

Light Board Studio

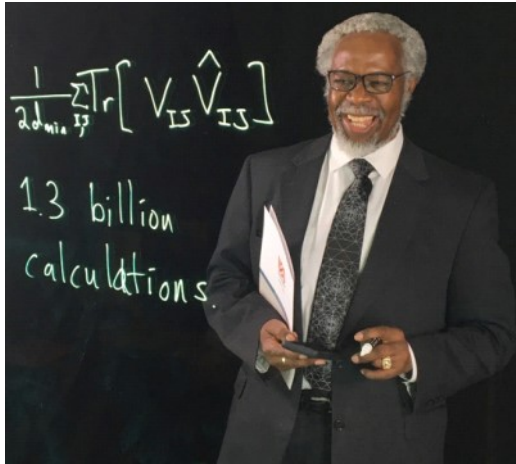


OSU College of Science iMPACT Magazine

"Upon entering his office, KC Walsh, an intro physics instructor in the OSU Physics department, showed me his latest instructional toy; a massive, room dividing, glass whiteboard with accompanying recording studio. He went on to explain the physics of the Lightboard which uses frustrated total internal reflection of light inside the glass to make words and equations luminesce brightly and colorfully where a marker draws on the surface—think of light trapped, bouncing around inside the glass and released wherever the marker touches. This is part of a recording setup for making new, engaging and higher-quality recorded lectures. In these videos writing appears to float unobstructed in front of KC as he works, making it easy to film and add in digital figures as needed."

- Leto Sapunar

Lights, Camera, Learning



by KC Walsh and Dan Rockwell



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* James Gates Jr. loved the lightboard and called technology like it "*the future of education*"

Special thanks to an OSU Learning Innovation Grant

Why Use Videos

Pros

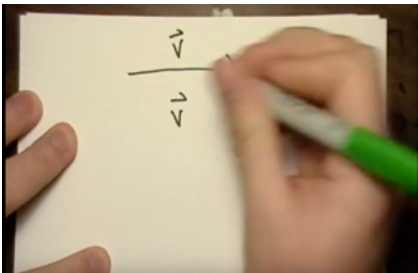
- a. Students: rewatchable, pausing, fast-forward
- b. Instructor: reusable, doesn't use class time

Cons

- a. Students: outside of class work
- b. Instructors: can de-emphasize reading

Learning Video Formats

- Hand writing on paper
- Writing at a whiteboard
- PowerPoint with voice over
- Picture in picture

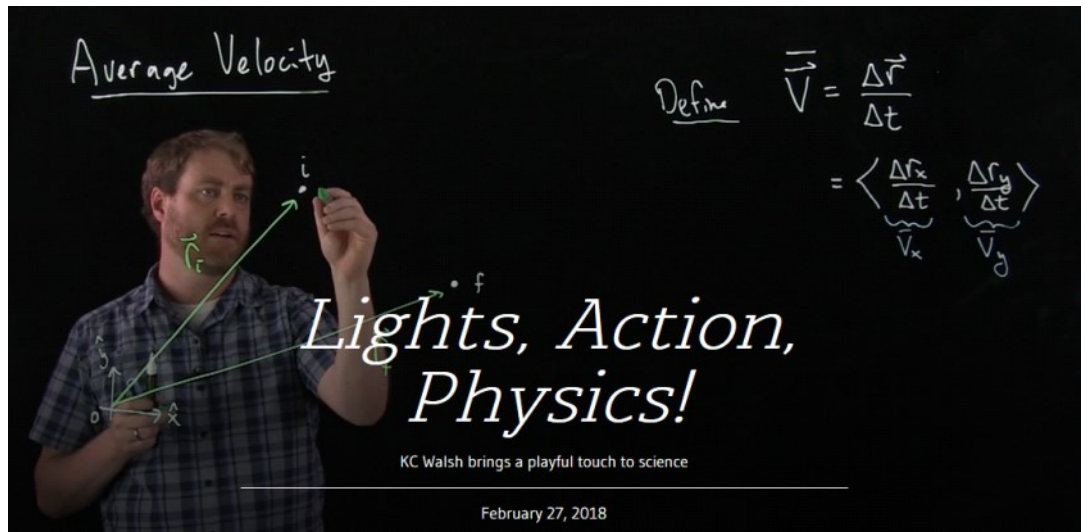


Light Board?

What is a lightboard video?



