# Virtual try-on system of curtain in consideration of the light-shielding performance

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This research proposes an application that can simulate drape curtains in virtual space.

Because curtain fabrics with various functions have been developed, we can coordinate our favorite curtains. Accordingly, there are many curtain specialty stores in each area. However, we cannot visually confirm situations that we put curtain on our house at the stores front and curtain online stores. Some curtain stores provide a service that allows you to try on desired curtain in the actual room. In the service, you can buy curtains after checking harmony with the room and darkness in the room. However, as we have to prepare the actual environment, we need a lot of time to purchase. The stores also need to prepare according to the window to try on, which is troublesome and costly. In addition, the weather is an important factor in confirming the light shielding property. However, there are problems that we cannot confirm the situation at sunny weather in bad weather. Therefore, it is not easy to try on the curtains with the current service.

In this research, the author proposes a system which expresses transmitted light of curtain, room darkness and indoor color tone according to the light shielding performance of the curtain in the virtual space customized by the users.

We explain the flow of the system. First, a user inputs indoor information using a computer. The information to enter is the color of the dimensions of the room and the window, the position of the window, the surface of each room (ceiling, floor, wall). Next, a room model is constructed on the virtual space based on the inputted room information. After constructing the room model, the user selects a desired curtain and hangs the curtain on the indoor opening in the virtual space. Ultimately, rendering is performed by computing the transmitted light of the curtain and the darkness and color of the entire room from the light blocking rate and color of the curtain hung in the virtual space.

In order to prove the validity of the rendering of this method, a comparison experiment

between the virtual environment and the actual environment was conducted. In the verification, we confirmed how closely they approximated when curtains were hanged on "real environment" and "virtual environment". Curtains with high light shielding resulted in low similarity, but curtains with low light shielding properties proved to be able to simulate approximate darkness and color.

As is also found in the verification, the curtain with high light shielding resulted in low similarity, so it is necessary to improve the calculation formula. Also, since it is not evaluated as an application, it is necessary to make an impression evaluation. Also, this method does not consider the shape of the curtain model when lighting in rendering. Therefore, it cannot cope with the change of the transmission expression due to the change of curtain fold. Therefore, it is necessary to show a calculation formula that considers the shape of the curtain model. In this research, we try on simulation in the virtual space customized by the user, but furniture is placed in the actual environment, and walls are decorated in some cases. In order to cope with that point, it is necessary to enhance the quality as a fitting system by enhancing customizability. As a future prospect, we are simulating now with external light in virtual space fixed, but we plan to make external light variable to aim for simulation in various time zones. Further, since the direction of entering external light varies depending on the direction of the room and the weather, it is under consideration that it is possible to input such information at the time of user input. Moreover, we think that not only appreciation on the screen, but also a feeling of immersion can be raised by viewing with a head mounted display, and the state of the room can be grasped in further detail.