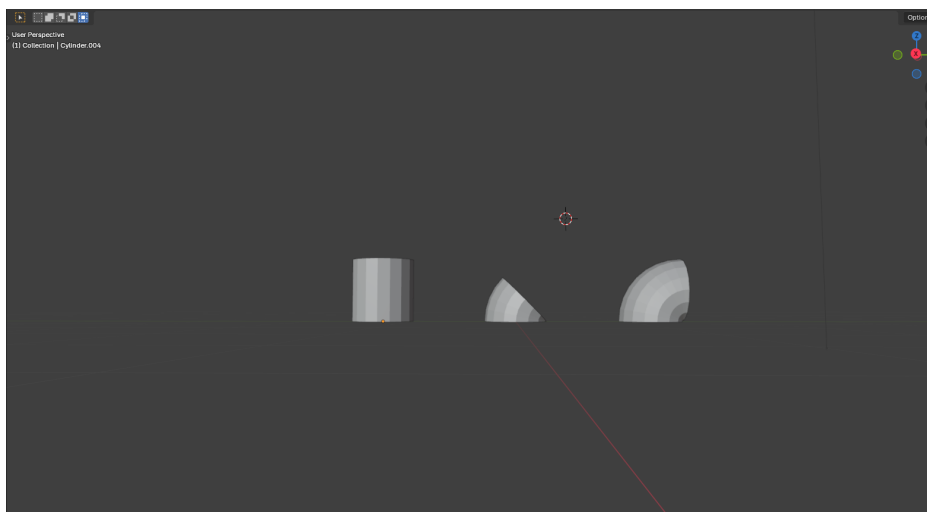
The application will have several wood heaters to choose from. Depicted below is an in-progress screenshot depicting a custom-made cuboid wood heater model for this project. It



will be one of the options available to users, and serve as the default model for testing.

(Early screenshot of the basic wood heater model)

The other model being worked on for this application is a modular series of models for the flue. These models will use Unity's hierarchy system to place them accurately in relation to each other.



(Early screenshot of the wood heater flue models)

Conclusion

Using a variety of wood heater models the application would be able to give a visualisation of what a particular heater would look like before installation. Alongside the visualisation, the application would be able to provide measurements and a variety of customizable elements such as colour, style, or even specific elements like the flue pipe.

References

No external resources were used in the design of this application.