Reenacting Scan Processing Instruments

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ABSTRACT

Scan processing is an analog computer technology developed in the late 1960's and early 1970's. While it was initially conceived as a method for animating still images, its core operation is the manipulation of video frame scan lines. This real time work flow encouraged radical, surreal, and sometimes grotesque transformations of live video imagery, and encouraged the use of scan processors as instruments with which to compose and play moving images. Although cheaper digital tools replaced scan processors in commercial animation studios during the 1980s, scan processing has a distinctive aesthetic that continues to inspire both visual artists and instrument designers. This presentation will examine the specific affordances provided by historical scan processing technology, including the ability to directly influence images through the use of audio signals, and will discuss contemporary reenactments of these instruments using digital audio and video technology.

Author Keywords

scan processing, media archaeology, reenactment, historical instruments, audiovisual synthesis, Pure Data, animation, video synthesizer

CCS Concepts

• **Social and professional topics** → **History of hardware**; • **Applied computing** → Media arts; • **Computing methodologies** → *Image manipulation.*

1.INTRODUCTION

Scan processing is an analog technique used during the 1970s and 1980s to animate, manipulate, and synthesize video imagery that is known for its specific visual effect that warps the image's scan lines. One of the first scan processors available commercially was the Scanimate system, patented by Computer Image Corporation in 1969 [1]. The Scanimate was intended chiefly to replace time-consuming methods of stop-motion animation with an automated, electronic workflow.

A successor to the Scanimate, the Rutt/Etra Video Synthesizer, was originally marketed to video production studios and schools as an affordable production tool [2] that offered fewer functions at a far smaller size and lower cost compared to the Scanimate. The Rutt/Etra's 1973 list price of US$12,000, however, was still the equivalent of a luxury automobile at the time.

Those on more limited budgets and with more experimental goals—such as artists working in universities, video cooperatives, or community television stations—learned to construct their own production tools from parts intended for industrial, scientific, or military applications, such as the modular components offered by suppliers such as Optical Electronics Inc [3]. The Videographics Lab system that Michael Scroggins built for CalArts in the early 1980s is a key example of this approach [4].

2.TECHNOLOGY

Understanding scan processing's affordances begins with understanding the materiality of the cathode ray tube (CRT). A CRT display employs a beam of electrons to illuminate phosphor within the face of a vacuum tube. In a normal television, this beam moves in a predictable zig-zag *raster scan* pattern. A scan processor is an analog computer optimized to process this raster scanning signal through the addition of other electronic signals (both video and audio), and display it in an arbitrary *random scan* pattern on an oscilloscope monitor. Since the resulting images are no longer a technically viable video signal, and therefore cannot be recorded or broadcast on their own, a video camera is aimed at the scan processor's output CRT display in a process known as *rescanning*.

3.AFFORDANCES

When operating the Scanimate, typically two- and three-dimensional artworks—such as the logos of television programs and their advertisers—were scanned by a video camera and animated in real time by analog computer circuitry [5]. Bill Etra emphasizes the real time applications of the instrument he created with Steve Rutt, however. He likens the Rutt/Etra to a "piano for visuals", allowing users to play images interactively, as a music composer would [6]. The relative accessibility of the Rutt/Etra over the Scanimate provided opportunities for many artists to explore the affordances they found with this instrument.

Works by Steina Vasulka, Vibeke Sorensen, Gary Hill and Benton C Bainbridge surveyed in excerpt during this presentation illustrate various affordances discovered by the artists in conjunction with the Rutt/Etra. In these examples, imagery from video cameras is bent

and warped by other electronic audio and video signals, two dimensional images take on the appearance of having three dimensions, and abstract figures generated by the mathematical functions of analog oscillators twist across the screen. Notably, each artist discovers different affordances with the device, and these affordances are specific to the constraints of their own creative approaches.

4.REENACTMENT AS A METHOD

Jussi Parikka notes artistic practices within the field of media archaeology involving the creation of art from obsolete objects and practices; the search for "buried conditions" within contemporary media; and the formulation of imaginary future media based on those of the past [7]. These practices echo discussions within visual and performance arts which argue that reenaction is not merely repetition or imitation, nor does it involve a relationship of fidelity between a performer and a score. Rather, a reenactment is an iteration of the original work, akin to a literary citation "tethered" to its source but placed within a new context [8], with personal interpretation allowing for quite different outcomes than the original [9]. Therefore, a reenactment of a historical synthesizer, for example, is neither an imitation nor a strict reproduction of an original. Rather, such a reenactment works through the historical historical affordances of the instrument using current technological means to address present contexts.

5.REENACTING SCAN PROCESSING

In both interviews with video art practitioners and surveys within the larger video art community conducted by the author, the real-time aspects of historical scan processing instruments are mentioned consistently as among their greatest strengths. The same sources also lament the instruments' scarcity, fragility, perceived "random" uncontrollability and general lack of state saving and recall systems as their weakest aspects. Such frustrations, alongside the desire to reproduce key visual effects linked to specific scan processing instruments, have inspired several attempts to reenact the Rutt/Etra in particular, within both the analog and digital domains.

Anton Marini's "v002 Rutt/Etra" (2008) [10], written for the MacOS Quartz Composer framework with substantial input from Bill Etra, represents a successful digital reenactment of affordances demonstrated on the original Rutt/Etra Synthesizer by Bill Etra and Benton C Bainbridge. It also realizes visions of the instrument's future which Etra was unable to realize during his own development of the hardware. Ivan Marušić Klif's "REWereHere" [11] and Derek Holzer's "Vector Synthesis" [12] represent alternate approaches to the reenactment process. These digital applications, coded in Max and Pure Data respectively, employ audio signals sent from sound cards to hardware oscilloscopes. Both projects aim to reenact various affordances of the original instrument observed from the numerous video works created using it, as well as from analyses of the Rutt/Etra's underlying electronic circuits and its user interface. Examples from each of these three reenactments will be shown during the presentation.

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