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Joint Senior Project Proposal
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I plan to do a joint senior project in Math and Computer Science on Anamorphic Projections. An anamorphic projection, or anamorphosis, is an image that is intentionally distorted so that the original image can be seen only when looked at from a certain perspective, or using a special device, for example a mirror. Anamorphosis is prevalent in art, with the most famous examples seen in street art. It also has practical applications and a simple example is an elongated road sign made visible for drivers, who look at it from a very small angle above the ground.

In my project, I will begin with exploring planar anamorphoses, similar to the elongated road signs. I will explore the mathematical transformations needed to generate such projections, as well as implement an algorithm for generating anamorphoses for a given planar surface. This exercise should give me some basic knowledge necessary for generating anamorphoses on more complex surfaces such as multi-planar or non-planar surfaces. Besides implementing the transformations, the algorithm will involve feature detection, which could be done using a projector-camera system, or a Kinect for more non-standard surfaces. The “inventive” part of this project in terms of computer science is solving the problem of multiple viewers, which has not been addressed towards anamorphosis because by definition, anamorphosis only works for one perspective. My goal is to implement a program that will estimate a projection optimal for all given viewers. Another interesting problem that I would like to explore in my project is finding a way to efficiently estimate complex surfaces using just a simple projector-camera system instead of the Kinect. This project is equally challenging from a mathematical point of view because it requires a thorough understanding of the projective transformations as well as coming up with a good method of surface estimation.