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Integrated combat & training simulator system

- “The Sphere”



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## System Purpose

The integrated software and hardware system “The Sphere” has been developed for the purpose of tactical and firearms training of armed and special forces as well as security forces in the mediums of virtual and augmented realities. A qualitative difference between our integrated complex and similar solutions is the possibility of spontaneous movement and interaction with synthesized reality due to using a locomotion interface of “The Sphere” and a high-precision system for positioning the user and the firearm inside the complex.

A realistic tactical situation is synthesized in the training simulator complex according to the original mission and actions of the user in training, while the other participants (the opponent) are controlled by the AI system or by the other users in similar training complexes via a network mode.

Likewise, the scenario or mission may be influenced by the training instructor with the option of co-participating or opposing the specialists in training who control their own characters. The simulator includes a wide range of firearms, bombs and grenades, mines and other weapons with life-like physical characteristics (bullet flight trajectory, grouping of shots, target zone, etc). The surrounding environment (arrangement of minefields, bombing zones, ambushes) that is changed by the commander using a flexible graphic and intuitive comprehensible toolset – point of training control (PTC) immerses the fighter into the atmosphere of a real battle to the maximum effect.

## Basic components of the system

Components include:

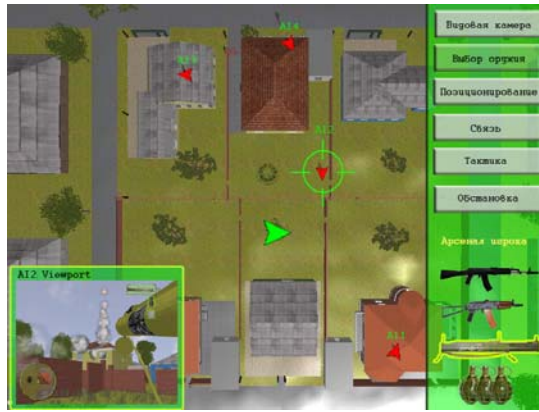


Server – HPC platform coordinating networking components and workstation of the training instructor who plays the commander role at the PTC

### 1.1. Main purpose and functional capabilities of PTC:

*Monitoring of tactical situation in the training zone:*

- a) Switching the display angle of the battlefield using various previously set up view monitoring cameras; survey the events via a dynamic tactical commander's terrain map (perhaps using a real three-dimensional terrain map built using the GeoMan™ toolset);



б) Situation visualization from the point of view of any combat unit\* chose on the map and participating in the training scenario;

## 1.2. Controller of the living force in the training system environment:

a) Communicating orders, corrective information, previously received intelligence information via a special console commander's remote in text mode or through a voice channel using a microphone to any combat unit\* chosen on the map;

b) Positioning any combat unit\* on the battlefield at a particular moment of training;

c) Adding AI characters on terrain at any moment of training and specifying a strategy of either cooperation or counteraction, depending on their affiliation with either the enemy or the allies. Setting the defense lines, the target set for destruction, arrangement of machine-gun unit slots, etc.

d) Assignment of the necessary arsenal of weapons, ammunition, combat gear and role performance characteristics for each combat unit;

f) Interception of control of any combat unit for cooperation or opposition, task performance by the specialists in training gives the commander the ability to be present in the most important combat position at the present moment of the development of the training scenario plot;

g) Controlling the reasonable behavior of the AI characters;

h) Controlling own character with visualization of "self" from your own view or visualization through view camera from third-party view.



### 1.3. Dynamic modification and correction of the surrounding battlefield on the training terrain:

- a) Dynamic mine field arrangement, correction of bombing zones and bombing frequency for a synthesis of real combat conditions within the training scenario.

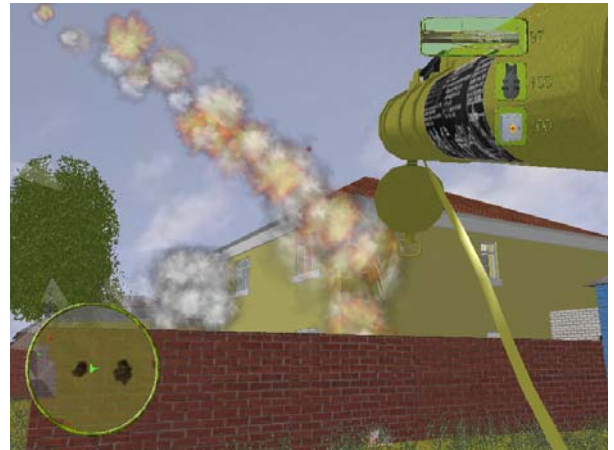


2. Training spot - workstation of the specialist in training can be implemented in two versions: either using standard control instruments (keyboard and mouse-like manipulator) or using more advanced devices for immersion into VR medium of the integrated complex, such as the virtual sphere (for recreating the conditions of realistic movement in the virtual world), stereoscopic glasses (for realistic visualization of the battlefield), real firearms sample prototypes with orientation tracking sensors (further listed as the training workstation – TWS). TWS can be delivered in two versions as based on the virtual sphere:

- a) Stationary computer that transfers data to the virtual sphere using WiFi/WiMax communication channels.
- b) Specialized discharge jacket with a notebook inside worn by the trained user and used directly inside the sphere also communicating wirelessly with a Server.

