HOW DO WE LOOK?

Photographs by Engineering Students
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What happens when talented engineering students are challenged to express themselves artistically? The results are calculating and fascinating. Featuring the distortion of time, space and color, students of the Albert Nerken School of Engineering at The Cooper Union produced artistic portfolios that reflect their creativity and their technical training and, ultimately, how they view themselves and the world.

These images were produced in the Spring of 2012 by students taking a course entitled “Scientific Photography.” Each student completed a technical project—such as designing and building a thermal imaging camera—and produced a small artistic portfolio. This book constitutes a small sample of their artistic efforts.

The images were on exhibition at The Cooper Union in December 2012.
Imperfect Reflections
A reflection can be like a memory—clear and understandable overall—but upon closer inspection, a bit fuzzy in the details. I wanted to emphasize the imperfect reflection of the scene in the water so I cropped out the direct image completely. If the water were perfectly flat and still, the resulting image would resemble a conventional photograph of the scene. It’s the ripples, waves and floating objects that tweak these cityscapes and make them alternately disturbing and intriguing.
In Motion
In this work, I focused on the beauty of motion and how our imprecise movements are smoothed out over time. I wanted to capture the motion of objects before the scene was frozen by the camera’s flash. Medium-length shutter speeds were used to capture rotation and translation in the form of motion blur. To add randomness, I used my fingers to interact with the coin (opposite) and origami (cover image). To create this work with a point and shoot camera, I spun the origami with my breath and used the camera’s flash to freeze the coin. I experimented with a variety of shutter speeds to achieve the desired motion blur effect.
Photography usually captures single moments in time. But what if we could add the fourth dimension into photos? By moving a light source around the camera’s field of view in a long exposure, I am able to track the trajectory of the light and capture it in a single image. The result is a surreal layer of "light graffiti" added on top of the background. This technique allows painting on top of photographs without using any conventional medium or canvas, paying homage to the origin of the word photography: painting with light.
Time-Lapse Photography

Seeing photos that portray the same scene at different times of day sparked my interest in the concept of time-lapse photography. I especially wanted to express the contrast between early morning and night.

I wanted to portray New York City’s wide range of cultural diversity, earning it the nickname the “Melting Pot.” Unfortunately, due to time limitations—and the necessity to return to the same location several times for each composite image—most of my images simply portray locations in close proximity to Cooper Union. However on July Fourth, I was able to employ this technique in a panorama photo of the New York City skyline.
My focus in photography has always been wildlife. Most professional wildlife photographers camp out for days, monitoring one location. I designed a camera that could do the waiting and watching by itself. Trapped in the concrete jungle with little wildlife to speak of, I decided to take advantage of urban animals’ indifference to man-made objects to get close-ups. I used a peephole, with a viewing range of $2\pi$ steradians and fish-eye distortions. When motion is detected, a snapshot is saved and converted to an undistorted, rectilinear image. This set of images shows a pigeon working up the courage to take a cashew placed directly underneath the lens.
Motion in Detail

Capturing a still photograph of a subject in motion often ends in distortion and loss of detail. The Harris Shutter technique allows the photographer to combine information from more than one distinct moment in time to form one detailed image of motion. This is done by taking still photographs of the progression of the event at hand. Three photos best exhibiting the movement are placed in each of the red, green, and blue channels of a new photograph using photo editing software. Any stationary part of the scene returns to its original color, while moving objects appear in different colors at different positions.
A self-portrait is a depiction of oneself through his or her own eyes. I sought to deconstruct my self-portrait not into conventional pixels, but into the microscopic structures that make up the body. I sought to bring the viewer into moments when I see myself as a work of art.

I photographed 14 different samples of my body at various magnifications in order to capture the complexity of the building blocks that comprise our physical form. The microscope photographs expose the intricacies of how we are made and what we fail to see in our limited optical range.

I used a digital camera-microscope to photograph my body samples. I selected 200 images to compose a mosaic that resembles my face. This photo-mosaic mimics what happens when we look closely at ourselves, exaggerating by 4 to 400 times what our naked eye can distinguish. This effect is evident as you view the image (opposite), first from arm’s length, and then from a distance of a few inches. The photographs that follow are a selection of my body samples that were used to produce the photo-mosaic.
The side-to-side field of view of human eyes is about 180 degrees, but a panoramic photo can cover up to 360 degrees—everything around the photographer. I don’t like panoramas because they are shaped like band-aids—very long, but not very tall. To avoid that, I took some of my conventional panoramas and made them into “Little Planets.” This technique involves mathematically transforming the photo, warping it and connecting the right and left ends together to create a continuous, ball-shaped image that is comfortably square. I applied this technique to various Manhattan scenes such as Central Park, and was pleased with the worlds I created.
Forgotten Information
A single pixel in a digital color photo is represented as three values representing the amount of red, green, and blue in that dot. The values range from 0 to 255 such that a pixel with values (255, 0, 0) would appear to be bright red. These photos show what happens when constraints are put on these color values. For example, how would an Icelandic landscape image appear with only very blue pixels for the sky and very brown pixels for the land? Our eyes use context created by neighboring pixels to properly interpret shapes and colors, so these photos explore what we see when the context is removed.
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Photographs by Engineering Students
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The Cooper Union
Curated by
Alan Wolf & Teddy Koffman AR ‘13
Cover photograph: Eric Leong, ME ’14
Origami: Uyen Nguyen, ME ’14
Frontispiece: William Biesiadecki, ME ’14
Opposite page: Eric Leong, ME ’14
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Mindy Lang
Director, The Cooper Union Design Center
Exhibition Installation
Teddy Koffman AR ’13, Andrew Lam, AR ’15
Vincent Hui, AR ’15, Paul Ostner
Advisors
Steven Hillyer, AR ’90
Director, The Irwin S. Chanin School of Architecture Archive
Steven Lam
Associate Dean, The Cooper Union School of Art
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Professor Alan Wolf
William Biesiadecki, ME ’14
Robert Brumer, ChE ’14
Ferdy Buddhidharma, ChE ’14
Victor Chen, EE ’14
Jessica Chu, CE ’13
Elizabeth Kilson, EE ’14
Joann Lee, ChE ’13
Eric Leong, ME ’14
Kyle Ng, CE ’13
Uyen Nguyen, ME ’14
Michael Pimpinella, ME ’14
Gregorijohn Tayco, ME ’14
Derek Toub, EE ’13
Melinda Wong, ChE ’14
Bobby Yankou ME ’13