CLAIMS

1. A method for the three-dimensional scenario recording of the action taking place during training exercises of firefights at close range, in which multiple synchronized imaging systems (IS), such as video cameras, scanners or the like, are installed for monitoring the training areas, wherein software

- calculates a photorealistic 3D model of the scenario from the recordings of the IS and records the action continuously as a 3D scenario,

- detects persons, weapons and other equipment items (for example protective clothing) and further processes and reproduces them with their anatomical, ballistic, material-typical and optical features as an object module in the 3D model,

- detects the position and orientation of weapons and the firing thereof, calculates the line of flight of projectiles and maps them in the 3D model, and,

- in the case of persons who have been hit by projectiles, calculates the effect of the weapon on the basis of the position of the hit, any detected protective clothing and the ballistic factors.

2. The method as claimed in claim 1, characterized in that the imaging systems (IS) are selected in terms of their number, position and alignment such that their viewing angles overlap and the action in the training spaces is monitored from all perspectives without gaps.

3. The method as claimed in claim 1 or 2, characterized

in that the imaging systems are all connected to a computer on which the recordings are collected and processed using image recognition software.

4. The method as claimed in one of claims 1 to 3, characterized in that persons who have been hit are informed via an optical and/or an acoustic signal.

5. The method as claimed in one of claims 1 to 4, characterized in that hand grenades are likewise detected as an object module and the effects thereof in the special scenario are calculated.

6. The method as claimed in one of claims 1 to 5, characterized in that a 2D projection (outline of the training space) is generated from the 3D scenario recording, on which the participants and their actions (movements, weapons use, lines of fire or the like) are uniquely mapped.

7. The method as claimed in one of claims 1 to 6, characterized in that one or more persons are recorded even outside the training space by several IS in order to be inserted subsequently into the 3D scenario recording as a 3D model (avatar) for training purposes and as a result for example action improvements can be demonstrated.

8. The method as claimed in one of claims 1 to 7, characterized in that any disturbing backlight of directly visible illumination bodies or other IS in the training space are automatically compensated for by way of calculation.

9. The method as claimed in one of claims 1 to 7, characterized in that any disturbing backlight is avoided

by the illumination bodies producing the disturbing backlight being switched on and off with the frequency of the image recording of the opposite IS, wherein the IS only ever records an image when the illumination body is switched off.

10. The method as claimed in one of claims 1 to 9, characterized in that IS with different modes of operation and spectral sensitivities and illumination elements of corresponding, different spectral emission are used to compensate for cover effects (for example smoke), object corruption or defects in the 3D scenario.

11. The method as claimed in one of claims 1 to 10, characterized in that the recordings of the IS are provided and stored with a time stamp.

12. The method as claimed in one of claims 1 to 11, characterized in that initially a model of the training spaces without persons but with any furniture items that may be present is generated, such that during the training exercise only the difference in the image change caused by the action needs to be calculated.

13. The method as claimed in claim 12, characterized in that a plurality of models of training spaces without persons are combined to form a contiguous 3D model, for example to form a house model.

14. The method as claimed in one of claims 1 to 13, characterized in that the observer of the 3D scenario recording has the option of observing the action from the view of the participants using stereoscopic virtual reality goggles.

15. The method as claimed in one of claims 1 to 14, characterized in that the IS and any illumination systems present are operated supported by batteries and the images are wirelessly transmitted to the evaluating computer.

16. An apparatus for carrying out a method as claimed in one of claims 1 to 15, characterized by a plurality of imaging systems (IS) for capturing the action from a plurality of perspectives, a computer having software for calculating the 3D scenario recording from the data of the IS, a database with functional models of persons, weapons and equipment items stored therein, wherein in particular anatomical, ballistic, material-typical and optical features are stored, and at least one monitor for viewing or reviewing the recordings.

17. The apparatus as claimed in claim 16, characterized in that the IS are mounted on harnesses or rails for quick and simple mounting and are connected by cables.

18. The apparatus as claimed in claim 16 or 17, characterized in that daylight color image cameras and/or monochrome night vision cameras are used as IS.

19. The apparatus as claimed in one of claims 15 to 18 characterized in that white-light or infrared illumination bodies (for example LEDs) for illuminating the scenario are also mounted on the mounting harnesses of the IS.

