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Interactive Movies: Techniques, Technologies, and Contents

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Interactive Movies: Techniques, Technology and Content

Course Notes

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Course Abstract

The concept of interactive movies has existed for a long time, but only recently has the computer technology developed sufficient tools to support complex forms of interactivity. Recent advances in computer graphics modelling, natural language generation, role playing games, and networked virtual reality environments provide the technological base for integration with well established cinematic techniques for the creation of empathy. The convergence of various cinematic techniques and software technologies from telecommunications, entertainment, and amusement areas creates a new paradigm for interactivity in movies. This course will give the audience knowledge of individual technologies necessary for creating interactive movies, and illustrate the integration of these technologies to realize this new type of entertainment.

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Lecturer and Organizer Biographies

Ryohei Nakatsu (Lecturer and Organizer) received his B S M S and Ph D degrees in electronic engineering from Kyoto University in 1969 1971 and 1982 respectively After joining NTT in 1971 he mainly worked on speech recognition technology Since 1994 he has been with ATR (Advanced Telecommunications Research Institute) and currently is the president of the ATR Media Integration & Communications Research Laboratories His research interests include emotion extraction from speech and facial images emotion recognition, nonverbal communications, and integration of multi-modalities in communications He is a member of the IEEE, the Institute of Electronics Information and Communication Engineers Japan (IEICE-J) as well as the Acoustical Society of Japan

Edward Altman (Organizer) is a visiting researcher in the Human Communication Science Department at the ATR Media Integration & Communications Research Laboratories He completed his Ph D in computer vision at the University of Illinois in 1991 and completed one year of postdoctoral research at the Beckman Institute before moving to Japan His major research interests are in interactive graphics, visualization of complex systems, and the representation of nonverbal interactions in human communication using nonlinear dynamics models

Kristine Samuelson (Lecturer) is the Director of the Documentary Film and Video program in the Department of Communication at Stanford University She has been a professor at Stanford for the last fourteen years and has received a Dean s Award for Distinguished Teaching As a filmmaker, Ms Samuelson has been nominated for an Academy Award and has screened her work worldwide Screenings include the Sundance Film Festival British Short Film Festival, San Francisco International Film Festival, Montreal Festival des Films sur l Art, and New York Museum of Modern Art Currently, Ms Samuelson is the 1996 McNamara Faculty Fellow at Stanford and is editing a video work entitled "Ocean of Storms "

Scott Watson (Lecturer) is Walt Disney Imagineering s VR Studio Technology Director and Creative Technology s Chief Computer Scientist Scott has worked with computers since he was a kid In his college days, Scott wrote multi-tasking OSs, device drivers, cross compilers and RF communications stacks as a day job Upon joining Disney s R&D department, his first assignment was to write the control software for the "Indiana Jones Ride Vehicle " An eclectic spectrum of projects has followed Examples range from creating audio and image processing technology for theme-park films to helping design a computer keyboard for dolphins Since the beginning of Disney s exploration of Virtual Reality, Scott has been at the heart of the technology and is the principal designer of the "Disney*Vision Player " Disney*Vision is an interactive VR story development system that supports real-time Disney quality animation and the SAL scripting language

Don Marinelli (Lecturer) is Co-Director of the new Entertainment Technology Center in Carnegie Mellon University s School of Computer Science He is also a tenured Associate Professor of Drama and Arts Management in the College of Fine Arts and the H J Heinz III School of Public Policy and Management Prior to accepting the position in the School of Computer Science, Dr Marinelli was the Associate Head of CMU s Drama Department for fourteen years where he teaches theater history critical writing, and arts management

CMU Drama is the oldest degree-granting drama program in America. He is also Editor of the Dramaturgical Sourcebook Series developed by CMU Press and Smith & Kraus Publishers. Dr. Marinelli co-founded CMU's Master of Arts Management program, as well as the joint MFA graduate acting program between Carnegie Mellon University and the Moscow Art Theater School-Studio of Russia.

Scott Stevens (Lecturer) is Co-Director of the Entertainment Technology Center and Senior Systems Scientist in the School of Computer Science, Carnegie Mellon University. He was for ten years Senior Member of the Technical Staff at the Software Engineering Institute (SEI), CMU, Adjunct Research Scientist in the Department of Computer Science, CMU, and is a charter member of CMU's Human-Computer Interaction Institute. He has been involved with pioneering multimedia research and development for over twenty years.

