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The 15th Summer Workshop on Multimodal Interfaces

DEVELOPING A SCENARIO-BASED VIDEO GAME GENERATION FRAMEWORK FOR VIRTUAL REALITY AND MIXED REALITY ENVIRONMENTS

1. Introduction

Video games are widely used software which mainly aim to entertain their users with interaction mechanisms, scenarios and game objects [1]. Serious games [2] are video games which have other purposes rather than only environment —i.e. education, training, rehabilitation and emergency planning [3]. In serious games, developed environments act as testbeds and give the opportunity to test different possibilities, interaction mechanisms and highly complex role assignments. Even though there are lots of serious games and detailed research in the literature [4-8], a generic framework where complex role assignments and interaction mechanisms are easily adapted to game scenarios and player interactions, are still missing.

The main aim of this project is to build a pipeline that will convert a summary of scenarios and text-based descriptions to pre-defined game rules. These game rules will define the player's tasks, roles and provide the basis for the game mechanics. Such a generic rule-based system will enable the game developers to create training programs and/or planning-oriented games in a compact and easy way.

The proposed gaming framework and use-case scenarios will be adapted to both mixed reality (MR) [9] and virtual reality (VR) [10] environments. The players will interact with the scenarios in both environments, achieve their goals, interact with other users and receive feedback regarding the success of their outcomes. This will enable us to build a detailed training environment where training scenarios can easily be modified and played in three different settings: on computers, using VR headsets and MR headsets.

Finally, the performance and usability outcomes of the proposed system will be tested on volunteers. Besides collecting game-related parameters such as interaction time and score; standard questionnaires on usability [11] and technology acceptance model [12] will also be applied to users.

2. Tentative Work Packages

WP1 – Scenario and Task Definitions:

A detailed scenario where different roles and entities communicate with each other will be created using workflow and state diagrams. The theme of the scenario, active players, location and interaction mechanisms will be defined in detail.

WP2 – Game Design and Development:

Defined scenarios and interaction mechanisms will be mapped to game ideas, linear game stories and interaction mechanisms. Interaction mechanisms will be converted into concrete tasks and user roles. A generic system, built on top of the initial scenario definitions, will be conceptualized and implemented. Then, the generated system will be fine-tuned with goals, feedback measurements and score adaptations.

WP3 – Adapting the Framework to Virtual and Mixed Realities:

Framework will be tested on Mixed Reality environment using Microsoft Hololens and on Virtual Reality environment using HTC Vive. Bugs, performance problems, camera models and gesture adaptations will be tested and they will be fixed for each environment.

WP4 – Usability Testing:

The developed framework will rigorously be tested by the users and their feedback will be collected with usability tests (i.e. System Usability Scale) and technology acceptance model (TAM) questionnaires.

3. Team

a. Involved Researchers

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Dr. Mustafa Erkayaoğlu, Asst. Prof., <https://blog.metu.edu.tr/emustafa/>
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b. Scenario Advisor

Prof. Hafize Şebnem Düzgün, <https://mining.mines.edu/project/duzgun-h-sebnem/>
Mining Engineering, Colorado School of Mines

c. Prospective Researchers/Students

Participants with the following expertise and/or interest are welcome:

- Game Development
- Virtual Reality/Mixed Reality Applications
- Unity3D
- Usability Testing
- Technology Acceptance Modeling
- Game Testing
- Game Mechanics
- Storytelling Engines

References

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