

Immersive Training and Simulation via Gamification

Use of 3D virtual environments have been explored and utilized to impart training and simulation in High Risk environments, such as, Oil and Gas. However, such training is conducted in isolation or is modularized with limited interactions and simulation. Such training does not actually mimic real life as it does not add to the Emotional Quotient (EQ) and team building skills of the trainee. Real life work environments involve complex operations and interactions with people working in diverse roles and function.

Application of game design and gaming patterns to training enables trainees to participate in such massive online role playing environments through the use of 3D virtual worlds. Gamification of training enables the development of immersive training environments and helps prepare trainees for real life situations.

About the Author

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Introduction

Worldwide shortage of qualified and trained workers, changing demographics of workers, cost of onboarding and training workers on new systems and equipment, increased costs of equipment, prevention of operation delay and reduction of non productive time are strong reasons for adopting training methods supported by computer aided simulation. Operational and Safety training is being imparted via simulation of operational environments in virtual reality. Currently, training simulation for Heavy Industries, such as, Oil and Gas and Manufacturing is provided by using Training Rigs, Desktop and Web based Training applications.

Today it has become easier to use the safety and comfort of 3D environments to impart training for operations in high risk zones due to advances in 3D rendering engines. Realistic textures, sounds and advance physics modeling have added realism to training environments.

However industrial training and simulation have been limited to single user-single perspective scenarios where the apprentice/trainee operates on his/her own in the virtual environment. A trainee in modern simulation training is limited to operating the equipment in complete isolation or is required to follow a set of pre-programmed scenarios and interactions with virtual characters.

The problems with such training mechanisms are as follows:

- The trainee operates in isolation understanding his/her function in the overall operational environment.
- There is no element of randomness that is inherent in real life, multi-user environments and the training currently imparted cannot prepare the candidate for this complexity.
- Current forms of training build excellence in specific activities but cannot build co-operative behavior and team skills.
- Module based activity training even in virtual environments can only simulate specific conditions developed for the module hence external variables cannot be fathomed for preventive training.

This paper explores the value of augmenting the current learning and training mechanism with more immersive and adaptive gaming patterns. Technology and publishing environments available will complete solo-module based learning with MMORPG style environments to encourage team based training and learning.

Current training simulation environments do not leverage the powerful mechanisms of Massively Multiplayer Online Role Playing Games (MMORPG) style gameplay. Games, such as, "World of Warcraft" and "America's Army" engage the users to solve problems and complete challenges co-operatively. Such games tap into the collective wisdom of its users to create new scenarios and engage in new activities. Immersive learning occurs in environments where knowledge is shared amongst the players in near real time. Powerful tangential learning techniques keep users engaged to constantly improve upon failure and learn from previous experiences. Additional features, such as, badges, challenges and leaderboards also keep users engaged. Similarly real life situations and scenarios can be replicated mimicked using modern day game development environments.

Concept Online MMORPG Virtual Rig

Using powerful gaming engines, such as, Unity 3D and Shiva 3D we can build a virtual rig. Such engines allow developers to publish the clients to be consumed via the desktop or on smartphones. Game engines also provide many features that allow creation of real life environments with networking features built in allowing the development of such MMORPG games.

Industrial operations today require synergistic collaboration of technical experts operating complex machinery, performing engineering tasks and taking quick decisions at many junctures.

Let us consider the example of an offshore rig in an Oil & Gas company. Diverse teams operate in the limited space on the rig to drill and extract oil. While a drilling crew is installing drill bits, a pipe crew is creating the pipe assembly and an engineering team is operating the various machinery involved. During installation of an offshore facility a crane crew is moving and installing machinery whilst another team is building the facility. Thus each member performs actions in near real time and their actions impact the operations of the rig in its entirety.

Specialized training modules can be complemented by co-operative learning mechanisms with other trainees.

