

CITIES 2015 International Conference, Intelligent Planning Towards Smart Cities, CITIES 2015,  
3-4 November 2015, Surabaya, Indonesia

## 3D interactive simulation system (3DISS) using multimedia application authoring platform for landscape planning support system

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### Abstract

Recently, 3D simulation technology has been used as a communication tool in public meetings to facilitate public participation in planning and design development review. The development of 3D visualization that performs an interactive simulation in the Virtual Environment (VE) has grown rapidly and practiced for landscape visualization. VE technology is aimed to create a VE of urban landscape and presenting various alternatives of the landscape changes. The simulation of landscape changes is intended to perform a decision-making system in public participation. A multimedia application authoring platform has an advantage in the design of the graphical user interfaces and supported by a scripting language that can interact with external files. Through the integrated development of an interactive visualization and user interface, this application can be utilized to develop a Landscape Planning Support System. Eventually, the system is expected to attract public interest and elicit more contributions and input into urban planning.

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Peer-review under responsibility of the organizing committee of CITIES 2015

**Keywords:** 3D Computer Simulation; User Interface; Decision-making System; Urban Landscape

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## 1. Introduction

Indonesia is one of the developing countries that desperately requires expert help and better techniques to create and design a city plan more effectively and appropriately. The urban landscape has grown rapidly and uncontrollably, especially in developing cities such as Malang. The rapid population growth and technological advances have led to a significant change in the urban landscape. The government must be responsive to anticipate urban growth through proper urban planning. Further, the community requires delivery of design ideas through the process of public participation via a medium that is easily understood by the community (Laing, 2011). Public participation activities should be conducted in the initial stages of the planning process and urban design. The earlier and more intensively the people are involved in an urban planning project, the more likely the project will succeed (Wu et al., 2010). Hence, governments require proper advice and an effective response from the society against any efforts of city spatial planning.

The government appoints architects and urban planners to accommodate the creation of urban spatial spaces that can ensure an experience that is comfortable and satisfying for the community. Because the evaluation of the urban image is related to the people and environment (Nasar, 1998), it is important to include public participation in the urban planning process in order to evaluate and ensure the achievement of a valuable aesthetic experience.

### 1.1. 3D computer simulation

According to Porteous (1996) as cited in Jackson (1959:11), the aesthetic experience is very important for making cityscape. Architects and urban planners must be able to accommodate the creation of urban spatial that is able to ensuring the creation the experience a comfortable and satisfying for the community. Because of the evaluation of urban image is related with people and environment (Nasar, 1998), it is important to conduct a public participation in the process of urban planning in order to evaluate and ensure the achievement of a good aesthetic experience. In the public participation for urban planning, public requires the delivery of design idea through a medium that is easily understood by them (Laing, 2011).

The advantages of 3D computer simulation for evaluating a variety of visualization tools for public participation are interactivity, cost affordability, ability to represent complex contextual data, scale flexibility, capability to analyse potential designs, and ease of annotating the planning process (Al-Kodmany,2001). 3D simulation has been used as a communication tool in public meetings to facilitate public participation in planning and design development review. Through 3D computer simulations allows the public to see the differences in proposed design styles and development patterns and allows decision-makers to evaluate the potential impacts of proposed developments.

Since many high efforts are done by many designers to produce 3D modelling, this shift of perspective faces a new problem. Firstly, if the designer uses a very detailed geometry that correspond to the use a lot of polygon, then the 3D model data will be so very large and heavy. Secondly, if the designer uses a minimum polygon in order to reduce the amount of data, then the 3D modelling result would be far from the real impression. Considering about the approaching reality of making 3D simulation using a graphical software, Leavitt (1999) as cited in Kim, stated that the amount of geometrical details does not necessarily reflect how much reality the model can actually offer; in fact, rapid and inexpensive modelling techniques such as texture mapping and panoramic capturing prove to be successful with the generic audience.

### 1.2. 3D interactive simulation

Further, the development of Virtual Environment in planning support systems requires a user interaction to perform observation and navigation. Through this activity, the user is expected to be able to freely explore spatial as well as spatial assessment. Therefore, it is necessary to initiate developing a 3D interactive simulation system for urban planning that can be distributed via the web.

With respect to the development of interactive 3D simulation, there are many studies that use Virtual Reality (VR). Honjo and Lim (2001) studied the visualization of landscape in a garden and introduced an interactive simulation for various design scenarios. Koba and Kishimoto (2009) examined desirable building forms and façades in Marunochi. Further, several researchers have developed VR systems and user (web) interfaces for building consensus. Kawakami and Shen (2006) assisted consensus in public participation by developing a decision support system for district

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