

# **PROJECTION BASED DESIGN: A COLLECTION OF ACQUIRED KNOWLEDGE**

**A Senior Project  
By**

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## **Introduction**

The application of new technology in a classic medium, such as theatre, can be a strong force in creating a unique experience for both the audience and the designer. At first, introducing new media techniques may seem like a novelty and easily dismissed as a gimmick. The fact is the modern audience is more familiar with information displayed in video format and will find projected video elements implemented into the scenic design as another way to access the story the performers on stage are trying to convey. It is our duty as designers to utilize every tool at our disposal to inform and entertain our audience. Not only is projection based design a useful tool for the stage, it is widely applied in concert productions, artistic installations, marketing, and event lighting. Projection elements add another level of visual stimulation and enjoyment for everyone.

I find it a necessity to focus my senior project on projection based design as I have found it an increasingly useful, adaptable, and desired ability across multiple disciplines. Over the last three years I have been privileged to design projection installations for performances, events, and presentations for academic programs and professional groups across campus. While I have garnered much success over these few years I have failed miserably in conveying my accumulated knowledge and experience to the next generation of student designers so that these highly sought after projects can continue to improve as new generations of LAES and Theatre students become curious about the techniques. This iBook is my attempt to make up for lost time in hopes of providing a resource that can be studied and built upon in the years to come.

## **Background**

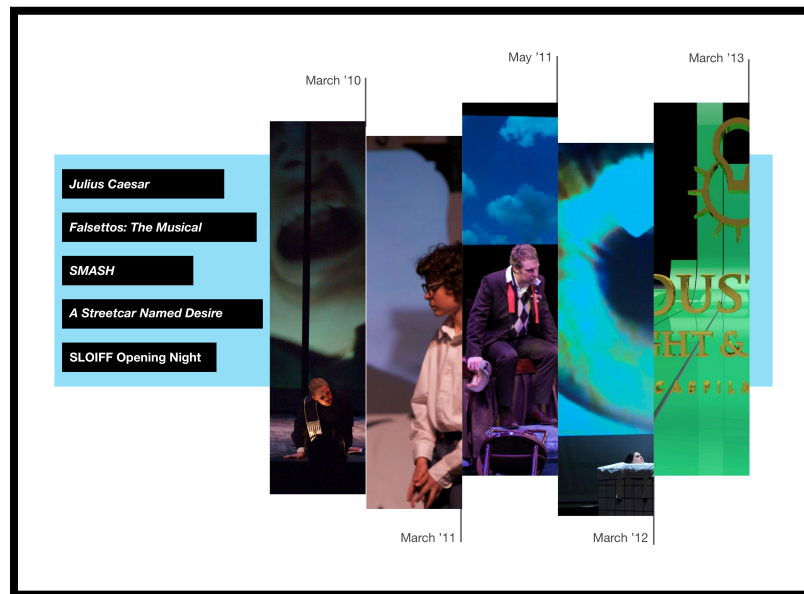
The goal of my final product is to be as accessible as possible to a wide audience from the novice designer to a more seasoned artist. Bearing that in mind it is definitely helpful if the reader has a basic understanding of a few key ideas: a general knowledge of projector applications, an understanding of digital video connections, and an understanding of technical projector specifications. These are all subjects that are thoroughly covered in the hardware introduction section although a prior knowledge will allow the budding designer to skip a lot of the technical jargon expressed in the opening chapters. It also helps to have a prior understanding of the content production tools (i.e. Final Cut Studio, After Effects, Maya, Cinema4d) as these topics will be glossed over and if there is additional training required there is a wealth of information available on the internet.

## “Projection Based Design: A Collection of Acquired Knowledge”

For my project my final deliverable will be a downloadable iBook for the iPad and iPhones. The book is a collection of written exposition, useful graphics, videos, pictures, and other interactive content. As this is written as an iBook it is intended for mobile application and reference so that students working on a design project or installation will have immediate access on location. The iBook format also has the additional benefit of being easily distributed through the iBooks Store for free download. As the book will include videos and interactive elements it is a superior form of information delivery than a simple text or online forum type resource more commonly used. In its entirety, the book is an aggregation of my collected knowledge working on projection based design projects for both LAES and the Theatre Department. Much of the information presented was learned through years of trial and error to find the most reliable and impressive systems and techniques.

The iBook is broken down into the following sections:

- Chapter 1 - Introduction



- Chapter 2 – Projects and Experience
  - Illustrates the techniques that I have already applied to productions and installations in order to gain the reader’s trust and show what has been done so far



**Matrox Triplehead 2Go**  
**When One is Just Not Enough**

The Matrox Triplehead 2Go is one of the single most revolutionary pieces of equipment the LAES program has acquired over the last few years with respect to projection based design. Prior to it's purchase our work was limited to the number of video ports on an individual computer. This meant that if the design called for multiple projectors each displaying independent media, there would have to be the same number of computers to run them. This became a major limiting factor in our design process, especially as we began moving towards more complicated productions that called for more control.

