Essay by Lachlan Howard

Since its invention in 1822 by the French physicist Augustin Fresnel, the Fresnel lens has been changing the world around us. It was first used to enhance the power of the lighthouse. Now, it can even be found around the house, in the form of a page magnifier or camera lens. The industrial uses of the lens are as widespread as their use around the house, with technology like theater lights and retina scanners. The Fresnel lens is a remarkable creation that has altered the course of history.

The Fresnel lens saved thousands of lives with its use in lighthouses. The old lights were dull and weak, which was often more dangerous than no light at all. As an article from the National Park Service states, "Many captains argued that it would be better to eliminate the lighthouses altogether rather than risk their ships searching for the dim towers."[1] The new lens was first used by the United States Lighthouse Establishment to simultaneously increase the width and brightness of the lighthouse beam, allowing ships to stay farther away from shore. The lens also permitted the lighthouse keepers to use patterns, so ships could tell the difference between lighthouses by the beam alone. The Fresnel lens saved the lives of countless passengers and sailors by guiding them past the hazardous shores.

In modern life, the Fresnel lens also has applications around the house. It is used in the page magnifier, a visual aid that magnifies an entire page while one is reading. Overhead projectors use them as well. Nikon uses the Fresnel lens to make its Phase Fresnel telephoto camera lens effective yet compact[2]. Many hobbyists use the Fresnel lens to focus the sun's energy in solar ovens. The Fresnel lens is useful in all kinds of ways at home.

The lens has not only domestic and safety uses, but industrial uses as well. Many theater lights have a Fresnel lens to project the beam onto the stage. Retina identification cameras use multi-focal Fresnel lenses that offer "multiple in-and out-of-focus images of a fixation target inside the camera,"[3] eventually resulting in the correct view of the retina. Fresnel lenses also make it possible to sinter sand, "the process of forming a solid mass of material by heat or pressure without melting it to the point of liquefaction."[4] This makes glass 3D printing possible. The Fresnel lens has helped make many industrial advancements over the years, paving the way for a new level of modern technology.

No matter how it is utilized, the Fresnel lens remains a staple of modern life. The lens creates a beacon in lighthouses, leading travelers away from treacherous shoals. It can be used at home to help someone read a book or to cook food. Industry employs it to create new inventions.The Fresnel lens is an invention that has changed the world, not only in factories and labs, but also in everyday life.

[1]National Park Service (2015, April 14). *The Fresnel Lens.* Retrieved from https://www.nps.gov/caha/learn/historyculture/fresnellens.htm

[2]Nikon (2015, January 6). *AF-S NIKKOR 300mm f/4E PF ED VR.* Retrieved from https://www.nikon.com/news/2015/0106_lens_02.htm

[3]Wikipedia contributors. (2018, August 11). Fresnel lens. In *Wikipedia, The Free Encyclopedia*. Retrieved 13:18, September 28, 2018, from https://en.wikipedia.org/w/index.php?title=Fresnel_lens&oldid=854463399

[4]"Sinter, v." *Oxford English Dictionary* Second Edition on CD-ROM (v. 4.0) © Oxford University Press 2009