06.WorkflowCamerasDarktable

Monday, September 11, 2023 3:27 PM

Today:

Photo Hardware resources
Cameras
Darktable/Photoshop/Gimp intro

Sam N, Michael, Matt - Catme?
Sam H, Michael - Slack?
Michael - Docusigns

Admin:
You should have gotten an email from CATME with the names of one or two POTENTIAL teammates and the times you have available in common. Check the times to see if you are really available when they are. Somebody usually reports an error at this point and needs to change their data in CATME. This will mean I need to shuffle people around and remake the teams. Let me know ASAP if you need to change your schedule and I will remake the teams. Even if you don't have an error, your teammates may change when I remake the teams, so please be patient.

Photography Hardware Resources

https://www.colorado.edu/libraries/services/borrowing-university-libraries-materials/technology-other/multimedia-equipment-lending-library
Dslrs, video cameras, tripods, lenses, table tents etc for student to borrow. One week, reserve online
ITLL 2 week checkouts

Rent macro lenses and other equipment:

Pro Photo Rental on Arapaho
http://prophotorental.com/
Canon, Nikon, Olympus bodies and lenses. Also used equipment for sale.
Pro Photo Rental, Inc.
1644 Conestoga St, Suite 5
Boulder, CO 80301

Used equipment shops

Victory Camera: Used and Vintage, buy sell trade.
https://victorycamera.com/
2875A 28th Street
Boulder, CO 80301
(720) 379-7789

Mike's Camera: Mostly new, some rentals, some used. Repairs. Will develop film quickly. Will match online prices.
2500 Pearl Street
Boulder, CO 80302
Phone: (303) 443-1715
Email: store1@mikescamera.com
http://mikescamera.com/

B and H big online store.

OVERVIEW Choice 4: Image Acquisition.

We'll do this section in more depth than in the rest of our Overview.

Good digital photography references:
Thousands of books and videos are out there.
LinkedIn learning: online video tutorials for photography and video production
CU has a site license. Access from MyCUInfo > CU Resources >Training > LinkedIn Learning

We'll cover basics here to get you started.

4.1) Workflow - Framing/Composition

a. #1 rule of photography: Make The Subject Fill The Frame
   Yes, you can crop to achieve this, but image dimensions of less than 700 pixels won't be accepted.

Use your real estate well.

b. Know your scale. Take an extra image with a ruler in it.
   You'll need to specify your FOV = Field of View
   i.e. "top to bottom was 10 cm"
   Sometimes the image will supply the scale, such as the diameter of a jet or jar.
c. Work it. Take many images, from varied POV = Points of View
   - Get close, pull back. Move around the sides.
   - Try a mirror to see the back.
   - Consider making a stereo image: 3D!
   - Try video, a few seconds or minutes
   - Change the lighting.
   - Try time lapse (smartphone camera app is easy to use)
   - Consider the motion: Capture the whole track, and also zoom in on a particular moment/location
   - Plan lots of attempts. **Look at results at full resolution first**, not just on camera LCD. Takes time.

Don't forget to also make copious notes on your experiment. What fluids, dropped from how high. Photograph your setup, measure distances to camera, to lights, everything you can think of so you could do it again.

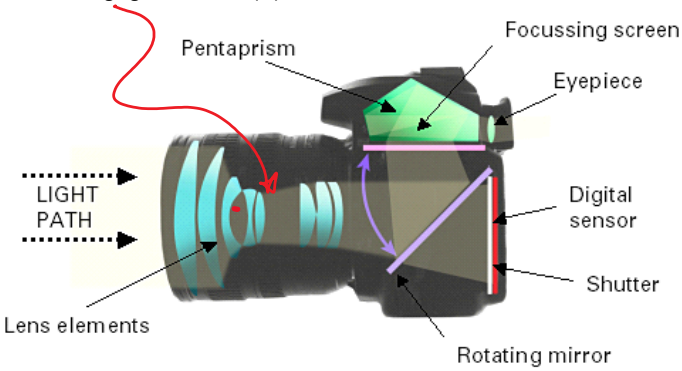
4.2) Cameras: Roughly 4 common types, but technology is changing quickly

All have
- AE = Auto Exposure. Automatically sets shutter time, aperture, ISO (sensor sensitivity) according to varied programs
- AF = Auto Focus. May be contrast focus and/or phase detection technology. See https://www.jmpeltier.com/2017/12/08/difference-phase-detection-contrast-detection-autofocus/