Lightboard Videos

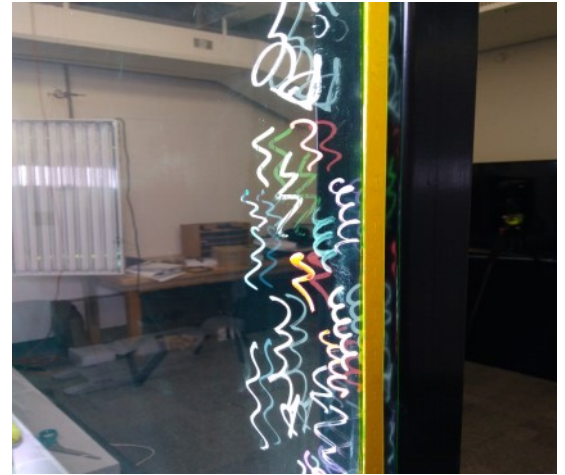


Thin Film Interference - https://media.oregonstate.edu/media/t/0_ydxprosh

Bones and Hands & Feet: https://media.oregonstate.edu/media/t/0_f3dttsexp

Why use a Lightboard

- **The instructor is visible along with their writing**
- **Ease and flexibility of use**
- **Live keying ("green screen")**
 - **Slides**
 - **PowerPoint**
 - **Prezi**
 - **OneNote**
 - **Figures**
 - **Videos**



Planning an Educational Video

- Storyboarding
- Where do you stand?
- Hook
- Limit the scope
 - 1 to 2 lessons per video
 - Duration ~10 min

Types of Videos

- Pre-lecture
- Post-lecture
- Video quiz
- Review
- Research
- Motivation
- Syllabus
- Recruitment
- Outreach
- YouTube series

Goals of BoxSand Studio

- **Minimize post recording effort***
 - **Records directly to a computer**
 - **Real-time image overlay**
 - **Minimal post processing and editing**
- **Big writing glass - lots of real estate**
- **To be in my office**
- **Modular - board rolls out of the way**

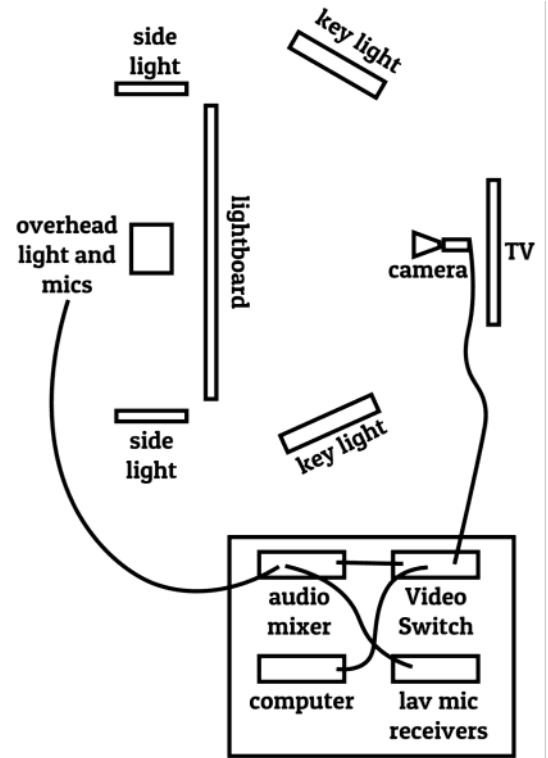
*** start recording to published video in less than 1 hour**

Lightboard

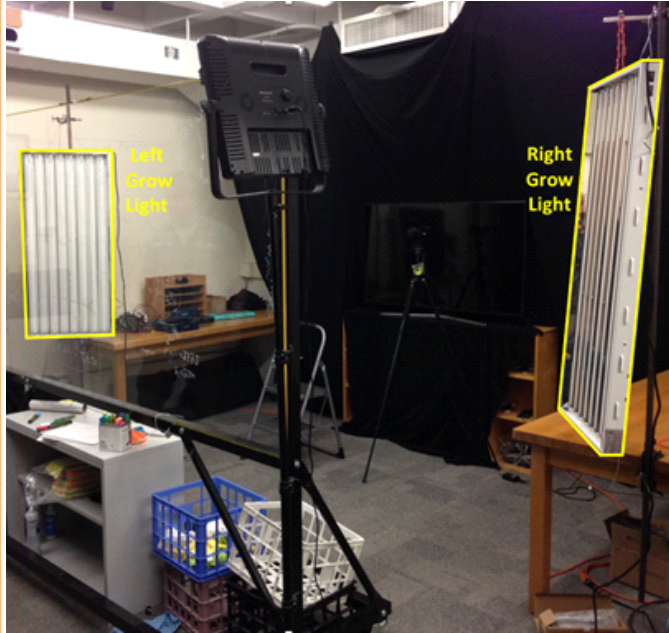
- Glass
 - 4' x 8' glass
 - 85% visible on video
- LED and power supply
- Steel frame



