X3DOM 을 이용한 라이브 행동자와 실체를 통합하기 위한 웹 기반 시스템

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A Web-based System for Embedding a Live Actor and Entity using X3DOM

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Abstract

Mixed and augmented reality (MAR) refers to a spatially coordinated combination of media/information components that represent on the real world and its objects, and on the other those that are virtual, synthetic and computer generated including any combination of aural, visual and touch. The extensible 3D (X3D) is the ISO standard for defining 3D interactive web-based 3D content integrated with multimedia. In this paper, we propose a model to integrate live actor and entity that captured from Microsoft Kinect to be represented in Web-based mixed augmented reality world by using X3DOM by which X3D nodes can be integrated seamlessly into HTML5 DOM content.

Keywords: Mixed and augmented reality, live actor and entity, X3DOM.

1. Introduction

Representation model defines representing and rendering for live actor and entity (LAE) in a mixed and augmented reality world and interaction interfaces between the live actor/entity and objects in a mixed and augmented reality (MAR) world [1-3]. Also, representation model defines a set of principles, concepts, and functionalities for live actor and entity applicable to the complete range of current and future mixed augmented reality standards.

Different from various experiments, this paper defines a representation model for LAE to be included in a web-based MAR. The 3D world has been created by X3D [6-7] nodes and is integrated into HTML5 by using X3DOM [4-5] which is a Java script library to rendering a X3D file.

2. Related Work

The system for implementing a MAR world with live actor and entity includes several components necessary for processing the representation and interactions of live actor and entity to be integrated into a 3D virtual world. There are sensor modules, recognizer/tracker, spatial mapper, event mapper, renderer/simulator, display/UI (user interface) and MAR scene [2-4].

3. The proposed Web - based system for LAE

The computational viewpoint in Figure 1 describes the overall of a web-based MAR system. It describes major processing components, defines roles and describes how it interconnects.

Kinect is a Microsoft' s motion sensor device that is provided a natural user interface by using gestures [8]. It used to detect, recognize and track the target physical objects to be augmented. The outputs of Kinect are camera information (e.g. field of view, position, orientation...), RGB video, and depth image. Processing server is the important part of web-based MAR system. NodeJS [9] webserver retrieves the Kinect stream and processes removing background by filtering module. Tracker is able to detect and measure changes of the properties of the target signal and parse the instantaneous value of LAEs to Spatial mapper. Spatial mapper is to provide spatial relationship information (position, orientate on, scale and unit) between the LAEs and MAR scene by applying the necessary

transformation for the calibration. Then LAEs will be embedded to the virtual space and displayed on client side.

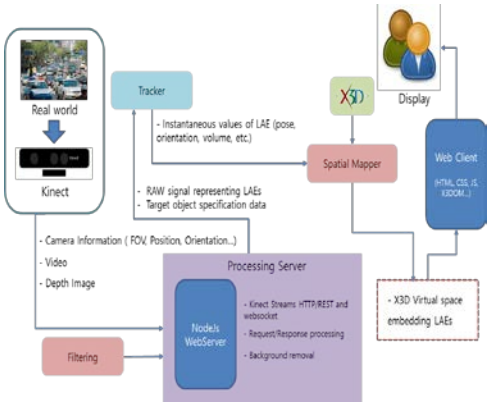

Figure 1: Overall configuration of web-based MAR.

4. Implementation Results

In order to implement the live actor and entity to be included in MAR world, we configure Kinect Web server by using Node.js. Node.js modules are written in JavaScript to make easy for implementing in client side. One of the most important Node.js modules is Kinect2. Kinect2.js [8] is a part of a Node.js library to access the Kinect 2 data from the official Microsoft SDK on windows. Electron is an open source framework developed by Github for creating native applications with web technologies like JavaScript, HTML, and CSS. It allows for the development of desktop GUI application using Node.js framework and Chromium, originally used for the development of backend web application for running our system as shown in Figure 2.

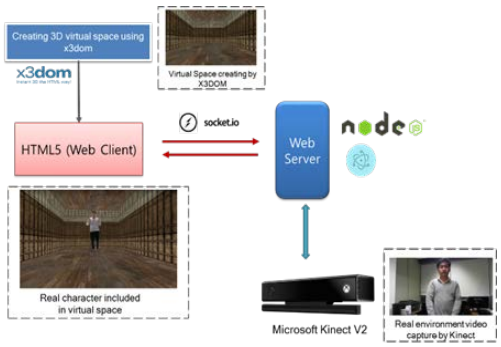

Figure 2: Kinect web server configuration.

The Kinect web server runs on the local computer and is used both to supply the Kinect sensor streams and to serve simple web content. When Kinect streams response to web-client by using web-socket, client-side can retrieve Kinect stream video to be extracted live actor from background. After integrated live actor and entity into canvas context of X3DOM, we can map the real actor in MAR world as shown in Figure 3.

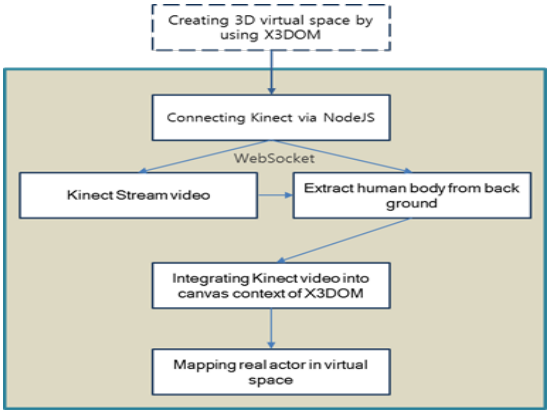

Figure 3: Processing flow of embedding real actor in MAR.

As the result, live actor and entity has been embedded into MAR world such as Figure 4 shows a live actor and entity walk around a room. The background removal image is inserted through performing texture mapping on a box of X3DOM.

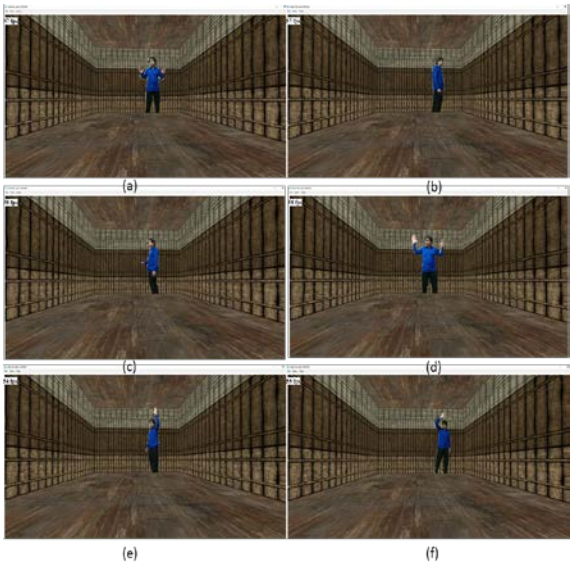

Figure 4: Live actor and entity moving and representation in web-based MAR system

5. Conclusion Remarks

In this paper, we specified and implemented a web-based mixed augmented reality for representing live actor and entity by using X3DOM. This study is really interesting and important for future innovation. Future study, we will improve our systems for more convenience such as adding live actor interaction with 3D objects, moving the navigation

of live actor and implementing new nodes for representing the live actor and entity. The new nodes will define object models for live actors and entities, define motion volume of LAE in both real world and virtual world, spatial mapper, event scene and event mapper.

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