# Luminance

## An Interactive Art Experience

A Thesis Proposal for
CSU Hayward Multimedia Graduate Program

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The Short Attention Span Team

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## The Research Question

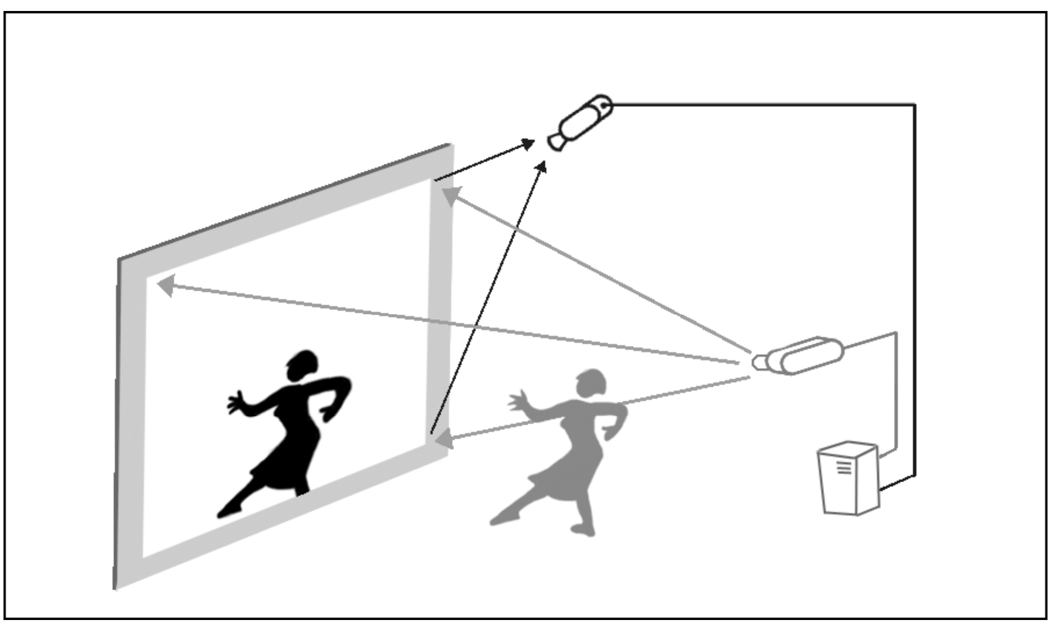
Can a new methodology be developed to create complex, playful content for multimedia installations whose interactivity depends solely on physical body movements?

## Introduction

Short Attention Span will implement Luminance, a multimedia installation that allows participants to interact with digital media using physical bodily movements. This installation will be used as the foundation for a period of exploration that focuses on the design and production of engaging and creative digital content.

Using image recognition techniques, participants will not be required to use traditional computing input devices such as a mouse or keyboard. The aim is to tap into users' natural physical impulses so that the participants may exercise their bodies and their imaginations

Through iterative user testing, content will be developed and adjusted in order to create evocative content for a delightful and more complex experience than a majority of art installations.



### A Period of Creative Discovery & Exploration

The core effort of Short Attention Span during the thesis year will be spent on a development process to support the design and production of unique interactive content for the multimedia installation. An examination of previous multimedia installations in which image recognition is a key component shows that their only aim in content development is to provide a visual or aural response to user movements. Often, the participant in the installation is solely a trigger, acting to activate a motion-graphics piece.

What seems to be missing from multimedia installations using image recognition is advanced content which encourages further user participation, investigation, and curiosity levels within the participant.

Processes and guidelines for the development of multimedia content have evolved in the areas of film, animation, sound, web, and other mediums of the digital age. Terms of usability, information design, and user experience have influenced the interactivity of all of these mediums. However, a set of guidelines incorporating these fundamentals do not exist for content creators interested in creating unique interactive installations based on the new methods of interactivity and action-response. Emerging mediums existing in spaces beyond the screen, distant from traditional input devices, deserve a careful study into how disciplines of design and production can deliver complex content. This is the area of study for Short Attention Span.

## Project Description

### Installation Setup

Luminance is an interactive installation which is dependent on shadow recognition as a mechanism for creating action-response feedback systems. Therefore, the light available in the installation environment is an important consideration. In order to provide the ideal contrast and improve the performance of pattern recognition software, the preferred installation environment for Luminance is one with limited natural light. While dark rooms are an obvious choice, Short Attention Span is also interested in unconventional environments for installation such as tunnels or underground walkways.

**The User Experience**

Users of Luminance will entire a defined physical space in which the user will be positioned between a video projector and a large video projection screen. As the video projector is creating light, the user is positioned in a manner to cast shadows upon the screen. Meanwhile, a properly positioned capture device such as a camera interprets the activity on the screen. The capture device is connected to a computer with software that can interpret the captured image. Specifically, the software must be able to process the shadows as a unique object within the image, converting it to a digital entity that can relate and interact with other digital entities.

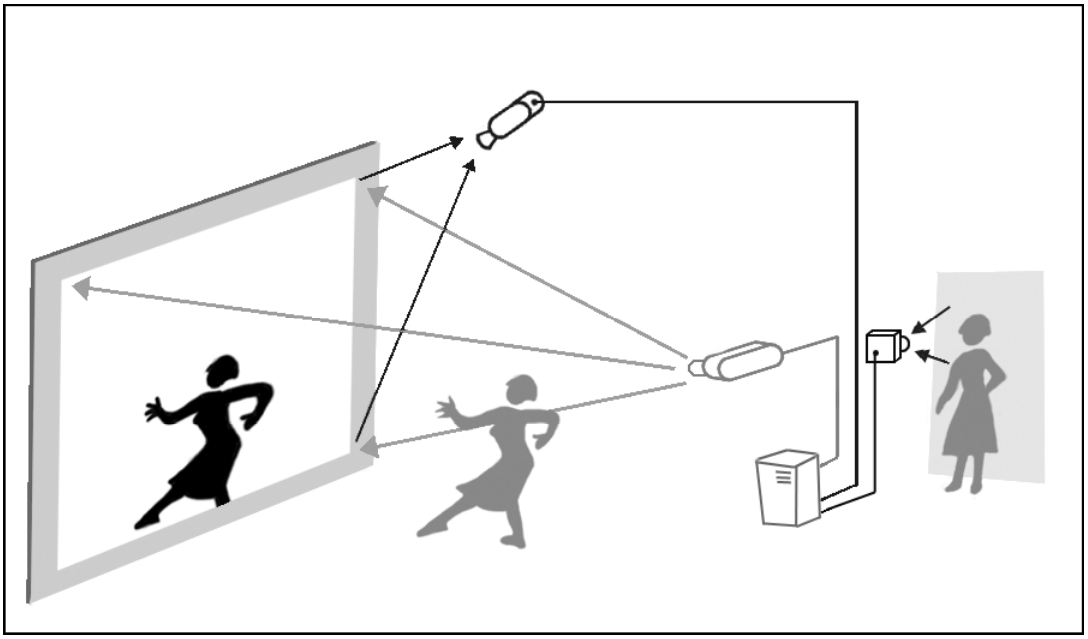
The interactive content of Luminance will vary. Interactive multimedia content for an installation medium dependent on full-body motion is the core area of project exploration.

Content will consist for a number of states within the Luminance installation.

- Forgotten Middle Child State: The Forgotten Middle Child State will consist of content designed to attract attention from people passing by the installation. The intention being to draw visitors into the interactive space of installation.

