

ARMY WAR GAME SIMULATION (AWAS) SYSTEM

Utilising architectural knowledge in virtual environments

MOHAMED ESHAQ AHMAD RAFI AND J. MOHD FAZIDIN
Multimedia University
Malaysia

Abstract. This research briefly examines the importance of collaborative design in developing a multi-user, multi-tiered, networked and real-time information base system. Aspects such as navigation, interaction, communication, movements (objects or virtual camera), control, level of details, spatial design and virtual spaces will be explained to show their importance in the development of virtual world. This paper will further explore the aspects of collaborative design in the context of Army War Game Simulation System (AWAS). A generic collaborative design-based framework will be demonstrated to simulate the overall operations of a war in command-control structure of the force.

It is suggested that design precedents for collaborative design using architectural and urban design approach will aid to a better war game simulation system. Similarities of using VE in Decision Support System (DSS) for architectural and urban design, with the AWAS will be explored and enhanced.

1. Introduction

This research aims to develop an integrated computerised war game real-time simulation system that will integrate all components of the simulation design to support operation, training, evaluation and research for the Malaysian Army. Existing battle field information particularly 'doctrine' tactics and techniques will be used and developed via technology convergence such as collaborative environment, real-time 3D simulation, integrated database, game design and the Internet. In this context, the architectural and urban design simulation approach in VE knowledge is very much useful and applicable to the interface design and content manipulation of AWAS.

2. Research Problem

In the early 80's the Defence Advanced Research Projects Agency (DARPA) began the development of the first realistic virtual battlefield in order to train tank teams in joint exercises (Siong, T.C., 1998). This continues with SIMNET by the Germans and Americans (McDonough, 1993). It is developed primarily to reduce in training costs and at the same time increased safety and reduced environmental impact. However, this prototype is extremely expensive and yet does not represent 'tropical' environment and application for the army simulation gaming. In fact, current application of war exercises by the Malaysian Army restricts interactivity, participation and exploration of war gaming, thus limiting communication, decision-making and planning. Participation of users, teams and authorities becomes a problem in the sense that a great amount of information is shared by more than the desired number of people. The restriction becomes paramount with the advent of VEs where navigation, spatial design, movement and build elements need to be interacted and manipulated upon. The sense of depth and height in a battlefield terrain and the understanding of scale, position and reference to the surrounding give architects and urban planners the edge in interfacing with AWAS. The task here is to design AWAS so that the elements of architectural and urban design is present and is engaging to the users of AWAS.

3. The Framework of Architectural and Urban Design in AWAS

The main impact of architectural and urban design in AWAS is in **Interface Design**, dealing mainly with layering, dimensioning and navigation, besides scaling, referencing and positioning whereby realism and gaming experience are enhanced.

3.1 INTERFACE DESIGN

Interface design is a term used in AWAS for building specific type of GUI for specific purposes. All the graphics and non-graphics layout including information representation, status display, database output and user interaction is within the scope of interface design. This is crucial for AWAS to seamlessly make simulation easier and more efficient in its operation (Figure 1).

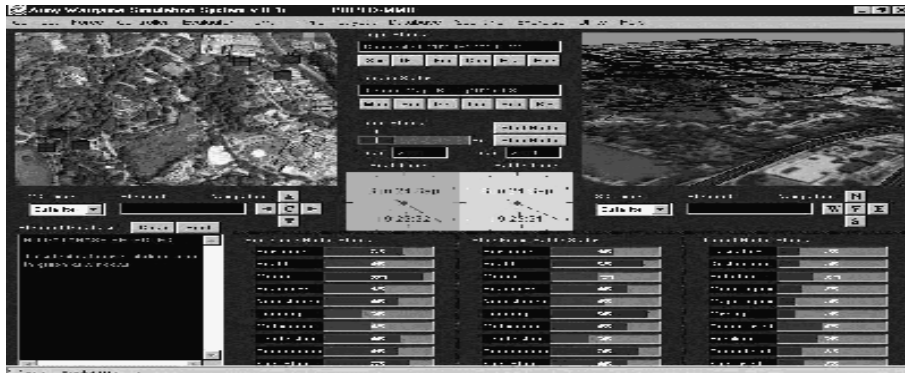


Figure 1. GUI interface of AWAS

3.1.1 Layering

In true architectural representation, layering in interface design refers to multiple levels of information that exist one on top of the other just like an architectural drawing of HVAC superimposed on a building plan. In AWAS, this principle is carried forward in 2D graphics where roads, land types, army units, topography and buildings are layered on top of the other and can be viewed and manipulated independently. This method is also used in information representation where the display area in AWAS has such characteristics.

3.1.2 Dimensioning

The use of dimensioning in architecture and urban design is to represent 'true' size in a much smaller medium such as drawing a plan on A2 paper to represent a building. In AWAS, a town or a district has to be represented in true size on the monitor screen. Dimensioning helps by constantly updating and tabulating distances and zoom ratio of a displayed area. This helps users of AWAS to naturally understand and experience the battlefield non-surrealistically.

3.1.3 Navigation

Another use of interface design using architectural elements is the axis. As with urban planners, an architect's axis is 2D in plan (XY) and 3D in elevation (Z). In a 2D and 3D terrain, besides axis, the latitude and longitude information also helps to anchor the users of AWAS to the digital ground. This helps them to manoeuvre along XY axis and elevation will be set to the height of the terrain.

4. Conclusion

As army war simulation design becomes more complex and dynamic a new level of interactivity, navigation control, database system, interface design and dimensioning is required in an integrated computerised form to support operation, training, evaluation and research for the Malaysian Army. The success (or failure) of this simulation will mostly depend on the large numbers of participant. Future research should consider high bandwidth to cater effective communication in a collaborative environment. Although we have a long way to go before we attain a truly integrated real-time simulation environment, we feel confident that architectural values have promised to taking army war game simulation system design to its next stage of evolution.

References

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