

# Dark Lab Equipment

- Projectors
- 86" Multi-touch Display
- DMX lights

# Projectors

## Our Projectors

### In the Lab

We have a number of different video projectors available for use in the Dark Lab.

Some of them are permanently mounted in the truss grid: those are ready and waiting for you to plug in and use!

If you would like to project anywhere else in the Lab, please ask Lieven van Velthoven (Dark Lab / Code technician), and he will see if it is possible to mount one for you. (no guarantees, but do ask!) Our projectors vary in brightness, throw ratio, zoom, lens shift, imaging technology, etc.. We can have a chat about which one might best suit your project. (these terms are explained below if you would like to learn a bit more!)

### To take home

We also have a few projectors that you can take home - namely the BenQ ones listed below. These are bookable through [ORB](#), our online loan store and equipment booking system.

### What do we have?

Here are the models we currently have. Click on the links to find out more!

2x [Epson EB-L635SU](#) (6000 lumen, LCD, 0.8:1 medium short throw) (these are the two main projection screens)

1x [Panasonic PT-VMZ60](#) (6000 lumen, LCD, 1.09-1.77 throw ratio)

1x [Panasonic PT-VMZ71](#) (7000 lumen, LCD, 1.09-1.77 throw ratio)

2x [NEC P525UL](#) (5000 lumen, LCD, 1.23-2.0 throw ratio)

1x [Optoma EH460ST](#) (4200 lumen, DLP, 0.5:1 short throw)

8x [BenQ TH671ST](#) (3000 lumen, DLP, 0.69-0.83 short throw)

### How to use the Dark Lab projectors

The permanently mounted projectors all have an HDMI cable (with USB-C adapter) that you are free to plug into whenever no one else is using them. The two main screens (Area 1 and Area 2) are also hooked up to the two corresponding PC's. Those have a little switch on the desk to choose between input from the PC or your own laptop.

The HDMI cables are labeled as 'Projector 1 (HDMI 1)', etc.; telling you which projector it is connected to, and which input to select on the projector itself.

On (or next to) the screens you will find remotes to turn the projectors on and select the correct

HDMI input.

(Please make sure to turn them off when you're done, and stick the remote back where to where it was!)

## Projector terminology

### Throw ratio

The so-called 'throw ratio' of a projector specifies how narrow or wide the projection angle of the lens is. In other words, it tells you how big the image will be, depending on the distance from the screen or wall.

Throw ratio is the projector distance divided by the image width. So for example, a throw ratio of 0.5 means that from one meter away it will 'throw' an image of 2 meters wide onto the wall (or 1 meter wide from 0.5 meter distance, etc.).

### LCD vs. DLP

There are a few different types of projectors, in the sense of how they actually create the pixels on screen. Each technology has its own strengths and weaknesses:

1. LCD projectors

Pros: Amazing colours. No artifacts when taking photos or videos.

Cons: Black levels aren't the best (dark grey instead of black).

2. DLP projectors

Pros: Black levels are usually better than LCD. Native support for 3D through DLP-Sync 3D glasses. Cons: Depending on the shutter speed, problems might arise when trying to take photos or videos (rainbow effect). Some people's eyes are sensitive to this, too. Colour reproduction is often not as good as with LCD.

### Brightness

When it comes to brightness; more is usually better! Thankfully, we have some really bright ones at CCI (up to 7000 lumen).

The light output of the projector will get spread over the whole image; so if you make the image bigger (by placing the projector further away from the screen), that means it will become less bright.

When using cameras, it sometimes helps to dial the brightness down a little, in order not to overexpose or blind the camera.

### Lens shift and mounting

Our more fancy projectors like the Epsoms, Panasonic and NECs have a feature called 'lens shift' (both horizontal and vertical). This allows them to shift the image up/down or left/right without physically moving the projector or distorting the image. Very handy!

Most 'simpler' projectors that do not have lens shift tend to project slightly upward - in the sense that if you put them flat (horizontally; level) onto a floor or table, they will project a rectangular image slightly upward onto the wall. This means that if you want to mount one of those projectors from the ceiling, you can place them upside down so that they project slightly downward onto the wall or screen.

# 86" Multi-touch Display



## Viewsonic 86" 4K multi-touch display

The Dark Lab has been outfitted with a large, two meter wide multi-touch screen. It has a built-in drawing app for sketching and (groupwise) ideation, but you can also plug in your computer and use it for touch-based interaction - or just as a big 4K monitor!

### How to use it?

Use the button panel on the front to power up the screen. It will automatically load up the whiteboard drawing app.

To use your computer instead: just plug in the USB-C cable provided! This should work for both the video and touch data.

**Please use the stylus pens whenever you can, as it is a giant fingerprint magnet!  
Feel free to use finger-based interaction - just use the micro-fiber cloth and  
screen cleaner spray when you are done (be gentle ;))**

### Using the built-in whiteboard

The Viewboard has very capable built-in whiteboard functionality. It's vector-based, 'non-destructive' (i.e. you can change edits later on), with infinite canvas plus a bunch of neat functions. The styluses have a sharp pointed side and a blunt side. The touch board can tell the difference, and will let you assign different colors depending on which side you used to touch the color palette.

For some nice videos about its other whiteboard functions see here: [Viewsonic 'Basic Whiteboarding' how-to videos](#)

You can load / save your sketches onto a memory stick or hard drive by plugging it into the USB ports on the front of the device.

In the whiteboard app or home screen, tap the folder-shaped icon to bring up the options for saving and loading files.

