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Sher Doruff, Waag Society, Amsterdam

Abstract

KeyStroke is a Multi-User Cross Media Synthesizer - a distributed application that allows players to generate, synthesize and process images, sounds and text within a shared realtime environment. As an instrument it allows communities of players to dynamically control and modify all aspects of digitized media in a collaborative performance.

The premise of the KeyStroke Project is to contribute to the emerging genre of telecommunications art. It is an instrument and a communications tool - a vehicle for sending and receiving commands, pushing and blocking choices, negotiating and dictating experiments, improvising and rehearsing the realization of a sensory display - a simultaneous realtime interchange with live and formatted media. KeyStroke provides the network infrastructure and interface, the players define the content, control and community.

Its design is inclusive of many media types and controller options. Implicit in this expansive architecture lay opportunities for deconstructed, specialized applications from realtime media performance in theatrical venues to gaming communities to distance learning environments to childrens playstations.

Sharing a common patchbay-type editing screen, players can create and manipulate audio/visual material using standard, ubiquitous controllers such as the keyboard, mouse and Midi. Endemic to KeyStrokes' design is the possibility of the 'invisible' components or properties of media to function as independent controllers of other component properties from media such as video, audio, midi, text, vector graphics, audio visualization, QuickTime movies, scanned images, etc. By connecting, thereby controlling, one property with any other property regardless of type, this new form of synthesis and on-the-fly modification provides a framework for unexpected as well as calculated results. The plug-in

architecture allows enthusiasts and programmers to write additional modifier and filter objects.

As KeyStroke runs over a network, bandwidth issues and hardware configurations dictate its performance capabilities. Internet versions for the general user (average hardware) will address these limitations. LAN's, T1 lines or satellite connections can provide the necessary speed for optimal (low latency) performance with high bandwidth media.

The KeyStroke Project

Research and development of new technologies often involves an exploration into metaphorical analogies of a goal. These analogies are useful for establishing a kinetic *raison d'être* for a project; a bigger picture, a broader scope of intention that leaves room for a concept to grow and adapt beyond its initial vision. In this regard, KeyStroke is as much a process as a project. An investigation in two main areas - optimal synthesis of digitized media and realtime collaborative methods.

KeyStroke is an instrument, a tool, an approach to non-linear connectivity within the socio/cultural structure of a group dynamic. It is also an experiment in practical systems theory that in many ways mirrors the metaphors of current philosophic/scientific thinking from chaos theory to the holographic paradigm. It reflects a finger on the collective pulse in which current philosophical concepts can be referenced in the everyday by the ubiquitousness of digital technology. Constructed as a malleable environment for creating live, collaborative multimedia performances, it is a vehicle for simultaneous experimentation with cross-media interaction and social interplay. A 'jam session' with images, sounds, and text. A media conference call for artists, designers and performers to work

ideas in a realtime context. A playstation for sensory synthesis. A framework for live performance interaction that allows a pervasive scope of artistic and communicative utilities and techniques.