DSLR

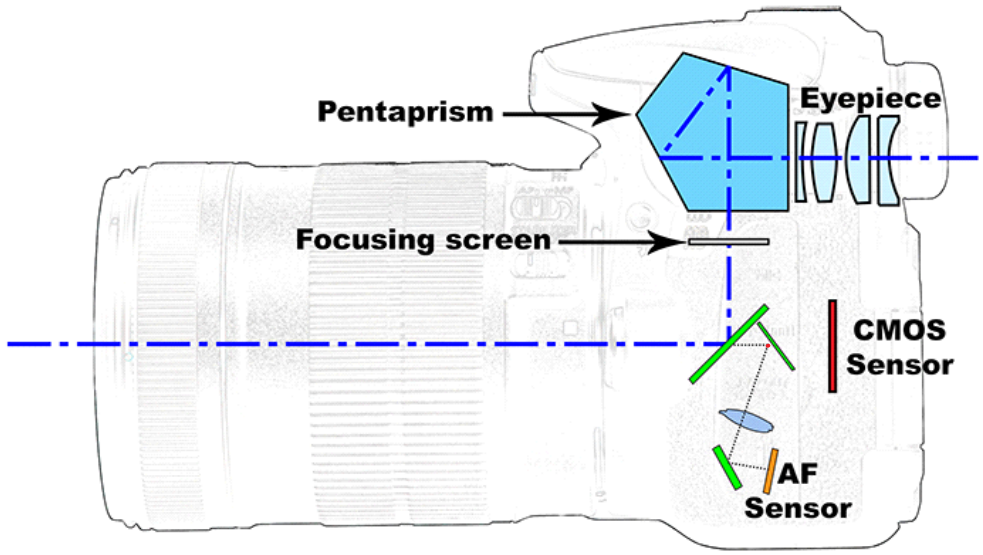
https://www.ephotozine.com/articles/nikon-d5-dslr-hands-on-preview-28654/images/highres-Nikon-D5-Internals-Cross-Section-1_1452055157.jpg

Imaging Stabilization (IS)



https://george12johnson12.files.wordpress.com/2015/03/slr02.jpg
Mirror flips up when shutter triggers = REFLEX.
For long exposures, lock mirror up to prevent vibration.

DSLR animation:
https://commons.wikimedia.org/wiki/File:SLR_-_DSLR_optical_diagram_07.gif



https://2dhnizrxqvv1awj231eodql1-wpengine.netdna-ssl.com/wp-content/uploads/2017/03/AFSensor.jpg
Use circular polarizers on lens front to get past partial mirrors into AF and AE sensors. Why use a polarizer? Darker skies, no glare, keeps colors for the most part.

Mirrorless

Same capabilities as DSLR, but no optical viewfinder; LCD display only. Lighter weight as a result. Image composition in varied lighting conditions can be difficult, harder for folks with glasses, less focus resolution. Maybe electronic shutter only?

Interchangeable lenses

PHD:

Small sensors; lower resolution even if mpx the same; diffraction limits approached?
Often no lens choices. Can still add close-up lens.
Composition is harder. LCD screens tough to use in sun, don't show fine focus (on low end cameras). Usually can't preview depth of field.
Much lighter, more portable.
Comparable performance at prosumer level.
Often excellent macro (close up) imaging due to small sensor and short focal length lens.
Becoming rare because

Phone cameras

Very small sensors, very short focal lengths but reasonable MPx. Often good macro imaging. Can add lenses. Often dirty or damaged lens surface. Fixed aperture size, electronic shutters only. Difficult to specify exposure or focus; specialized apps may help. Unknown image processing.

CAMCORDERS:

primarily for video, now only professionals use; prosumers use DSLRs, everybody else uses phones. Records to disk or solid state memory. Usually longer record time than still cameras. Built-in effects, maybe editing, quieter mechanisms, set white balance, better microphones
Action cameras: GoPro Hero series. Tiny, rugged, waterproof, good resolution, image stabilization. Fixed wide angle lens.

High Speed Cameras

In the ITLL Electronics shop for checkout

ITLL cameras

For student checkout. These are all located in ECCE 167B. Jonah Spicher's office in the ITLL Electronics Center. Jonah, or any engineer in that space, can support students with equipment checkout. Let me know if you need anything else. Thanks!