- Nice To Meet You: This state is triggered when a user enters the installation area. The initial content will be designed to make it obvious to the participant that his/her physical bodily movements are having an effect upon what is occurring on the projection screen.

- Curiosity: As a participant continues to exist within the installation, the interactive potential varies with increasing complexity as the user's speed and position begins to have more abstract effects on the digital content.



For example, one of the possible exhibits might be the following**.**

**Forgotten Middle Child:** There are a few rows of animating faces along the top of a projected screen. Some faces may so abstracted as to not be recognizable as persons. Each face's parts morph in cycles. In the lower half of the screen, a large face cycles through its changes at varied pace – now quickly, then slow. After some amount of time, the large face switches place with one of the smaller ones.

**Nice To Meet You:** When a potential user steps near the installation, a soft bell calls the visitor to a small video booth beside the screen. The booth is like a photo mat, with a video camera replacing a still camera. If the user stands still facing the camera for 5 seconds, a few frames of his/her face, in close-up, are captured.

As quickly as possible, the new user's vectored close-up replaces the previous user's large face on the projected screen. When the user approaches his/her image, the shadow cast by the user disturbs the positions of the face parts.

**Curiosity Plus:** As the user moves – making small hand gestures, arm swings or dramatic body shifts – the various face parts transform. There is a direct positional relationship between where on the screen the cast shadow falls and what area of the image is affected. Perhaps the affected parts morph into even more abstract shapes, or twirl in a circle.

As more time passes, the changes caused by the user's movements become more lively and/or bizarre: pupils may bounce off screen edges, teeth mutate into fangs, or hair flows like ebb tide. At some point, the alterations slow and fall into a cycle of the last few changes. The large face settles into its come-on cycle for the next participant.

The pace of the process follows the slow beginning, developing complications, dramatic emphasis and denouement of the classic story arc.

**Repeat?** Now that the user is aware of the experience, he/she could return to the booth and go again!

## Conceptual Explanation

The stated research question wasn't the SAS team's first query. Our first question was "What project would be fun to do?" What would be challenging and enjoyable to make that users would find challenging and enjoyable to do? The team was drawn to simplicity and playfulness. We shared what we appreciated doing personally, what multimedia gave us delight, what startling new activities had engaged us. The team began the search among enthusiasms and resources. We went back to basics.

The SAS team intends to create an art installation. Unlike designing commercial installations, which contain very specific information targeted to elicit predetermined responses, building an art piece is an exploration with surprising results. Certainly there are parameters in every artistic venture, but the value comes from the juxtaposition of the known and the unexpected. The journey of that exploration – to deeply investigate interactive content at the most direct user level – is a worthy endeavor.

Current multimedia installations the team investigated address two areas of interest that speak to a direct level of enjoyable human activity: sheer physical movement and the ability to transform things in the environment. Many of the most enjoyable of human activities involve body movement – dance, sports, mud wrestling, charades. And people love to transform things – sand castle building, landscaping, finger painting, burning effigies.

Most current installations in this category are either performances by an artist, exhibiting interactivity that is observed by an audience, or they are constructions whereby participants can have a restricted affect on an element. But, however ingenious and entertaining these latter art pieces are, they all manifest content that is one effect. They are one trick ponies. Sometimes the one trick is spectacular, as in Setpixel's "Firecaster". But very few have compelling content that engages the user for more than a few moments, or attempt even the level of absorption found in a haiku poem.

For example, in Adam Frank's "Shadow", users may step on a surface with a moving shadow. If the user approaches the shadow quickly, it flees to an opposite corner and cowers. If the user tries approaching it slowly, it "relaxes" and moves toward the user, arms outstretched.

This is not to sneer at the technical achievement of such work, but the emphasis on delivery systems too often has been at the expense of the content. To create an art piece where the interactivity actually works correctly has been the measure of success. Where SAS would like to engage its users is more in the realm of imagination that's found in reading.

No avatars, no 3D gloves. Adapting current technology in order to concentrate on the interactive content will provide an opportunity to delve more deeply into its possible lively scope and variety. Our creation process is designed to explore the interplay of direct physical action; manipulation of images and the user's imagination with iterative user feedback to develop more powerful content than is most often encountered.

## Social Justification

For over forty years, computation has centered about machines, not people. We have catered to expensive computers, pampering them in air-conditioned rooms or carrying them around with us. Purporting to serve us, they have actually forced us to serve them. They have been difficult to use. They have required us to interact with them on their terms, speaking their languages and manipulating their keyboards or mice. They have not been aware of our needs or even of whether we were in the room with them. Virtual reality only makes matters worse: with it, we do not simply serve computers, but also live in a reality they create.

In the future, computation will be human-centered and pervasive. It will be freely available everywhere, like batteries and power sockets, or oxygen in the air we breathe. It will enter the human world, handling our goals and needs and helping us to do more while doing less. We will not need to carry our own devices around with us. Instead, configurable devices embedded in the environment, will bring computation to us, whenever we need it and wherever we might be. As we interact with these "anonymous" devices, they should adopt our information personalities. As users of machine, we should not have to type, click, or learn new computer jargon. Instead, we should communicate naturally, using speech and gestures that describe our intent ("send this to Hari" or "print that picture on the nearest color printer"), and leave it to the computer to carry out our will.

New interaction systems should boost our accessibility to digital content by lowering the barriers which hinder the usage of the system. To understand this interactivity, a focus on interactive methods to creating action-response feedback loops with physical movements must be explored. As multimedia content developers, we need to understand how to create systems that create accurate responses and how these responses are understood by the user. It is these responses which begin to craft the possibilities of content creation.

A project of this type has significance in its discovery of process and method for content creation. Success of multimedia art installations are often dependent upon the environment in which they are encountered and the audience they are reaching. This project explores content itself and how different types of interactive content create a compelling installation and experience.

With the growth of new means of creative expression, these processes of discovery are necessary in order to determine the potential of the medium. Only with concentration in the content area will the depth of interactive experience be expanded. The processes Short Attention Span hopes to discover should not be considered different than the processes uncovered by painters faced with a blank canvas or a sculptor with large chunk of clay. This journey of discovery can serve as a roadmap for effective installation content creation.

## Physical Setup

The key to effective interaction between the installation and the user is a 1:1 correlation between the screen image perceived by users and the screen image perceived by the computer. Users must feel that their actions have direct and immediate effects on the projected world. Therefore, the users' bodies must not block the camera's view of the screen, as the system would likely perceive them as additional shadows. It is necessary, then, to have the camera capture the screen from an angle that eliminates this possibility.