The Design Concept

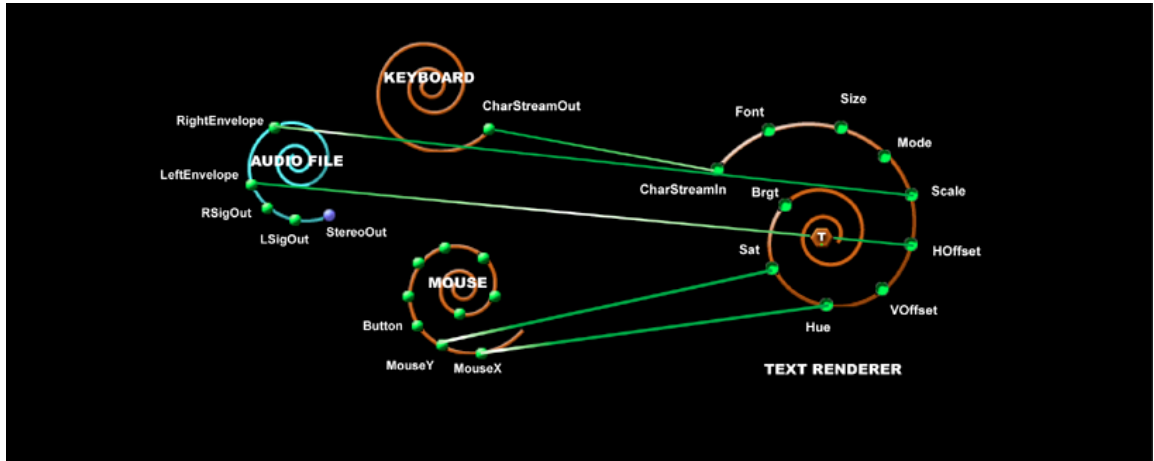
A multi-user software application, KeyStrokes' concept and design are built on the holarchical premise of nested wholes - enfolded entities which are in a continually fluctuating state of unfolding to reveal their component parts. Each part of each whole is in a dynamic state that may be influenced, altered or modified by any other part of any other whole, modeling the interrelatedness of all matter at all times.

Creativity is an integral and evolutionary catalyst of this dynamic process - a kind of randomizing engine that produces change, growth and unpredictability. In KeyStroke the players provide this element by choosing and filtering connections in a shared, realtime environment that can be both scrupulously determined and unforeseen. The players themselves form a nested collective as actions made by one effect the experience of the whole (Performance) in obvious and/or subtle ways over the duration of play. A small alteration by one player in the value of one component media property can create significant ramifications in the performance, exhibiting a 'sensitivity to initial conditions' otherwise known as the butterfly effect of chaos theory:

The flapping of a single butterfly's wing today produces a tiny change in the state of the atmosphere. Over a period of time, what the atmosphere actually does diverge from what it would have done. So, in a month's time, a tornado that would have devastated the Indonesian coast doesn't happen. Or maybe one that wasn't going to happen does. (Ian Stewart, *Does God Play Dice? The Mathematics of Chaos*)

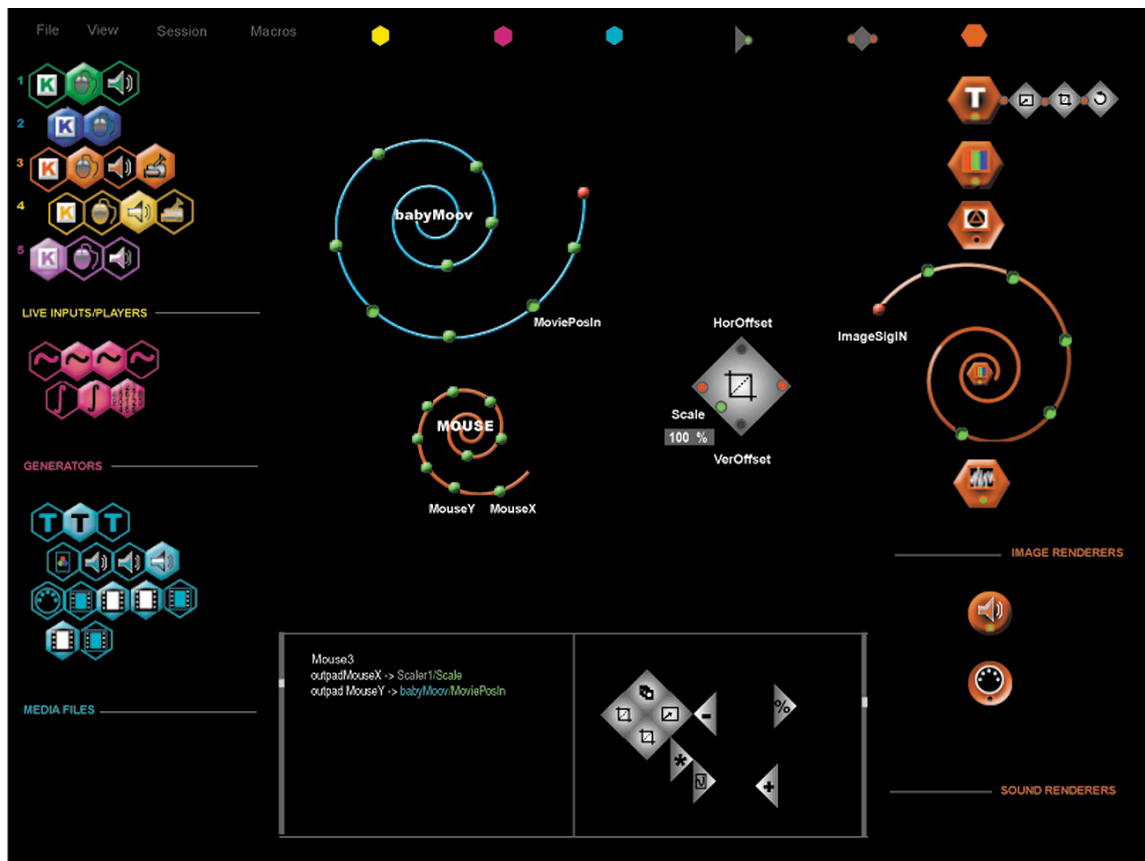
In KeyStroke, these nested wholes are analogous to different types of digitized media and their extractable component properties. This function has a visual corollary in the GUI in which each object is a spiral or helix form which when

