

SEMINAR

Optical Design from Art to Car Mirrors

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Abstract: In order to design a mirror, we must first decide how to write the problem mathematically. I will start by looking at the historical use of perspective and mirrors in art. Then I will discuss how we can trace individual rays of light to describe how a mirror should work. I will show previous examples of optical design such as a non-reversing mirror and a panoramic mirror. Finally, I will turn to the specific example of a car mirror and show one optical design technique that I use. The standard passenger side mirror on a car has a limited field of view which results in a blind spot. Other mirrors, such as spherical mirrors, reduce the blind spot but distort the image. My goal is to find a construction for a passenger side mirror that reduces the blind spot and but creates less distortion than a spherical mirror. The idea central to our construction is the concept of an eigensurface. In general, if a surface is viewed in a curved mirror, it appears distorted. However, there could exist a surface that appears invariant in a particular curved mirror. I will show how I use this idea of eigensurfaces to find a mirror that could work as a passenger side car mirror.

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