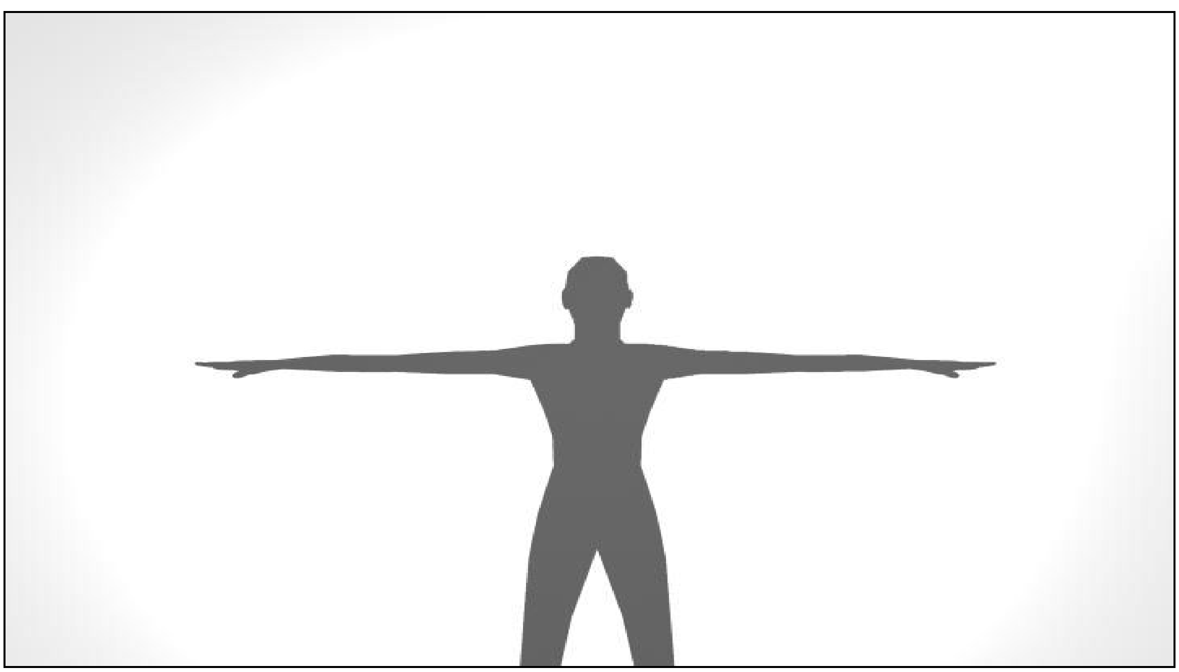


**Fig. 1.1** – The user's view of the screen.

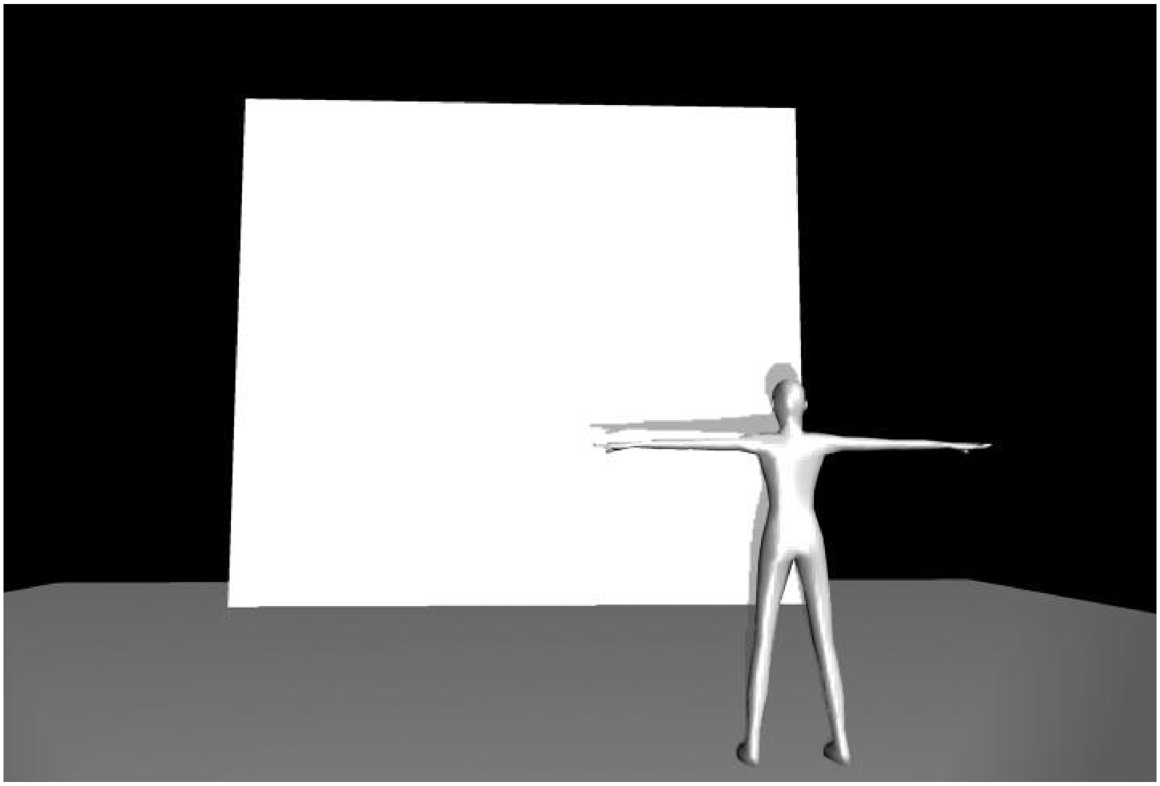


**Fig. 1.2** – The camera view from near the projector, with the user obstructing part of the screen.

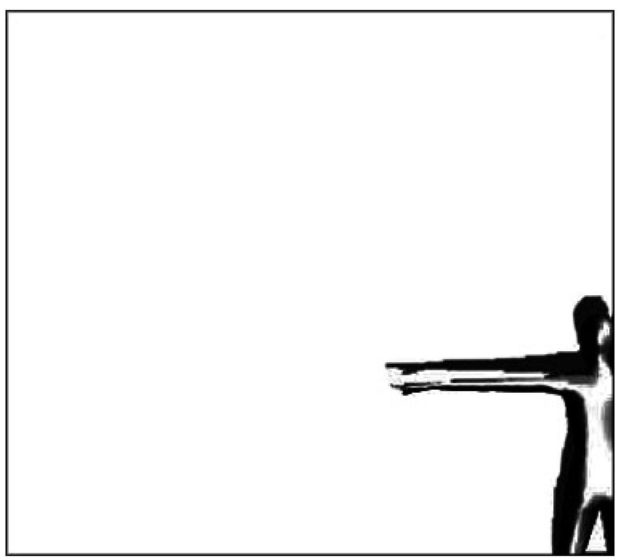


**Fig. 1.3** – A mockup of the captured digital image, adjusting for skew. Part of the shadow is obstructed by the user, meaning that there is a significant difference between what the user sees and what the machine sees. Additionally, there is a risk that parts of the user's body will be interpreted as shadows, further confusing the system.

**Frontal Camera Configuration**

The simplest installation involves a digital projector, a flat white surface to project onto, a computer system to drive the projector, and a digital video camera to capture the screen image, which is then relayed back to the computer system. The primary advantage of this configuration is that it can use a wall as the projection surface, reducing the number of components and increasing the portability of the system. The main disadvantage of this system is that the camera must be placed at a drastic angle to capture an unblocked view of the screen. The camera capture would then need to be processed to compensate for this distortion, making it difficult to calibrate and probably reducing the accuracy of the system. A second disadvantage is that a portion of space in front of the screen would be off-limits to users, as they would block the screen from the camera's view.