## Main functionality and technical capabilities of the TWS:

- a) Control of own character with first person visualization or third person visualization via the view camera (if TWS is implemented using the standard control instruments);
- b) Execution of combat tasks set by the commander PTC using the available firearms arsenal, ammunition and combat gear as defined by the commander and the PTC or captured during the training combat;
- c) Assisting or opposing the users executing the battle tasks by managing the combat units of either the enemy or the allies sides on the battlefield (if TWS is implemented using the standard control instruments).



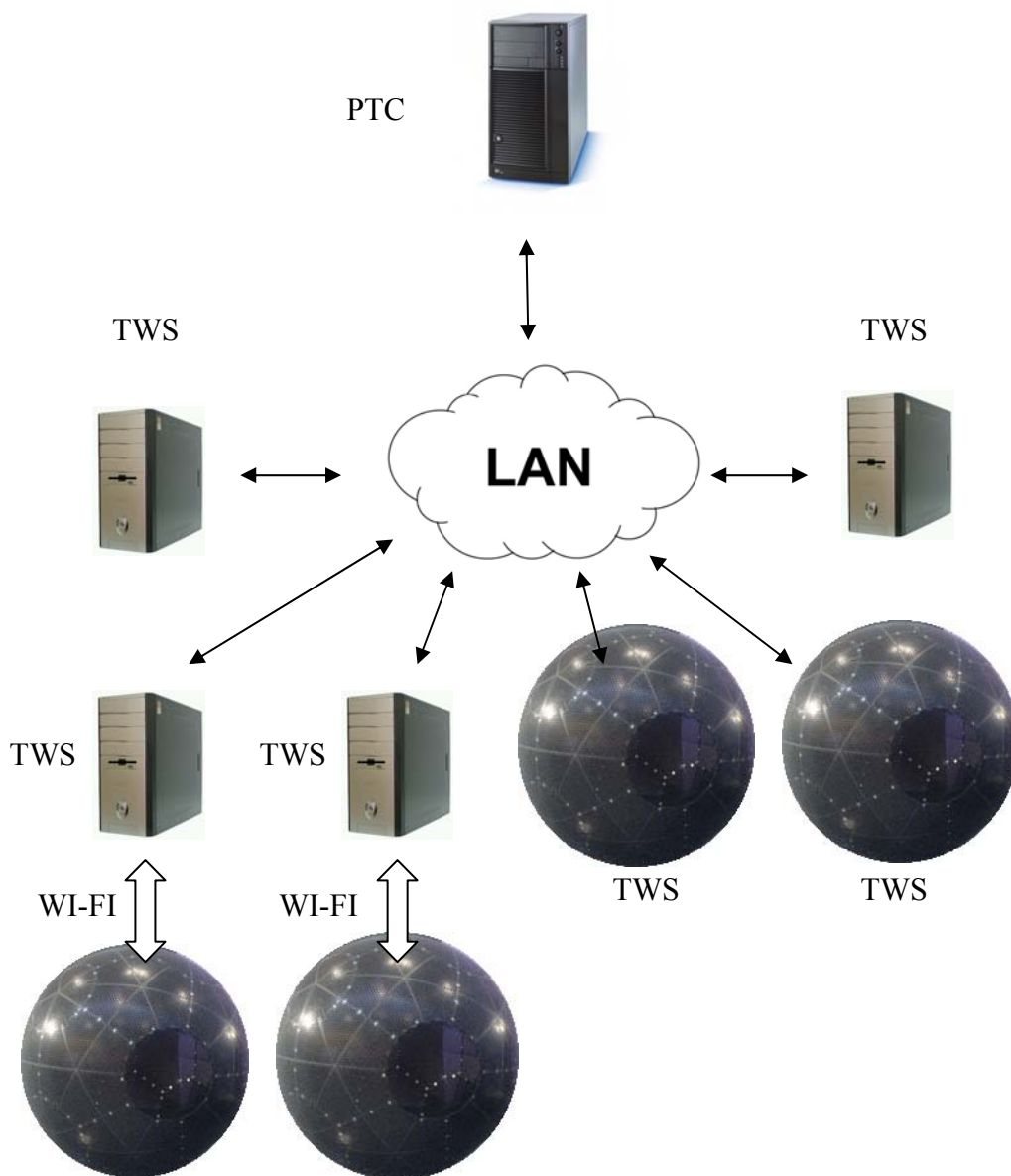
Integration scheme of software and hardware components into a single training complex “The Sphere”.

The composition and quantity of software and hardware components of the training complex may vary depending on type of training wanted, and the number of specialists involved in the plot of the performed battle task.

After training the systems provides the tools to analyze the quality of mission execution in personal and group modes.

## Conclusion

The system by technologies implemented could be also used for further **REAL** operation control using **GNSS** and **LOCAL** positioning sensor technologies for object and terrain tracking of the fighters, combat machines and supporting vehicles.



**Commentary.**

AI character\* - friendly or hostile fighter, controlled by the AI system, inbuilt by the developing team into the integrated complex, having a defined tactical potential, role and combat characteristics, as well as commander-defined strategy of conducting the combat;

Combat unit\* – specialist in training in one of the virtual spheres or at one of the working stations, or an AI character executing a particular function in the training scenario.