Mfg	Type	Model	Link
Sony	Camcorder 4K HDR	HXR-NX80	https://pro.sony/ue_US/hxr-nx80

JVC	Camcorder 1920 HD	GC-PX100BU	https://uk.jvc.com/microsite/eu/gc-px100/index.html#SPECIFICATIONS
Kron Technologies	Slo-Mo 1280x1024 @ 1,069FPS (max res) 40,413 Frames Per Second (FPS) at lower resolution.	Kronos 1.4 High Speed Camera	https://www.krontech.ca/product/chronos-1-4-high-speed-camera/
Panasonic	Mirrorless. 20 Mpx, 4K video	Lumix GH5	https://shop.panasonic.com/products/gh5m2-mirrorless-camera-body
Canon	DSLR. 15 Mpx, HD video, ISO 128,000	EOS Rebel T1I	https://global.canon/en/c-museum/product/dslr801.html
GoPro	4K video max, wide angle lens, 240 fps at low res	Hero3	https://gopro.com/content/dam/help/hero3-silver-edition/manuals/HER O3_Silver_UM_ENG_RevC_web.pdf

Camera technology is changing rapidly. Lines between designs are shifting. Superzooms, for example.

Who has what? Clicker poll:

A - DSLR	B - Mirrorless	C - Compact, Point and Shoot	D - Film	E - Phone camera only
Digital Single Lens Reflex Optical viewfinder	Interchangeable lens but no viewfinder, just LCD	PHD Push Here Dummy. LCD viewer, fixed lens		

2020	2022	2023	2024
A - 54%	73 %		65
B - 21%	17%		18
C - 14%	7%		6
D - 4%	0		6

Darktable

Get a mouse!
Most decent editors are designed for them; not styluses, not trackpads.

E - 17% File formats; export
3% 2. Desktop nav
3. Contrast
18 4. Crop tool
5. Retouch/Clone stamp
6. Filters, sharpen

Darktable live demo. See video recording.

"C:\Users\hertzber\Pictures\IMG_0070.CR2"

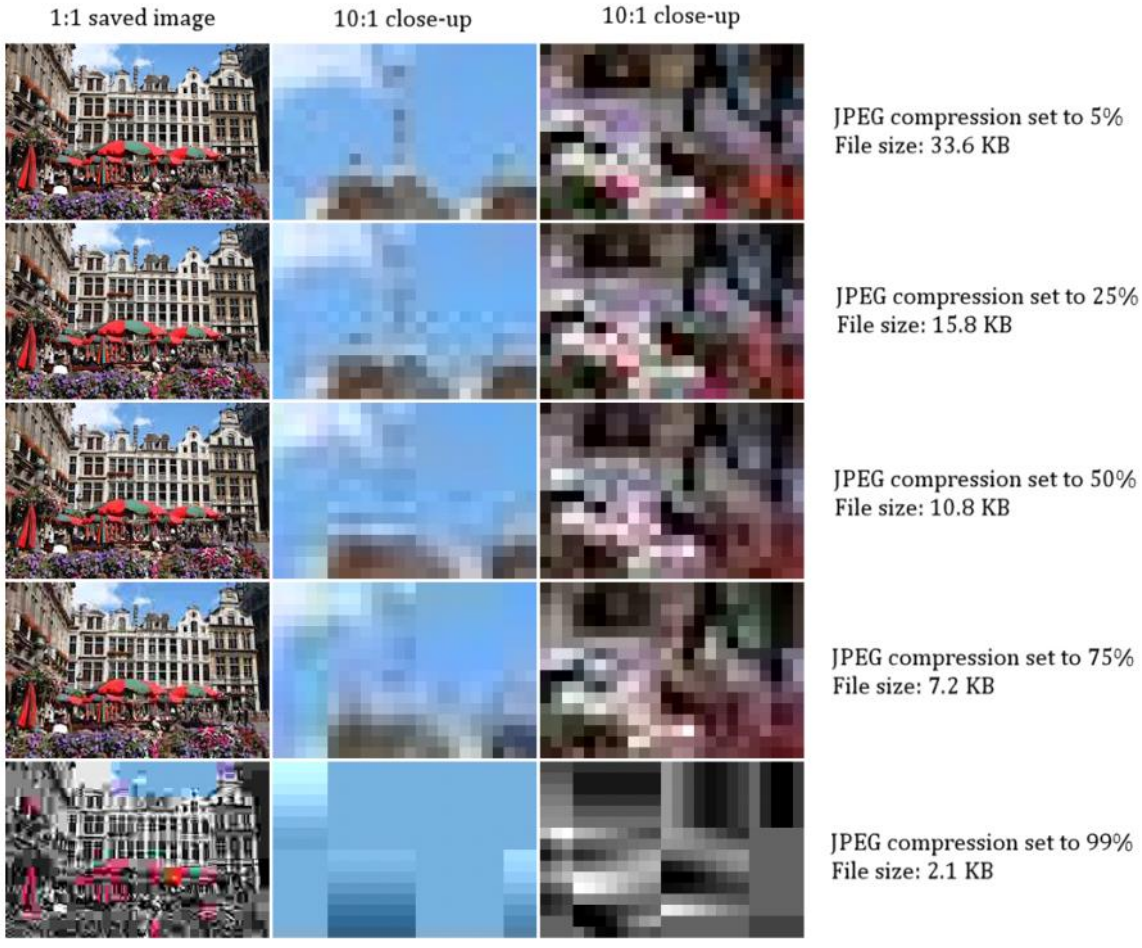
1. File Formats
2. Will go over these Wednesday