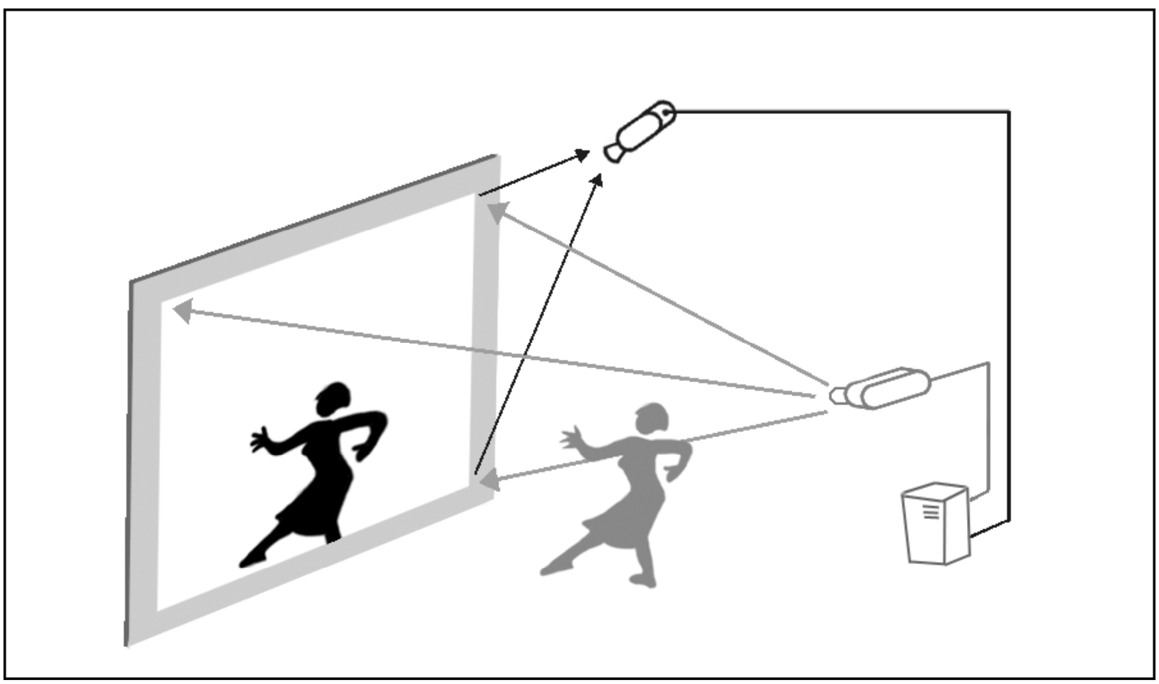


**Fig. 1.4** – Frontal camera configuration

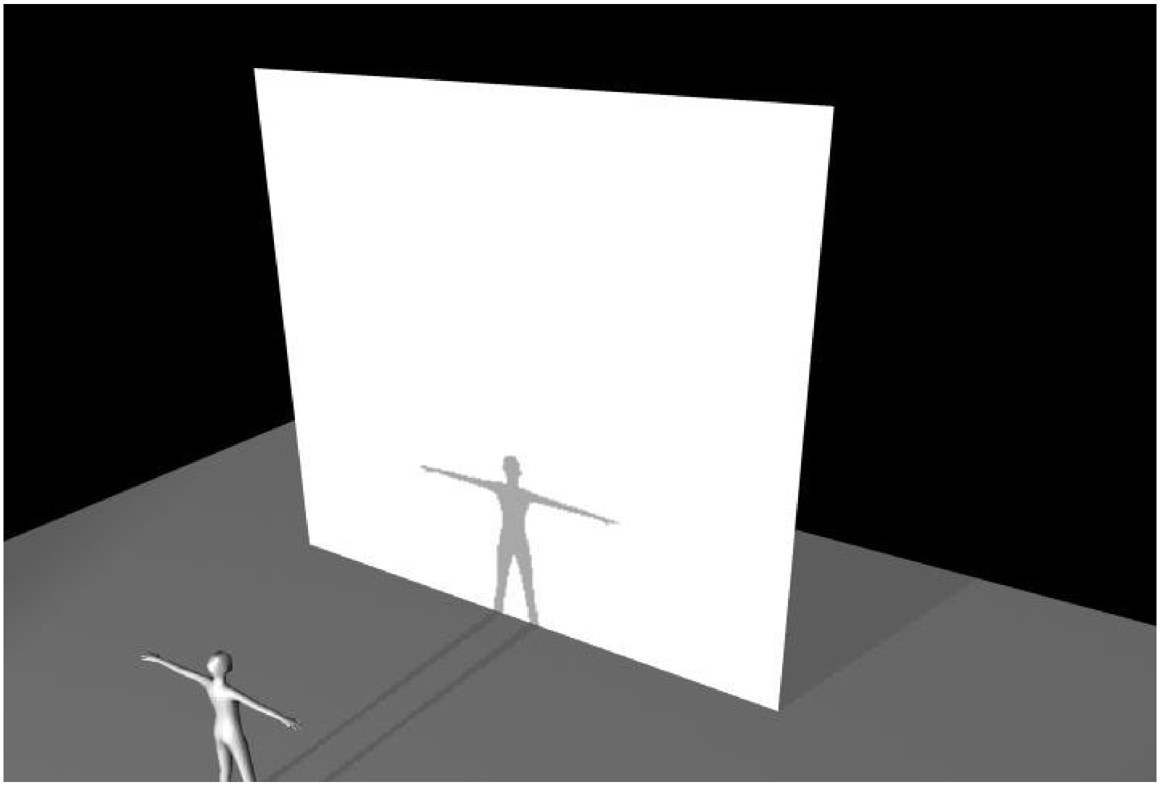


**Fig 1.5 –** The camera is set to an alternate angle to maximize its view of the screen. The users must be kept a certain distance back to keep them from blocking the screen.

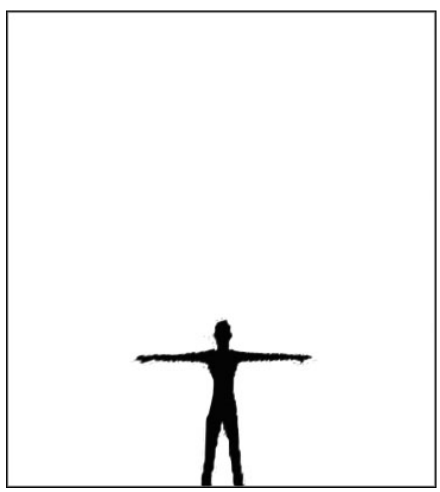


**Fig 1.6 –** Mockup of the digital capture from Fig 1.4. Note that correcting for the image skew will inevitably introduce artifacts into the image, essentially sacrificing accuracy for reduced space and component requirements.

**Rear Camera Configuration**

A more accurate setup would involve a free-standing screen with the camera placed on the far side, with a straight view of the screen's rear. In picking up the users' shadows as silhouettes, the system would only need to invert the image horizontally for the captured image to be very similar to what the users see. An advantage of this configuration is that the entire space in front of the screen is open to users. The main disadvantage is that it requires a free-standing screen and enough space behind the screen for the camera to capture its entire surface, which limits this configuration's portability. Additionally, some of the space in front of the screen is consumed in moving the screen forward. The improved accuracy of this configuration may, however, be worth this sacrifice.