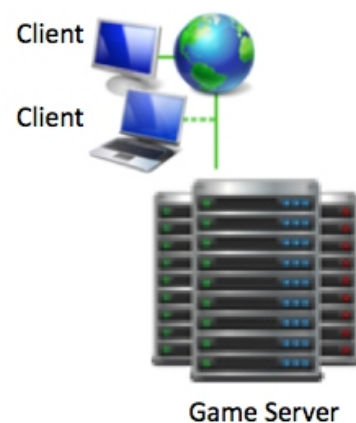
Thus, in this new concept environment a crane crew can train alongside a drill crew and/or an engineering crew thus creating a massively online simulated virtual rig with different crews operating training simultaneously.

The following figure represents the simplest architecture of a MMORPG game that is required to create the virtual rig.

The environment can be hosted in-house or on the cloud leveraging the technical capabilities available for such deployments. The game server monitors the location of the users, the interactions and the processing logic for actions within the environment.

A work scenario can be “gamified” with several layers of learning and complexity. If you operate oil rigs, for instance, both a learning module as well as a freeplay mode can be built. A user moves from module training to the virtual game environment. With added skill points or karma points the complexity of the task increases and the trainee learns through immersion into the game.

Training Module: This module can be a preparatory training module. The trainee goes through this mandatory training module for operating a crane. The trainee learns how to operate the crane after “playing” this module. This prepares the trainee for basic operation in the simulated environment. Only after successful completion of the module, the trainee allowed to move into the game environment.



Environment Tasks: Once the trainee successfully “plays” the training module, they log onto the virtual rig environment. The Trainee joins a team on the rig and accepts tasks. The tasks are available according to the karma of the trainee. By completing both the assigned tasks and task available in the market the trainee gets more karma points and upgrades to a new level, say hypothetically to a Junior apprentice. Additional challenges can be posed to the user. Example of a challenge would be to move a box to a particular position under different environmental conditions, such as, rain, hurricane, earthquakes and so on. Thus by changing the environmental conditions the difficulty level of the challenge can be varied. A challenge can constitute moving a load of different dimensions to be placed in a busy environment. Thus this challenge’s points can also add to the karma of the user. Any accidents caused or errors in operating the crane causes the trainees to lose karma points thus ensuring that the user is aware of the importance of safety. This module can help the trainee get familiar with several scenarios which may be difficult to showcase as classroom learning or through passive simulation applications (where the trainee just listens and watches and maybe turns a few knobs)

Campaign Learning: The user can then participate in the virtual environments, such as, an oil rig. The trainee can participate in campaign scenarios, such as, accidents, evacuation, fire fighting, and operations under various environmental conditions as part of a group. Campaigns prepare the trainee to work in teams and achieve common objectives. The successful completion of a challenge awards all the players in the team with goal points.

Thus participants in the MMORPG style training environment can take up multi disciplinary roles and learn along with other trainees. The concept can be extended to go beyond training and continue to be used as a game for further learning and engagement.

Benefits

The creation of an in house online environment has the several benefits. Over and above training employees, the organization can use it to glean knowledge in many areas such as:

- Tracking and analyzing player behavior and leaders can reveal best team players and most valuable workers. The statistical data gathered can be used to model and predict events.
- Freeplay and campaign modes can reveal the success of training and/or evacuation plans and the nature of the users in the training.
- “Black Swan” events can be simulated in the isolated environment of the virtual world and scenario manuals can be created. The element of randomness in training can help trainees learn from the events in the game.
- Gamification leads to instant gratification, engages users and makes learning more immersive learning as training now becomes a team based activity. Awarding tangible or intangible benefits becomes simple as the leaderboards reflect the most meritorious users.
- Role playing games builds EQ and impart team building skills to the trainees so that they can function effectively in real life environments

Conclusion

Customized solutions that closely mimic a customer's work scenario can be built cost effectively by solution providers with comprehensive domain knowledge, and who have the relevant technological capability and are experienced in social gaming platforms.

Real work environments have become complex and there is a steep rise in equipment operation and maintenance. The human cost involved during mishaps and accidents can only be averted through extensive training and preparation. These are strong reasons for rapid growth in Industrial training and simulation using 3D virtual environment. Application of MMORPG style gameplay for real-world industrial training and simulation can lead to greater collaboration and team play and reduce the dreariness involved in solo-training. Such trainees and players are more equipped to function in complex environments and to work better as a team.

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