unfurled by a simple mouse rollover, reveals all the component properties specific to its type.



Caption: Example of the media spirals and their properties. Here a player is sending a text stream and will control its Hue and Saturation with mouse position. An audio file downloaded from the session File Library is controlling the size (Scale) and screen position (HOffset) of that text. These connections could represent one aspect of a more complex patch.

The architectural foundation of KeyStroke is based on modularity. These media modules coexist and interact by player control within the multi-dimensional sphere of cyberspace, of networked communication. The notion that the resultant synthesis of the component parts or properties of different types of media (video, audio, text, graphics, etc.) may yield interesting and unexpected artistic results is central to its design. But the control of these results is spontaneously driven by the artistic, emotional and intellectual dynamic of the players involved and places a premium on the social context, the behavior and interplay of the controllers. This mixture, or delicate balance, of control variability and media synchronicity are the cornerstones of the project.



Caption: Simulated screen shot of a typical KeyStroke session.

An Example Patch

Let's take an example performance setup that involves a theatrical space. Live video and audio of a dance performance is streamed to a battery of five KeyStroke artists (musicians, poet, media designers, etc.) who interpret and control this source material in a variety of ways. One player may choose to layer the video source of the dancer with prerecorded movie clips. Another player may decide to modify the sound source from the dance performance with a delay filter while another types comments and another adds sound samples to the mix. Control of these elements is always interchangeable so that one player may decide to scale the incoming text with her mouse while another changes the color and screen position of the text with a midi controller. A decision is made by a player to 'scratch' the movie position of one clip with the mouse of another player. Perhaps the dancer

modifies the vocal input of a singer with ultrasound sensors. All of this activity culminates in the Realizer, which in KeyStroke is the performance or display of the constant interactions of the oscillating components of digitized media.

Conclusion

The unpredictability of the synthetic process is certainly a provocative element in the play of KeyStroke. But the truly maverick agent in the process is the group dynamic. Will disparate communities form around issues of friendly improvisation or structured linear development? Will players routinely compete for control or abdicate control in favor of a defined group aesthetic? Will we face an extensive learning curve in collaborative etiquette? How will we respond to sensory cacaphony? KeyStroke poses these questions and hopes to pass on new insights as the program is introduced this spring/summer to a core group of artists, performers and researchers.

Sher Doruff

Keystroke is developed in the Medialab of the Society for Old and New Media by Niels Bogaards, Just van den Broecke , Sher Doruff, and Tom Demeyer - www.waag.org. KeyStroke has received support from Stichting STEIM, de Amsterdams Fonds voor de Kunst, de Mondriaan Stichting, Fonds voor de Podium Kunst, The ArtsAlliance, UK and MultiMediaLab2, UK.