CLAIMS

1. A method for the three-dimensional scenario recording of the action taking place during training exercises of firefights at close range, in which multiple synchronized imaging systems (IS), such as video cameras, scanners or the like, are installed for monitoring the training areas, wherein software

- calculates a photorealistic 3D model of the scenario from the recordings of the IS and records the action continuously as a 3D scenario,

- detects persons, weapons and other equipment items (for example protective clothing) and further processes and reproduces them with their anatomical, ballistic, material-typical and optical features as an object module in the 3D model,

- detects the position and orientation of weapons and the firing thereof, calculates the line of flight of projectiles and maps them in the 3D model, and,

- in the case of persons who have been hit by projectiles, calculates the effect of the weapon on the basis of the position of the hit, any detected protective clothing and the ballistic factors, characterized in that one or more persons are recorded even outside the training space by several IS in order to be inserted subsequently into the 3D scenario recording as a 3D model (avatar) for training purposes and as a result for example action improvements can be demonstrated.

2. The method as claimed in claim 1, characterized in that the imaging systems (IS) are selected in terms of their number, position and alignment such that their viewing angles overlap and the action in the training spaces is

monitored from all perspectives without gaps.

3. The method as claimed in claim 1 or 2, characterized in that the imaging systems are all connected to a computer on which the recordings are collected and processed using image recognition software.

4. The method as claimed in one of claims 1 to 3, characterized in that persons who have been hit are informed via an optical and/or an acoustic signal.

5. The method as claimed in one of claims 1 to 4, characterized in that hand grenades are likewise detected as an object module and the effects thereof in the special scenario are calculated.

6. The method as claimed in one of claims 1 to 5, characterized in that a 2D projection (outline of the training space) is generated from the 3D scenario recording, on which the participants and their actions (movements, weapons use, lines of fire or the like) are uniquely mapped.

7. The method as claimed in one of claims 1 to 6, characterized in that any disturbing backlight of directly visible illumination bodies or other IS in the training space are automatically compensated for by way of calculation.

8. The method as claimed in one of claims 1 to 6. characterized in that any disturbing backlight is avoided by the illumination bodies producing the disturbing backlight being switched on and off with the frequency of the image recording of the opposite IS, wherein the IS only ever records an image when the illumination body is switched off.

9. The method as claimed in one of claims 1 to 8, characterized in that IS with different modes of operation and spectral sensitivities and illumination elements of corresponding, different spectral emission are used to compensate for cover effects (for example smoke), object corruption or defects in the 3D scenario.

10. The method as claimed in one of claims 1 to 9, characterized in that the recordings of the IS are provided and stored with a time stamp.

11. The method as claimed in one of claims 1 to 10, characterized in that initially a model of the training spaces without persons but with any furniture items that may be present is generated, such that during the training exercise only the difference in the image change caused by the action needs to be calculated.

12. The method as claimed in claim 11, characterized in that a plurality of models of training spaces without persons are combined to form a contiguous 3D model, for example to form a house model.

13. The method as claimed in one of claims 1 to 12, characterized in that the observer of the 3D scenario recording has the option of observing the action from the view of the participants using stereoscopic virtual reality goggles.

14. The method as claimed in one of claims 1 to 13, characterized in that the IS and any illumination systems present are operated supported by batteries and the images are wirelessly transmitted to the evaluating computer.

15. An apparatus for carrying out a method as claimed in one of claims 1 to 14, characterized by a plurality of

imaging systems (IS) for capturing the action from a plurality of perspectives, a computer having software for calculating the 3D scenario recording from the data of the IS, a database with functional models of persons, weapons and equipment items stored therein, wherein in particular anatomical, ballistic, material-typical and optical features are stored, and at least one monitor for viewing or reviewing the recordings.

16. The apparatus as claimed in claim 15, characterized in that the IS are mounted on harnesses or rails for quick and simple mounting and are connected by cables.

17. The apparatus as claimed in claim 15 or 16, characterized in that daylight color image cameras and/or monochrome night vision cameras are used as IS.

18. The apparatus as claimed in one of claims 14 to 17 characterized in that white-light or infrared illumination bodies (for example LEDs) for illuminating the scenario are also mounted on the mounting harnesses of the IS.