	Still images, 3 files			Video		
	1) Original = straight from the camera. Do not edit or change file type	**2) Edited Archival**	**3) Edited for posting**	**1) Original clips**	**2) Edited Archival**	**3) Edited for posting**
Submit to	Canvas	Canvas	Flowvis.org	None	Canvas	Youtube or Vimeo
File type	As shot, preferably in camera raw format: NEF, CR2, HEIC etc.	PNG. Choose zero compression.	.jpg, with at least 90% quality	none	Mpeg/mp4 Must include title clip	mpeg. Must include title clip
Resolution	As shot, as high as your camera is capable of	As shot, minus cropping	Max 1300 px wide	none	Maximum, as shot	Max is recommend ed

Required in Title clip:
Your name
Date
Collaborators
Music credit
Optional: video title, course name etc.

If assembling a video from multiple still images, upload a representative raw image along with edited final video.

Why does archival version have to be non-lossy?
Jpg loss example: By Marek Slusarczyk, CC BY 3.0, https://commons.wikimedia.org/w/index.php?curid=143680321



Most DSLRs and mirrorless offer a camera 'raw' or native format: NEF, CR2 etc. These contain the maximum information. Use this if available!
Most other cameras store images as jpg only. Every time you edit and then save a .jpg, it compresses the image again, and you lose

information because jpg compression is always *lossy*. Open in whatever, then edit and ***do not store as jpg again until posting***!

Instead, store as a non-lossy format: png, PSD, Photoshop's native format or .XCF, in Gimp. Darktable doesn't affect original images, and only stores your edit information in a 'sidecar' xml file until you export at the end; thus is lossless.
DON'T use *Photoshop* RAW. Metadata is lost; images can't be opened.
Camera raw formats, like HEIC, NEF, CR2 etc, are good for original images.
HEIC is maybe lossy, maybe not; depends on compression setting.

For uploading to flowvis.org & Wordpress: YES save as jpg, max width 1300 px for landscape image. For portrait orientation image, make into a landscape format: save as 1100 wide by 900 high, with extra space on sides in a dark neutral gray. Our Wordpress theme, Impreza is 'responsive', resizes image for each device, but makes portrait orientation images too large and low res when selected as featured image for a post.

Gimp and older Photoshop cannot open camera raw formats. You will need a conversion program of some sort.
Darktable can open camera raw formats, even new ones.

Do not import from camera directly into a photo program; it will convert files automatically, and you could lose the original metadata. Instead, **download, i.e. save to a file first**. Try plugging your camera or SD card from the camera into the computer, then drag files from camera to hard drive.

Post Processing

All images will benefit from cropping and/or contrast & brightness tweak.
Art/Sci line: Edit to enhance physics, not obscure it. With that first, aesthetics next.

Most image processing software will be adequate for this course: crop, brightness, intensity, spotting

Quick poll:
I am familiar with

A) No image processing program
B) Photoshop
C) Instagram image editor
D) Darktable
E) Other?

	2022	2023
a	37%	43
b	-	36
c	30	14
D	Gimp -	DT 4
E	Gimp, lightroom, RawTherapee	4%