The device is capable of taking in one single video feed, either DVI or VGA, and producing three additional monitors each capable of displaying its own view. This capability reduces our reliance on excessive computer systems in the control booth and the less crew members that could be used elsewhere during the production. Also, this technology allows for the future advancement into projection mapping techniques in which multiple projectors are used to cover a three-dimensional surface with video as seen in the intro video.

A limiting factor to consider when using the Triplehead is the distance you can run video lines from your computer to the box and from the box to the destination projectors. The best technique I have found is cover the furthest distance with the initial video out from the computer, positioning the Triplehead equidistant to each projector and running the three additional video signals from that location. The box is powered by USB so any distance over fifty feet from the computer will require a powered USB extension cable.


*From the images you can see the connectivity of the Triplehead. You are capable of running three independent monitor feeds from a single computer output.*



*Expand your control to three independent projectors from a single computer.*

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- Chapter 3 – Hardware
  - Description of the hardware a designer should be familiar with and a reference to available equipment as well as new tools to consider



**DNA**  
*CalDNA from Livid Instruments is a very versatile application that has proved its reliability and control time and time again.*

**CHAPTER 4**  
**Software**

So you've got the media and the hardware, but without control there is no way to execute your design sequences. *How do you want your media to flow?* There are many applications available depending on what your finished look will be. What follows is an explanation of the available resources and how to best utilize them.

- Chapter 4 – Software
  - Description of the software the designer should be familiar with and untried systems that should be considered for future projects



- Chapter 5 – The Design Process
  - The Artistic Design Process
    - A step-by-step guide to designing projection based elements for a show or installation. Useful to those students who have not had the opportunity to take a design course or for those who could use a refresher. Helps to systematically problem solve for in process designs.
    -
  - The Technical Design Process
    - Bringing the artistic concept from theoretical to physical can be a difficult task. This chapter will help designers understand how the hardware and software referenced earlier can be put to use. Designers will benefit from my experience in troubleshooting the projector system and controls set up.
- Final Thoughts and Recommendations

My hope is that after I am graduated and gone new students will be able to use this book as a starting point for their design aspirations and allow them to save time working through the initial problems I faced numerous times and move into more advanced techniques at a faster pace. I will provide the iBook template on the LAES computers so that any future students that are particularly interested and adept will have the ability to expand and add new content as they learn their own style and approach to these projects.

## **Design/Implementation**

As the final product is in the form of an iBook the users will be restricted in its display and distribution. The iBook can be presented either on an iOS device or in the form of a PDF. On Apple mobile devices, the project will be free to download from the iBooks store or from a campus computer preloaded with the iBook files. In PDF format the iBook can be distributed across any platform that supports PDF documents or can be printed for physical reference. The intention is that the designer will not be limited in how they can access the information either in the Design Lab or on location.

## **Analysis**

As this is an intellectual project rather than a physical project the verification process is a bit trickier. The preferable method for verifying the quality of the work would be to provide a new designer with the iBook and get feedback as to it's utility. This is an impossible task at the present so I have to rely on the feedback of peers, both informed and uninformed, to get an idea of how successful I have been in conveying the information. The intention is that this book can be a working document that future students will be able to edit or add to as they see fit.

## **Related Work**

As of now there is no single resource available that is equivalent to my project. If there had been it would have been an incredible help in my formative years as a designer and would have solved a lot of issues that I had to deal with early on. Primarily, the only related tools are online discussion boards for the related technology and other designers. This is what served as my base of reference for the last few years and while there is a wealth of knowledge available, it is hard for a new designer to know what to be searching for if they don't already have a foundation of knowledge to start from. It is extremely frustrating as someone working with these systems for the first time and only finding technical documentation or online message boards filled with industry jargon that only serves to further confuse. In this sense my project is an entirely unique way to approach projection based media projects, and while future students will hopefully be motivated to move beyond the context of the document they will at least have the foundational knowledge of what has been accomplished, how, and the tools they have at their disposal to accomplish their goals.

## **Conclusion/Future Work**

My goal is to provide a resource for future student designers that is rooted in personal experience so that they can benefit from my own trial and error rather than being doomed to repeat history. It is my responsibility to the department and theatre associates to make accessible the collective knowledge I have gained over my years at Cal Poly. Students that are new to both the program itself and projection-based design will find this book very helpful, as the task can be daunting with little experience to draw upon. I hope that with the help of my project future generations of LAES students will be able to expand their design visions and move into more advanced techniques that they are excited about without the need for the extensive online scouring I had to do when starting out.

If given another year to work on this task I would be most interested in creating a web based component of the material so that student designers at other institutions would be able to benefit not only from my experience but be able to interact with one another and share ideas. In this way each student can act as an expert, sharing trials and tribulations as well as finding out about other student designs that would otherwise go unreported. I am proud of the work we have been able to provide at Cal Poly and would have loved to be able to broadcast it to other students working on this type of design work as well as gain inspiration from what others have been able to achieve. In this fashion students would be able to build an online community where they can learn, question, and network with students sharing their interests.