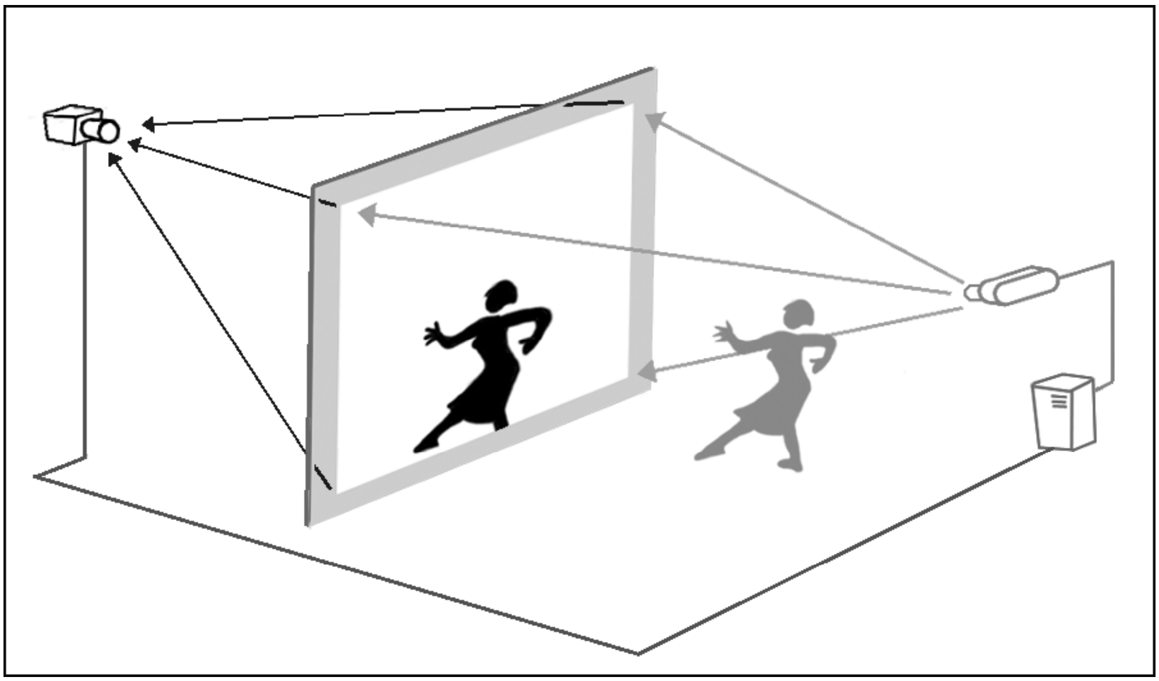


**Fig. 1.7** – Rear camera configuration

We are also considering other solutions such as infrared lamps with an infrared-sensitive camera to aid in defining the shadows, or backfilling the screen with an index color. Determining the need for extra measures will be part of our implementation research.

A note about the distance to the camera: the Firewire specifications list the maximum reliable length of a single Firewire cable as approximately 4.5 meters. This can, however, be extended with an in-line repeater, which should cost under $40. A similar solution could be applied if we choose a USB webcam.

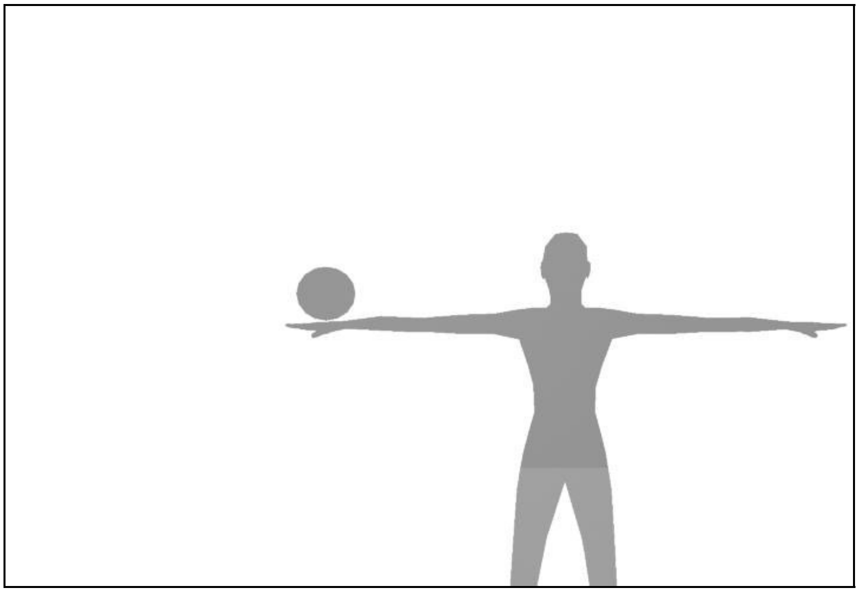


**Fig. 1.8 –** The user's view in configuration 2, ball added to show symmetry.

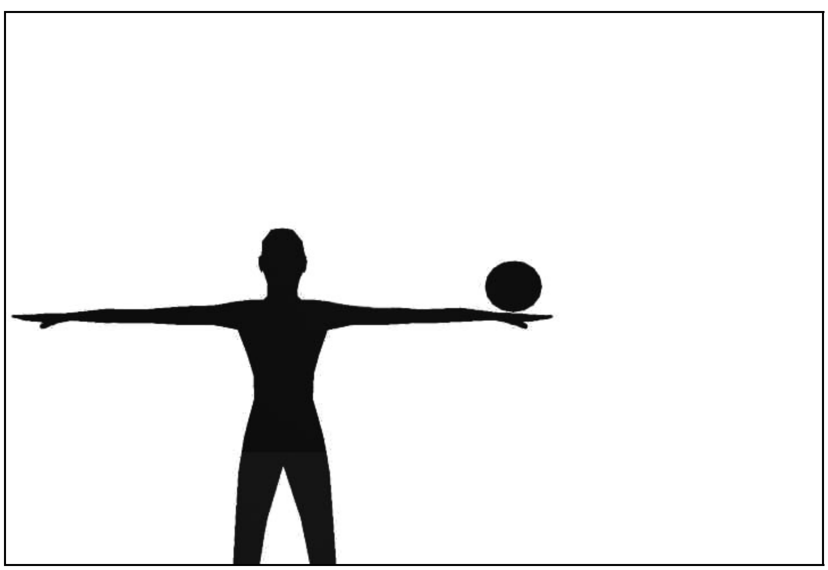
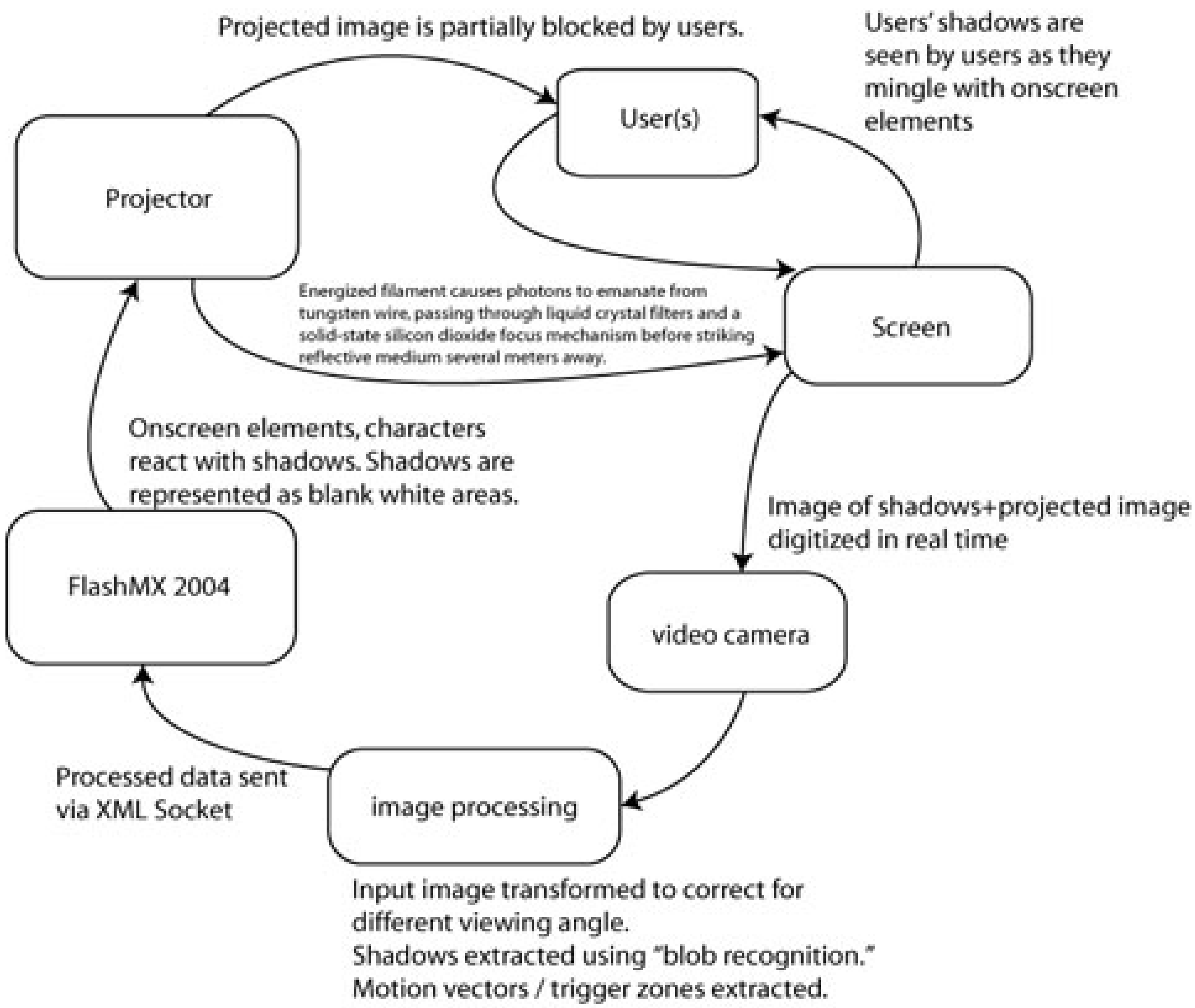


