

Team Third Report

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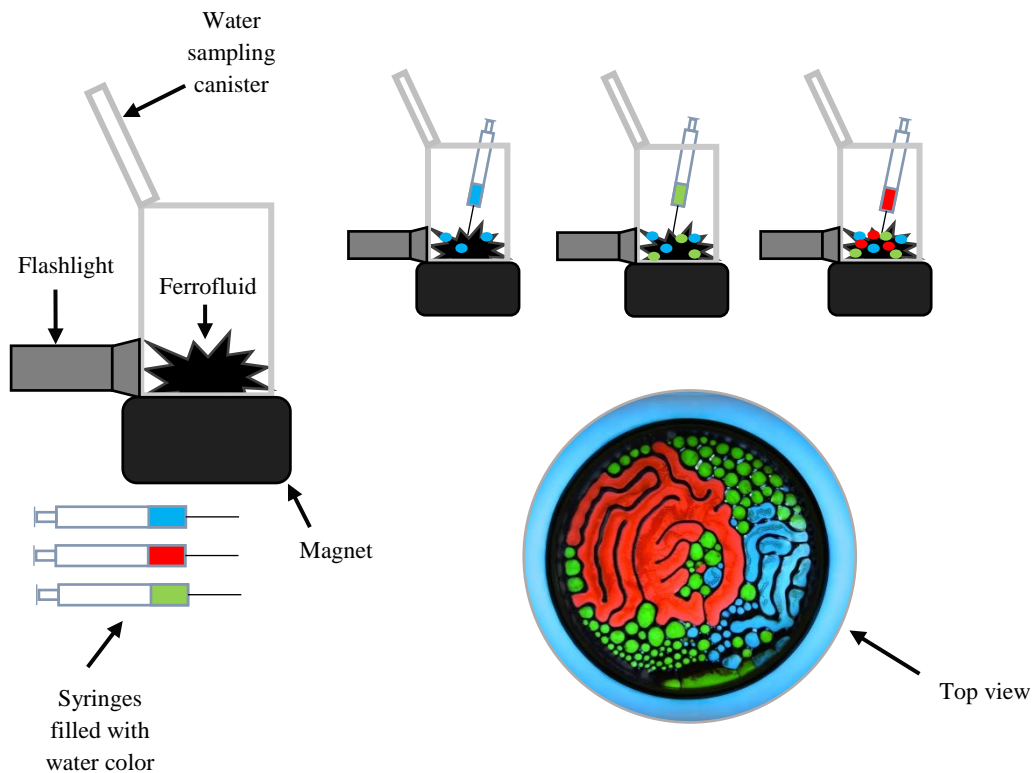
Flow Visualization: The Physics and Art of Fluid Flow



This image was inspired by the artwork of Fabian Oefner—an artist that is able to capture some of the most majestic fluid flow. By placing ferrofluid on top of a magnet and then injecting water colors into it, the final image is radiant, unique, and quite demonstrative of the physics between oil and water. Materials for the setup are as follows:

1. Small water sampling canister (small round container with translucent walls)
2. 1 Tablespoon of ferrofluid
3. 1 Magnet
4. 3 21G-BD 3mL syringes (*DISCLAIMER: I worked in a medical facility for two years. If you do not have experience with needles, you must be very careful.*)
5. Blue, red, and green water color paint (neon)
6. Water
7. Flashlight
8. Gloves
9. Pipette

Gloves were worn throughout this entire procedure (ferrofluid is extremely messy). Using a pipette, the ferrofluid was placed inside the water sampling canister. The canister sat upon the magnet, and a flashlight was placed up against its side. Each syringe contained approximately 0.5 mL of water color paint—one syringe for each color. Each color was injected into the ferrofluid very gently, and as long as the container remained still, the paint would stay where it was during syringe changes. A diagram of the procedure is shown below



Something to note about adding the water color: the paint must be injected into the ferrofluid for this effect to take place. Ferrofluid is a volume of magnetic fibers mixed with an oily fluid, and the paint is mixed with water. If the color is simply dropped onto the ferrofluid from above, it will bead up and drip off. If it's injected into the fluid, it moves the oil from within until it reaches the surface, which is how the patterns emerge.

This photo was edited using Adobe Photoshop CS6. The contrast and saturation were increased slightly, but not by much-- the flashlight was able to bring out the brightness of the colors for the most part. That said, the flashlight also provided a rather distracting glare along the lines of the ferrofluid between the colors, so that reflection was edited out using the clone stamp tool. The image was cropped so that the fluid was perfectly centered. Using transform tools, I also was able to mirror the outer rim of the image so that it had a more consistent light blue surrounding. This image contained a lot of natural beauty, therefore I didn't want to tamper with the capture of the fluid itself.

A Nikon D3300 camera was used for this image. The specs were as follows:

- Exposure time: 1/60 sec.
- ISO Speed: ISO-2200
- Focal length: 55 mm
- Max Aperture: 5

The dimensions of the original image were 6000x4000 pixels, whereas the final image was 2763x2776 pixels. Other than the image being cropped to center the fluid, there wasn't a significant loss in data from the original image.

This is by far my favorite image from my collection during this class. This image is clean on the edges, but exciting and colorful within the fluid itself. It is a picture that stems from the basic relationship between oil and water with an artistic touch thrown in. And what amazes me most is that this image didn't need much editing—it was naturally a very beautiful phenomenon that I am extremely content with.

WORKS CITED

1. Humphries, Matthew. "Ferrofluid and Water Colors Make for Beautiful Magnetic Paintings | Geek Pick | Geek.com." *Geek*. Geek, 30 June 2010. Web. 13 Nov. 2015.
2. "Fabian Oefner Millefiori." *Youtube*. Mthw, 29 Jan. 2012. Web. 13 Nov. 2015.
<https://www.youtube.com/watch?v=rNHIRYRYjQk&feature=youtu.be>