

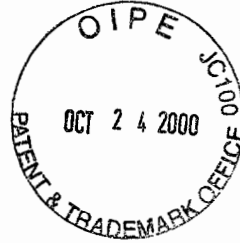
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October 24, 2000

Assistant Commissioner for Patents
Washington, D.C. 20231
ATTENTION: Box PATENT APPLICATION

Attorney Docket No.: 37112-164994

Sir:

Submitted herewith is a patent application under 37 C.F.R. § 1.53(b) for:

Inventor: ALAN J. LIPTON

Title: INTERACTIVE VIDEO MANIPULATION

This is not a Provisional Application.

The application includes:

- Specification (39 pages), which includes claims (1-58) and an Abstract (1 page)
- Formal drawings (8 sheets, Figures 1-8)

In view of the above, it is requested that this application be accorded a filing date.

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Respectfully submitted,

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APPLICATION FOR UNITED STATES PATENT

INVENTOR: ALAN J. LIPTON

TITLE: INTERACTIVE VIDEO MANIPULATION

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37112-164994

INTERACTIVE VIDEO MANIPULATION

BACKGROUND OF THE INVENTION

Field of the Invention

5 A system in the field of video processing is disclosed. More specifically, techniques are disclosed for interacting with and manipulating video streams for applications, such as entertainment, education, video post-production, gaming, and others.

References

10 For the convenience of the reader, the references referred to herein are listed below. In the specification, the numerals within brackets refer to respective references. The listed references are incorporated herein by reference.

[1] H. Fujiyoshi and A. Lipton, "Real-Time Human Motion Analysis by Image Skeletonization," Proceedings of IEEE WACV '98, Princeton, NJ, 1998, pp. 15-21.

15 [2] A. Lipton, H. Fujiyoshi and R. S. Patil, "Moving Target Detection and Classification from Real-Time Video," Proceedings of IEEE WACV '98, Princeton, NJ, 1998, pp. 8-14.

[3] A. J. Lipton, "Local Application of Optic Flow to Analyse Rigid Versus Non-Rigid Motion," International Conference on Computer Vision, Corfu, Greece, September 1999.

20 [4] A. Selinger and L. Wixson, "Classifying Moving Objects as Rigid or Non-Rigid Without Correspondences," Proceedings of DARPA Image Understanding Workshop, 1, November 1998, pp. 341-58.

Background of the Invention

In augmented reality, which is a research topic in the computer vision community, video imagery is augmented by accurately registered computer graphics. Computerized x-ray vision and video assisted surgery are two examples of augmented reality. One of the long-time goals of computer vision community is to analyze and interact directly with real-time video-derived data.

One of the long-time goals of the entertainment industry, such as the movie industry and the computer gaming industry, is the creation of realism. To achieve this, the movie industry invested in computer graphics to create realistic false images. Additionally, the computer gaming industry integrates photo-realistic still imagery and video to enhance a user's experience. To date, this integration is largely non-interactive using only "canned" video sequences to achieve little more than setting atmosphere.

Examples of the early use of imagery in games include still images or canned video sequences as a backdrop to the action, with computer generated characters overlaid on top, rather than truly interacting with the action. A slightly more interactive use of video is displayed in more recent games, such as Return to Zork™ and Myst™, in which short, relevant video sequences provide the player with timely information or atmosphere. The most interactive use of video has been in video-disc based games, like Dragon's Lair™, in which the game itself is made up of small image sequences, each containing a small problem or challenge. Based on the player's choice, the next appropriate video sequence is selected to provide the next challenge exploiting the fast random access time available to the videodisc medium.

There has been some effort made to use video interactively, most notably as an input device. There exist companies that produce games based on chroma key screen technology. Real players are inserted into a virtual environment to perform simple actions like tending a

virtual soccer goal or shooting virtual baskets. These games require considerable infrastructure. The player must wear distinguishing clothing, for example, green gloves, so that the computer recognizes body parts, and the game is played in front of a large blue screen stage. More modest applications of this type that run on desktop computers include, for example, SGI's Lumbus™, in which the IndyCam is used for simple head or hand tracking to control a plant-like creature called a "Lumbus" in three-dimensional (3D) space.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a system and techniques to accomplish real-time and non-real time interactive video manipulation.

It is a further object of the invention to provide a system and techniques to apply interactive video processing to applications such as entertainment, simulation, video editing, and teleconferencing.

These and other objects are achieved by the invention, which is embodied as a method, a system, an apparatus, and an article of manufacture.

The invention includes a method comprising the steps of: extracting an object of interest from a video stream; analyzing said object from said video stream to obtain an analyzed object; manipulating said analyzed object to obtain a synthetic character; and assembling a virtual video using said synthetic character. The method further comprises the step of tracking said object.

The step of assembling comprises the step of inserting the synthetic character into said video stream. The step of assembling comprises removing said synthetic character from said video stream. The method further comprises the step of determining functional areas within said video stream.

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