**Fig 1.9 –** The immediate capture of the view from the rear of the screen. Since the camera is capturing a straight image of the screen, the image requires no transformation to match the physical screen's proportions. More importantly, users can walk right up to the screen because no area is "out of bounds."

**Software Setup**




Functionally, we can separate the digital portion of Luminance into two components. The first is the Recognition Component. Its input is video from the camera. Its workload involves the transformation of that frame to match the proportions of the screen, the subtraction of the user silhouette, and the motion/shape/gesture analysis of that silhouette. The output of this component is the transmission of that data to the content component.

The second component, or Rendering Component, encapsulates all of Luminance's content, and will most likely account for the bulk of the project's development. Its input is the motion/shape/gesture data from the first component. Its workload is in rendering the on-screen elements, visual effects, behaviors, and simulated physics. Its output is a video signal to the projector.

The Recognition Component of Luminance defines the base computing requirements. Our primary candidate, the EyesWeb Open Platform (www.eyesweb.org), runs on Windows-based systems, and has low hardware requirements. It is open source, and add-in modules, or "patches," are available online. Additionally, there are a number of active message boards and newsgroups with up-to-date discussion among users of this platform, allowing us to tap into an extensive source of research and references to further our development. Silhouette extraction should be possible through its "BlobAnalysis Library," which tracks concentrations of similar pixels. As long as we can keep the contrast of the shadows high enough, this should be able to accurately track their position.

Our secondary candidate, EyeCon (eyecon.palindrome.de), lists a Windows-based system running at least an 800mhz processor, which falls well below the listed specifications of the workstations in our possession. Based on limited testing, it is our opinion that the computing requirements of the motion and shape recognition portion of Luminance will not pose a significant problem in its development.

We've chosen FlashMX 2004 as our primary candidate for the Rendering Component. It is a mature platform, proven capable of generating and rendering complex scenes and effects. It is available to us, as it is licensed to the graduate program. Furthermore, its wide usage gives us plenty of sources for reference, inspiration, and synthesis of new ideas.

With the EyesWeb platform, it is possible to enable communications between the system running EyesWeb and a remote system running Flash, meaning that the processing can take place on two separate computer systems, if necessary. The suggested avenue for this approach is to use the OpenSoundControl (OSC) protocol to package messages from EyesWeb, passing them through an intermediate piece of software such as flosc (transmote.com/flosc/) to translate these messages to a format which can be recognized by Flash's XMLSocket feature.

## The Research Plan

Short Attention Span has defined the following areas of research for the Luminance project.

**User Research**

A major milestone in the production schedule is to create the first working prototype in the first three months of the overall timeline. This milestone is most critical as it allows for not only user testing of the interface experience, but will serve as the primary method of validating the quality of evocative content. It's intended that there will be at least five testing sessions in the production timeline.

After the initial test, each successive set of users will consist of half returning participants and half new participants. Using this pattern will insure a simultaneous investigation of the user-to-content improvements as a fresh experience and an evaluation of the changes by the returnees.

User's research will focus on the effectiveness in two primary areas. The first is the user interface. The project team will observe each user's interactions with the installation, without offering aid. The team will pay particular attention to the ease with which participants are able to learn how to interact with the digital content. The users will then answer a survey and give the team their feedback on the clarity of their experience.

The second area of user research concerns interactive content development. In addition to the subjective evidence compiled from team observations, a user survey will be administered to obtain detailed responses and suggestions. Several factors will be explored in this process:

- What content configurations are most absorbing
- Which types of activities are most enjoyable and/or provocative
- What is the most effective level of image complexity
- What is the most effective range/scope of image alteration
- What is the most effective timing for image alteration
- What is the best scale of image to user
- What is the most effective speed for user-to-image response

- How can sound be utilized  to aide the absorbing illusion
    - Ambient tonality
    - Varied effects keyed to activities
    - Tones keyed to user's physical distance from installation
    - Abstract tones or sound effects that echo the activity, i.e. brushing, striking, leaping

**Hardware Research**

The type of video camera used for motion capture will have an impact on pattern recognition.  The project team has explored possibilities for motion capture using MiniDV camcorders and simple Web Cams as video inputs.  Not surprising MiniDV cameras will provide superior results due to their higher resolutions.  Sharpness of color contrast also has an effect on pattern recognition.

Additional research is being performed to assess the use of alternative camera types for image capture and recognition.  An example possibility is to use an infrared camera to facilitate the separation between physical body movements and the capturing of motion within digital projected content.

The project team has also performed research on computer hardware necessary for project realization.  The primary variable driving hardware choices are CPU clock speeds.  The project team hopes to employ a laptop computer for mobility and ease in project installation.  It is anticipated that the hardware infrastructure of a laptop computer will be sufficient for the project.  The main difference between desktop computing architecture and laptop computing architecture is the size of processor caches.  The team has concluded that the smaller caches found in laptop computers will not be an issue for Luminance.

### Software Research

The key software component in Luminance is the software that will be used for pattern recognition.   Preliminary conclusions in the area of software have been reached. This section documents the various software solutions that were considered by the project team.