Naoko Tosa (Lecturer) is a Media Artist & Researcher in the ATR Media Integration & Communications Research Laboratories. She is also a lecturer in the Dept. of Imaging Arts and Sciences, Musashino Art University. Her major research area is Art and Technology where she is working on the creation of film & video, computer graphics animations, and interactive arts. Her recent work includes the Neuro-Baby project, an autonomous computer agent with automatic facial expression and behavior synthesis that can respond to human voice by recognizing emotions and feelings. Her work was exhibited at the Museum of Modern Art (New York), Metropolitan Art Museum, SIGGRAPH, ARS ELECTRONICA, Long Beach Museum, and other locations worldwide. Also, her works are collected at The Japan Foundation, American Film Association, Japan Film Culture Center, Nagoya Prefectural Modern Art Museum Japan, and other institutions in Japan.

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Course Introduction and Overview

Ryohei Nakatsu and Edward Altman

The evolution of the movie industry from an analog format to a digital format enables new kinds of interactivity with movies. The objective of this course is to demonstrate how the techniques, technology, and know-how of traditional movies are being transformed and applied in the emerging digital film medium. The interactivity of the digital medium provides new opportunities for movie making, so we will examine both the current technologies as well as emerging trends in research from virtual reality, human-computer interaction, interactive art, role playing games, etc.

Rather than looking at how we can add interaction to traditional movies, we consider how the digital medium provides opportunities for new forms of interaction. The key idea is that interaction should be used to enhance the story telling function of the movie. To do this, it is important to understand the evolution of the movie industry in terms of cinematic techniques, software technology, and compelling content as well as their transformations into interactive movies.

The lecturers in this course are pioneers in this new area or have long experience in producing movies. Therefore they will be able to give the audience the knowledge necessary to produce interactive movies. The lectures include such important and interesting issues as the empathy mechanism in human behavior, the basic architecture of an interactive movie system, interactive story generation techniques, interactive CG character generation technologies, and interaction technologies including speech recognition technologies and gesture recognition technologies.

Introduction to Interactive Movies (Ryohei Nakatsu and Edward Altman)

Interactive movies are one aspect of a new type of media arising from the convergence of multimedia technologies, virtual reality technologies, and AI technologies. The realization of this new media is expected to be derived from extensions of present trends in the areas of telecommunications, entertainment, and amusement. Although the types of content which will eventually be produced from this convergence are hard to predict, it is already clear from the popularity of role playing games and networked virtual reality environments that the dynamics of social and emotional interactions will play an important role in the development of new content in this emerging media.

Connecting with the Moment: Emotion and Empathy in Film (Kristine Samuelson): This presentation considers the ways in which cinematic techniques create an emotional response in audiences. Such responses occur in reaction to individual shots, as well as to the sequencing and relationships of groupings of shots. These image chains, augmented by aural elements, convey both the "text" of the story as well as the "music" of the cinematic composition. Particular attention will be given to examining how these structural elements are used to draw audiences into a media work. Possible choices for the "point of view" and the effect of that choice on the sense of connection by the audience will also be considered. Selected film clips will be used to examine how these elements are utilized in editing and reinforced by sound design.

Generation of Interactive Stories - (Scott Watson). The making of Disney's "Toy Story" shows how a digital movie may be treated as a kind of software program. The creation of interactive movies is facilitated by the design of characters with personalities and behaviors which can be manipulated. The lecture, "Generation of Interactive Stories"

by Scott Watson describes the basic architecture of interactive movie system, mechanisms of interactive story generation, and the development of software for controlling interactive story telling

Interactions between Audience and Actors - (Don Marinelli and Scott Stevens): Audience empowerment means the ability of a user to become a genuine protagonist within a story Truly interactive movies must transcend the current state of forced-choice and decision-tree paradigms that are at the heart of most interactive environments today The computer-user interface must permit a lifelike interaction wherein a user and CG persona can converse in a non-linear manner, discuss the given circumstance, establish and pursue objectives, while heightening the dramatic impact of the story

Carnegie Mellon's Entertainment Technology Center, appreciating the lifelike, invisible interface that interactive entertainment must achieve, has developed Synthetic Interviews Synthetic Interviews allow users to interact via spoken language with a CG persona The goal is an open-ended, non-linear dialog, with the CG persona deciding the parameters of what can be discussed Since conversation is the basis of how most human interaction is conducted Synthetic Interviews explore a primary way in which users become protagonists in an interactive movie

Generation of Interactive Movie Actors - (Naoko Tosa): This presentation demonstrates how the skills of an artist contribute to the creation of a unifying framework or story line which accomplishes the primary movie making task of telling a story A prototype storytelling system, called the Inter Communication Theater, which allows the viewer to interact with the characters by means of voice, music, and gesture The merging of video with real-time computer graphics provides the artist with additional tools for the creation and expression of emotion to enhance the cinematic experience of the viewer