Physical Layout



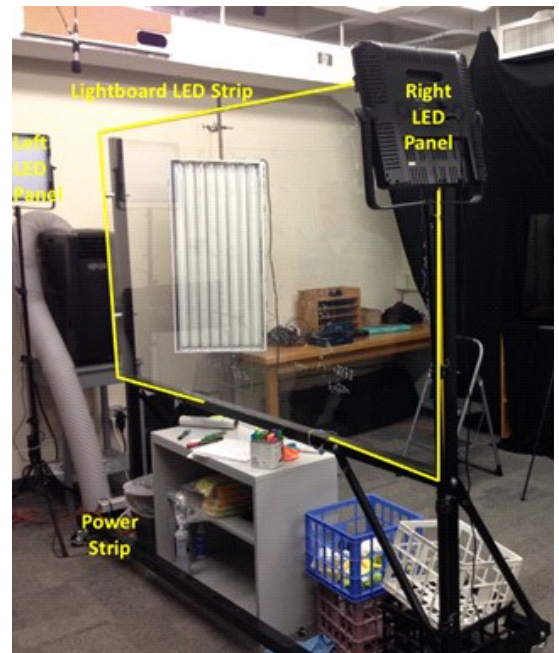
Lighting



- **Lights in our studio**
 - **Main key fluorescent front facing lighting**
 - **Side/rear LED arrays**
 - **Overhead LED array**

Lighting

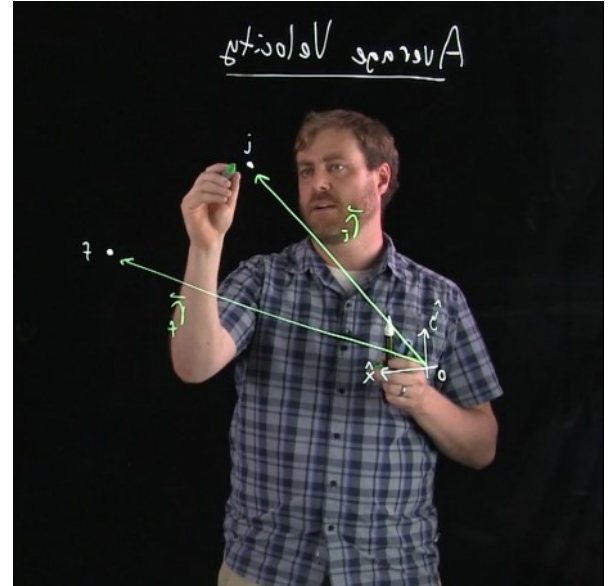
- Glare
 - layout and polarizing filter
- It can never be too bright
 - Need a large depth of field
- "Studio" lighting is much more expensive than grow lights
 - Match the color temperature for all the lights





Camera

- 1080p - 30 FPS
- Manual controls
 - F-stop, shutter speed, ISO (graininess)
- Ability to flip image (scan reverse)
 - Avoids using a mirror or post-processing



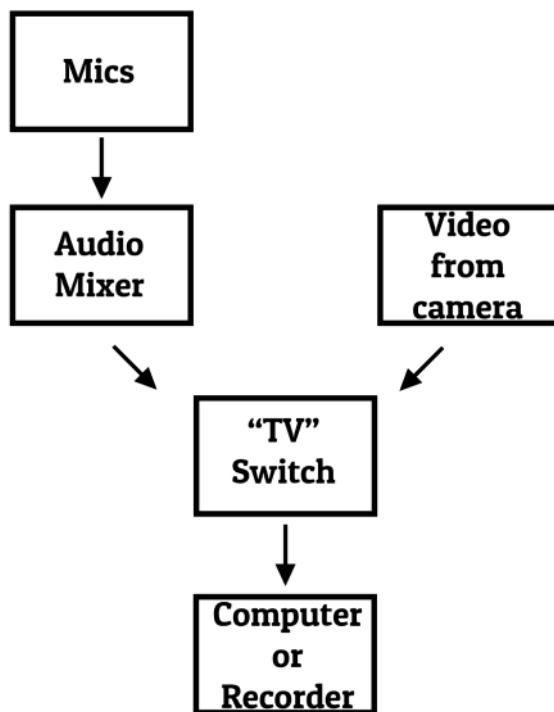
Audio



- Lav mics
 - 1 or 2 people
- Omnidirectional overhead mics
 - More than 2 people
- Audio mixer - merges audio before video merge

