

A Web Application for an Interior-Design Simulator using Augmented Reality

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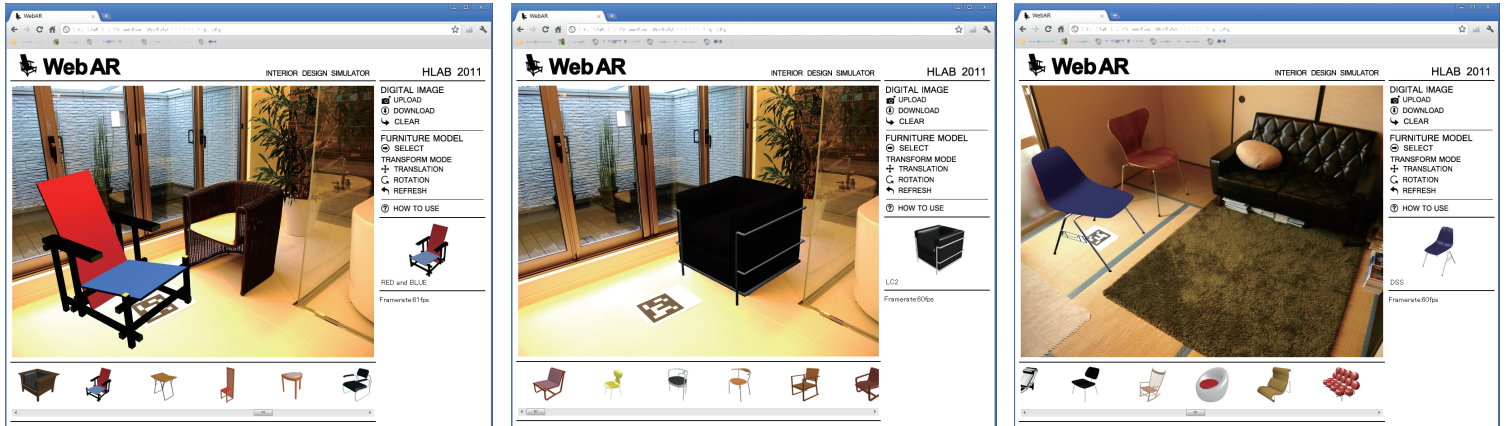
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We describe an interior-design simulator implemented as an Augmented Reality (AR) web application. The system is freely available over the internet and open for use by anonymous users.

The purpose of this research is to evaluate the effectiveness of the AR system in the architectural field; therefore in the near future we plan to interview users.

KEYWORDS: Augmented Reality, Interior Design Simulator, WebApplication.

The open experiment information is available via our website at the following URL: <http://hlab.ta.chiba-u.jp/>



1 INTRODUCTION

It is difficult to evaluate the practicality of AR systems where various factors complicate the evaluation. The gap, jitter and occlusion of overlapping 3D graphical representations on a back-plate image are typical factors. Completeness of a virtual 3D model, reproducibility of light environments, and video frame rates can also be factors. Which of these factors is important depends on the particular evaluator. After considering practicalities in evaluating AR systems, we noticed that third-person evaluations offer reasonable solutions. We developed the AR system as a web application and made it available to a large number of anonymous evaluators. Interviews have as yet to be performed but will be attempted soon.

2 SYSTEM ARCHITECTURE AND IMPLEMENTATION

The system is composed of client and server programs written in PHP and C/C++ languages. Dynamic HTML programs reside on the server; the client loads and executes the HTML including Java Scripts if necessary. The maker-tracking program in C/C++ resides also on the server and calculates the camera and model space parameters of a digital image when uploaded to the server.

2.1 Marker Tracking

The maker-tracking program employs ARToolkitPlus. If tracking is successful, the output data is stored in the PostgreSQL database. The server retrieves the data from the database when requested by a client.

2.2 Superimposing

The client superimposes a 3D model of the item of furniture on the digital image recovered from the server's database. The HTML file includes WebGL descriptions controlled by JavaScript code running in a web browser.

2.3 Furniture Model

We adopted Blender as our 3D modeler to create representations of furniture items because the exporter of an x3d file is provided by default. The parser that we developed in C/C++ reads the x3d file and outputs modeling data of geometry and appearance as a JavaScript code.



3 OPEN EXPERIMENT OF A PROTOTYPE

Prior to launching the application on internet, we conducted research interviews to 60 subjects who came to our laboratory's open day. After their operating the application, we asked the following questionnaire to them. The summary of the questionnaire is shown in the pie charts.

We considered about the result of each question.

a-1,2 The subjects who know the words "AR" were less than the half of them, but it seemed that most of them were interested in AR by experiencing this application.

a-3,4 To these questions, we added the following question: "Could you concretely point out the reason why you felt sense of incongruity?". Some persons pointed out the occlusion inconsistency in the arrangement of a virtual furniture and real ones, however, the more ones mentioned the reproducibility of light environments and 3d model texture.

b-1,2 The GUI design of the prototype was friendly evaluated.

b-3 The 2/3 subjects evaluated the operability was easy. A few hoped the more intuitive operation.

b-4 Not less than 90% subjects gave good evaluation ("Yes" or "I would rather say yes") to our application.

b-5 It turned out that such service enhances customers' purchase incentives.

b-6 Almost all subjects acknowledged the availability of AR, and hoped to use applications employing AR.