**Although you can store files on the device itself, DO NOT store anything personal/sensitive that you do not want others to see!!**

## For more information:

The '[Viewsonic Education North America](#)' YouTube channel has loads of other how-to videos, in case you ever get stuck on anything - including how to use it with Windows and MacOS.

## Enjoy!!

# DMX lights

## DMX (stage) lights



## What is DMX?

DMX (Digital Multiplex), aka DMX512, is the industry standard protocol for controlling lighting and effects in clubs, theatres and tons of other places.

At its core, DMX data consists of a list of 512 numbers, each between 0 and 255, usually referred to as 'channels'. This data gets sent through an XLR-style cable from the lighting controller to the lights.

Most light fixtures (and other DMX-enabled devices) usually have both a DMX-in and DMX-out port. This allows them to be daisy-chained together, meaning you can control multiple lights through just one cable.

Some lights might have one function (e.g. dimmer), while others might have a whole range of controllable functions like Red, Green, Blue, White, Dimmer, Strobe, Pan, Tilt, etc.. This means that each light takes a specific number of channels to control it, and that number will differ between lights.

All lights have a function to set their 'DMX address', indicating which of the 512 channels are meant for that light.

For example: if one light takes **eight** channels to control it, and the next one takes **fourteen** channels;

- The first light would be set to DMX **address 1**, and takes DMX **channels 1-8**.
- The second light would then be set to **address 9**, and take **channels 9-23**.
- The third light would be **address 24**, etc.

In general, for controlling \*any\* light, you will want to look up the User Manual for that model to find out which channels control which function of the light.

Just scroll down to find a table like this:



## DMX protocol

DMX	Value	Function	Fade type	Default
1	<b>Strobe and Pulse effects</b>		Snap	12
	0-7	Off		
	8-15	Open		
	16-131	Strobe, slow to fast		
	132-139	Open		
	140-181	Pulse, fast close & slow open		
	182-189	Open		
	190-231	Pulse, fast open & slow close		
	232-239	Open		
	240-247	Strobe random		
	248-255	Open		
2	0-255	<b>Dimming Coarse</b> 0 → 100%	Fade	0
3	0-255	<b>Dimming Fine</b>	Fade	0
4	0-255	<b>Red</b> 0 → 100%	Fade	0
5	0-255	<b>Green</b> 0 → 100%	Fade	0
6	0-255	<b>Blue</b> 0 → 100%	Fade	0
7	0-255	<b>White</b> 0 → 100%	Fade	0
8	<b>"Color Wheel" Effect (Color Presets)</b>		Snap	0
	0-10	Open		
	11-15	Color 1		
	16-20	Color 2		
	21-25	Color 3		
	26-30	Color 4		
	31-35	Color 5		
	36-40	Color 6		
	41-45	Color 7		
	46-50	Color 8		
	51-55	Color 9		
	56-60	Color 10		
	61-65	Color 11		
	66-70	Color 12		
	71-75	Color 13		
	76-80	Color 14		
	81-85	Color 15		
	86-90	Color 16		
	91-95	Color 17		
	96-100	Color 18		
	101-105	Color 19		

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RUSH MH 6 Wash™ User Manual

DMX	Value	Function	Fade type	Default
8	106-110	Color 20	Snap	0
	111-115	Color 21		
	116-120	Color 22		
	121-125	Color 23		
	126-130	Color 24		
	131-135	Color 25		
	136-140	Color 26		
	141-145	Color 27		
	146-150	Color 28		
	151-155	Color 29		
	156-160	Color 30		
	161-165	Color 31		
	166-170	Color 32		
	171-175	Color 33		
	176-180	Color 34		
	181-185	Color 35		
	186-190	Color 36		
	191-192	Open		
		Color Scroll		
	193-214	Ascending, fast → slow		
	215-221	Stop (at current position)		
9	222-243	Descending, slow → fast	Fade	128
		Random Slots		
	244-247	Fast		
	248-251	Medium		
	252-255	Slow		
	0-255	<b>Zoom</b> wide → narrow		
	0-255	<b>Pan</b> 0° → 540°		
	0-255	<b>Pan</b> (fine control)		
	0-255	<b>Tilt</b> 0° → 220°		
	0-255	<b>Tilt</b> (fine control)		
14	<b>Fixture Control Settings</b>		Snap	0
	0-9	No function (disables calibration)		
	10-14	Reset fixture		
	15-54	No function		
	55-59	Enable calibration		
	60-74	No function		
	75-79	Pan & Tilt Speed = Normal		
	80-89	Pan & Tilt Speed = Fast (default)		
	90-94	Pan & Tilt Speed = Slow		

## How to use the Dark Lab lights

The permanently mounted stage lights in the lab are all daisy-chained together. There is a little switch box where you can select what controls the lights: i.e. the lighting desk, a USB DMX interface, or the wireless DMX receiver (ask the Kit Room or a Dark Lab technician for the wireless DMX transmitter).

We also have DMX shields that can plug into your Arduino.

All lights in the Lab are labeled with their DMX (starting) addresses. Please refer to the User Manuals of the lights to know which consecutive channels correspond to which functions:

[Martin Rush Batten 1 Hex User Manual](#)

[Martin Rush MH6 Wash User Manual](#)

The Eurolite lighting desk has already been set up to work with our specific lights, so you won't need to worry about addresses and channels if you just want to change the colours!

If you want to incorporate DMX into your projects and make it interactive through code (using e.g. a USB or Arduino DMX interface to connect to the lights), you will need to keep the above in mind though!

## What DMX equipment is available to take home?

We also have a few lights and DMX interfaces that you can take home. These are bookable through [ORB](#), our online loan store and equipment booking system. Feel free to have a look, or have a go! The technicians will be happy to help with any questions you might have.