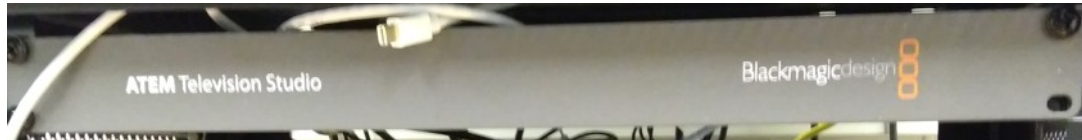


Studio Diagram



Live Production Switch

- **Live Production Switcher**
 - **Keying - overlap multiple video sources in real time**
 - Think green screen weatherman
 - **Combine audio and video in real time**
 - **Encodes - sends to USB**
 - **... and much more**
 - easily add logos/titles or transitions



Live Feed TV

so you can see the overlay video



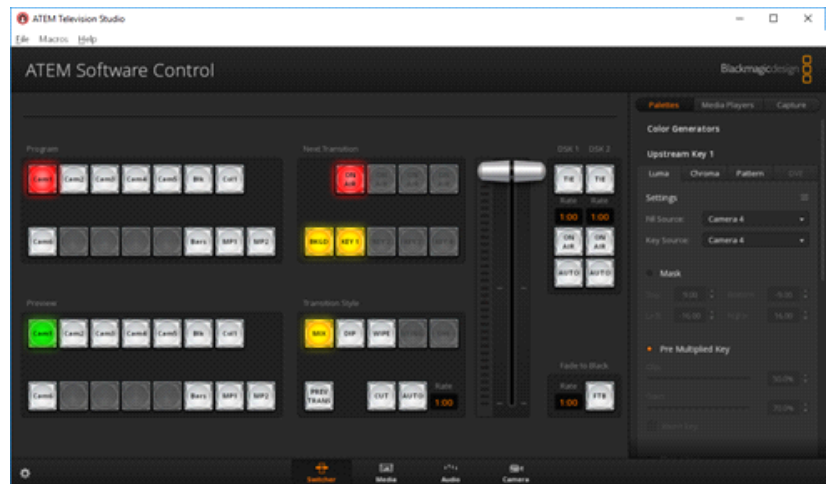
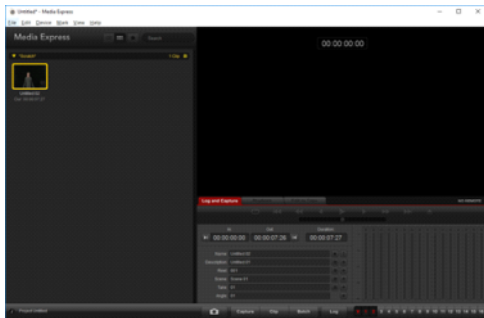
Direct to Disk Capture

- **Convenient**
 - **Can be fickle and expensive**
- **Requires SSD hard drive**
 - **A striped raid array is required for >1080p**



Recording Software

- Switch (and mixer) control
 - Provided with hardware
- Video capture
 - Provided with hardware



Editing Software

- **Adobe Premiere**
 - chosen for compatibility and cost
- Ideally just trim the film
- Adobe Photoshop, Paint
- Movie Maker or QuickTime could do most things
- We've: added intros, spliced, edited out, speed up, noise reduction



Lessons Learned

- **Glare**
- **Mac vs. PC (Linux not tested)**
- **High-res video capture can be fickle**
- **Reading and planning, beware of interoperability of competing technologies**
 - **We tried integrating different capture devices and in the end went standardized**
- **Audio and noise**
 - **Solved by using an external mixer, not going directly into the camera, and using the switcher to merge (mux) audio and video**

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- Heidi Schellman and the OSU Physics Department
- An OSU Learning Innovation Grant
- Lindsay Biga (biology)
- Devon Quick (biology)
- Drew Olson (Ecampus)



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