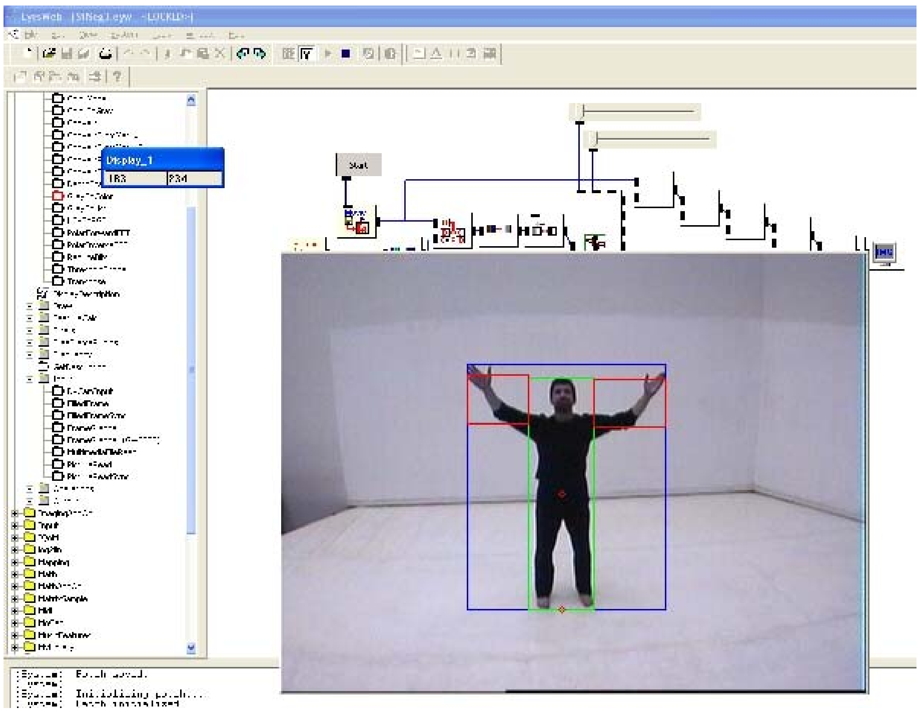


Figure 2.1 – Screenshot of Eyes-Web

*Eyes-Web*

At this time, the project team considers Eyes-Web to be the best solution.  Eyes-Web is freely available for download and use.  Because it is open source software, extensive support networks exist via online support message forums.  Eyes-Web has an extremely extensible nature that allows additional modules and plug-ins to be developed for the software, expanding its capabilities.  A number of add-on modules for pattern recognition within live video inputs already exist.

The project team has also conducted some interviews with pervious users of Eyes-Web.  These interviews gave preliminary confirmation that an implementation of Eyes-Web would meet the image recognition needs required for project execution.  These first-person accounts, in addition to the lack of licensing costs and availability of software to connect Eyes-Web to Macromedia Flash were the primary factors in deciding to proceed with Eyes-Web.

*Making Things*

The company Making Things produces a number of tools that allow for the interface of software and external hardware such as a video camera. They have also developed software which allows for their hardware to communicate with Macromedia Flash (via an XML socket connector). However, Making Things low rate of frame capture and image resolution capabilities seem to indicate that it is not robust enough of a solution to create a compelling multimedia environment.

*MaxMSP with Jitter*

MaxMSP is a graphical environment for music, audio, and multimedia developed by Cycling '74. Jitter is a set of 135 brilliant video, matrix, and 3D graphics objects for the Max graphical programming environment. The Jitter objects extend the functionality of MaxMSP with flexible means to generate and manipulate matrix data -- *any* data that can be expressed in rows and columns, such as real-time.

*EyeCon*

The EyeCon software was developed for uses in performance pieces. The software allows for interactivity between captured video content and digital media content by providing a software interface in which the developer defines imaginary impact lines or zones. The developer can then indicate the activity f the motion in the captured video interacts with a defined zone of the frame. The interface of EyeCon is seen below.

# Budget

**Components List – Hardware**

- **Server –** One of our Windows-based workstations should suffice in this role. Alternatively, a moderately powerful laptop may serve, which would aid the portability of the setup.
  **- Expected Cost: $0**
- **Projector –** A digital video projector capable of at least 1280x1024 screen resolution. We will also need a means of mounting the projector in a fixed position.
  **- Expected Cost: $0**
- **Screen –** A flat white surface to project the image on. In its most basic form, this can be a bare wall. For the rear-camera configuration, we will need a freestanding screen that is not fully opaque. A stretched sheet of fabric would probably serve nicely in this role.
  **- Expected Cost: < $50**
- **Camera –** The image processing solutions that we are considering advertise the ability to capture and process video from a wide range of sources, ranging from simple USB-capable webcams through high-end DV cameras. For Luminance, we intend to use a DV camera attached to the server through a Firewire connection.
  **- Expected Cost: $0-250**
- **Misc. Hardware –** Extender cables, power strips, specialized mounting hardware needed to place hardware components in position.
  **- Expected Cost: < $150**

**Components List – Software**

- **Recognition –** Most likely the EyesWeb Open Platform, with the motion capture library and necessary patches applied. EyesWeb, its base libraries, and most patches are distributed freely.
  **- Expected Cost: $0**
- **Translation –** Necessary to translate position and motion data to a format understandable by Flash. This will most likely be flosc, which is distributed freely.
  **- Expected Cost: $0**
- **Rendering –** Most likely FlashMX 2004, for reasons already stated. This is already licensed by the program.
  **- Expected Cost: $0**
- **Flash Video Compressor –** Sorenson Squeeze
  **- Expected Cost: $250**

**Errata**

- **Books –** Alphanumeric symbols pressed into cellulose in meaningful patterns.
  **- Budget: $250**

**Total Estimated Cost: $500-750**

## Influences and Inspirations

Luminance is informed and inspired by many previous efforts of research, artistic exploration, and experiments. Luminance has been influenced by projects and theories of human computer interaction, human sociology, and learning theories. A compilation of these influences and their impact on Luminance follows.

**Mine Control** (www.mine-control.com)

Led by artist/programmer Zack Booth Simpson, Mine Control has produced exhibitions exploring interactions between users, projected screens, and shadows. Beginning with more rudimentary demonstrations of particle behaviors in 2000, the group has since explored such topics as collaborative game environments, visualization interfaces, as well as installations using props and flashlights as the tools of interaction. Most of Mine Control's exhibits are based on Simpson's custom-authored "Shadow Garden" platform.

**Myron Kruger – "Responsive Environments"**

Myron Kruger's work in the 1970's investigated the interaction between machine and humans, with the interaction serving both as interface device and as a tool to develop social relationships. Kruger used concepts of responsiveness to create artistic experiences and environments in which the ultimate goal was for "full-body participation in computer events that were so compelling that they would be accepted as real experience."

Marshall McLuhan stated that the "massage is the medium." Similarly, Kruger's work explored the notion that "response is the medium." The idea of full-body interaction creating action and reaction systems is a core fundamental characteristic of Luminance.

**Camille Utterback – External Measures Series**

Interactive installation artist Camille Utterback explores interactive mediums that provide a fertile environment to explore the connections between physical bodies and the myriad of representational systems possible in the digital realm. Utterback attempts to bridge the conceptual and the corporeal in exploring how people use bodies to create abstract symbolic systems, engaging people's bodies instead of just their fingers and eyes.  Interactive systems determine the grammar of interaction with digital media, and ultimately its possibility for meaning.  Her External Measures series attempts to create aesthetic medium which responds fluidly and intriguingly to physical movement in the exhibit space.

Utterback's influence upon Luminance is to develop an interactive installation that respond to a participant's actual gestures, body language, and physical location with the installation space.  By developing physical-digital systems that engage people's bodies instead of just their fingers and eyes, the intent is to refocus attention on the embodied self in an increasingly mediated culture.   In addition, Utterback places a great deal of emphasis upon aesthetics.  Similarly, Luminance will explore different types of multimedia content to engage participants.  Visual and audio aesthetics will be a significant variable of content exploration.

**Norbert Weiner – The Human Use of Human Beings**

Norbert Weiner's insights into human-machine interactions are the premise behind all human-computer interactivity and interface design. Weiner observed that the quality of data transmission between man and machine is affected by system feedback and noises.  Weiner also promoted the idea that interactions between man and machine should be based upon natural communication methods from person to person.

The influence upon Luminance should be obvious.  The communication between man and machine in Luminance depend upon natural physical communication of man.  In addition, Short Attention Span's will heavily explore notions of two-way feedback between the systems of man and machine as well as the use of sounds to enforce machine responses.

**Bill Viola**

The work by multimedia artist Bill Viola influences the Luminance project in a number of ways. The first way he has been an influence is merely by the scale he uses for his video installations and the high quality of production value in his projects.  But most importantly, his choices of content are influenced by artistic works of other mediums. For example, his video piece "The Greeting" is inspired by Italian Renaissance paintings. Short Attention Span will use similar methods of drawing upon our favorite artistic creations for inspirations for interactive based multimedia content.

**Jean Piaget**

Jean Piaget's theories of cognitive development influenced Alan Kay's developments of the graphical user interface and the Dynabook while he was at Xerox PARC.  Piaget outlines four stages of cognitive development which had certain characteristics with Short Attention Span will incorporate into Luminance.  Short Attention Span will use Piaget's theory that supposes that people develop *schemas* (conceptual models) by either assimilating or accommodating new information. These concepts can be explained as fitting information in to existing schemas, and altering existing schemas in order to accommodate new information.  This will be a cornerstone of the initial content developed within the user interface

Piaget's also pointed a need for hierarchical nature of learning stages.  Short Attention Span will use this hierarchical nature in the content developed.  Users will encounter different types of interactive digital content that will become progressively more intriguing to adapt to and learn how to influence.

**Reactrix**

Reactrix is a company in Menlo Park, California which specializes on interactive marketing installations. They have developed a software/hardware configuration which has been installed in high traffic consumer areas. The Short Attention Span has spent time observing an installation of Reactrix at the Sony Metreon in San Francisco. Users interacting with the installation, particularly children become immersed in the digital graphics on the floor and often spent lengthy amounts of time discovering and playing.

Short Attention Span aims to produce compelling enough content to sustain audience participation for such lengthy periods of time. The playfulness of Reactrix systems and digital content present an excellent example.

**Burning Man**

The annual art festival Burning Man encourages not only creative artistic expressions but also promotes an atmosphere in which everyone is a participant. Similarly, Short Attention Span is developing Luminance as a multimedia installation that demands active participation. Luminance is not for the casual observer.

**Waking Life**

This 2001 animated feature follows an angst-ridden young man on his philosophical journeys. Its graphic style is the inspiration for the SAS team's "Faces" concept. Engineer Bob Sabiston created a Macintosh – based rotoscoping software that resulted in a stunning, lively, vibrant look for moving bodies.

The shifting planes of flat color keyed the idea for manipulating face parts.

# Project Realization

Two primary phases have been defined by Short Attention Span.

**Installation Configuration**

This phase comprises the definition of technical requirements, software and hardware design, and the actual physical setup of the installation. The most significant challenge during this configuration is the use of the image recognition software component and understanding how that software translates captured images into digital interactive objects in Macromedia Flash. At the end of this phase, the project team must understand the potential to use variables of positioning, speed, and distance of the recognized object.

**Content Creation**

The content creation phase is comprised of numerous, iterative cycles of content design, content production, and user testing. The project team will work together during this phase by individually brainstorming and presenting concepts to team members at schedule meetings. This collective process will help shape concepts and make determinations for production. Each creation cycle ends with a period of user testing that focuses on the participants' ability to interact with the content, his/her ability to understand the content, and his/her ultimate enjoyment of the piece. The intent of each cycle of content creation is to build upon the learning of prior user testing periods in regards to interactivity and content type.

## Project Milestones

Short Attention Span has defined the following major milestones:

**November 1, 2004 – Installation Design**

Hardware and software decisions finalized. All necessary assets acquired and on-hand. Test bed environment set up for initial development.

**December 1, 2004 – First Functional Prototype**

An initial functional prototype, representing a complete interactive feedback loop. Recognition Component is capable of meaningful communication with Rendering Component. This prototype will become part of the test bed for further content development, though further refinement and optimization will probably be necessary.

**December 15, 2004 – Initial Content Designed**

Initial content outlined and ready for basic production. This includes a description of the base content and expectations for user interaction.

**January 31, 2005 – Content Version 0.1 ready for testing**

Initial content ready for first phase of external testing. In this phase, our focus is the collection of data on user interaction and reactions.

**February 28, 2005 – Next round of concept testing**

Initial testing feedback incorporated into content, with additional performance refinement as necessary. While the main focus of this round of testing is user interaction, we are also interested in initial user reactions to the content.

**March 31, 2005 – Third round of concept testing**

Feedback from prior round of testing incorporated, additional refinements as necessary. Additional content developed and incorporated to expand the exhibit. While interactivity is always an important part of the testing, the majority of our interest is in user reaction to the content.

**April 31, 2005 – Final concept testing**

"Release candidate" ready for intensive testing by users. The exhibit at this point should be stable, without any show-stopping bugs (those that require operator intervention to remedy).

**May 30, 2005 – Preparations for final installation**

Findings from final round of testing incorporated/addressed. Location(s) chosen for exhibition, installation details finalized.

**June 15, 2005 – Thesis show**

Successful exhibition at thesis show.

**Documentation by Blogging**

As the process of creative discovery is at the heart of thesis year, each Short Attention Span team member will maintain an online blog which captures the thoughts and activities of the process. While each individual blog entry may not reveal any groundbreaking revelations, the intent is for the sum of the individual parts to reveal an underlying methodology. By capturing the activities of the thesis year, Short Attention Span intends to reveal a template for multimedia content production that captures a working model of brainstorming, design, development, and deployment within our interactive area.

## Assessment

MILESTONES: In addition to meeting deadlines, the assessment of the project will be geared to the findings of each milestone as in the two areas previously outlined: user interface response and content factors - such as image scale, sound application, activities mix, etc.

CONTENT CREATION PROCESS: After the initial testing stage, how the content creation process evolves as a result of the findings can be evaluated as well.

ROADMAP DEVELOPMENT: Using a requirements and specifications model, we intend to record each stage of development as a living document from which a set of useful interactive content development guidelines will be established.

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http://www.setpixel.com/content/?ID=105 Firecaster

http://www.creativityandcognition.com Creativity Cognition Studios

http://www.uni-weimar.de/~bimber/research.php

http://www.artcom.de/index.php?option=com_acprojects&page=6&id=7&Itemid=115&details=1&lang=en Images that COMPEL folks to do things, close relationship between physical activity & resulting change in images (ice breaks, water ripples) which evokes SPECIFIC & clear activity > stomping, schuffling.

http://interactivity.stanford.edu/projects/barehands.htm
"BareHands uses recognition of the shape of the touching hand (one finger, two fingers, side, etc.) to combine the convenience of direct touch with the power of multi-key

interactions."

http://www.3dluvr.com/voltaire/plaything

http://www.idonline.com/imdr02/body.html
A camera-based tracking system monitored the coordinates of overlaid shadows in real time, using movement as an agent of change.

http://www.flatblackfilms.com/ mesmerizing, translucent, shapes.

http://www.unfinished.com/index.html
Recent Discoveries from The Dept. of Shape Research

Camille Utterback - http://www.camilleutterback.com

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Linklater, Richard. “Waking Life” feature film. 2001. "interpolated rotoscoping" programmed by Bob Sabiston.