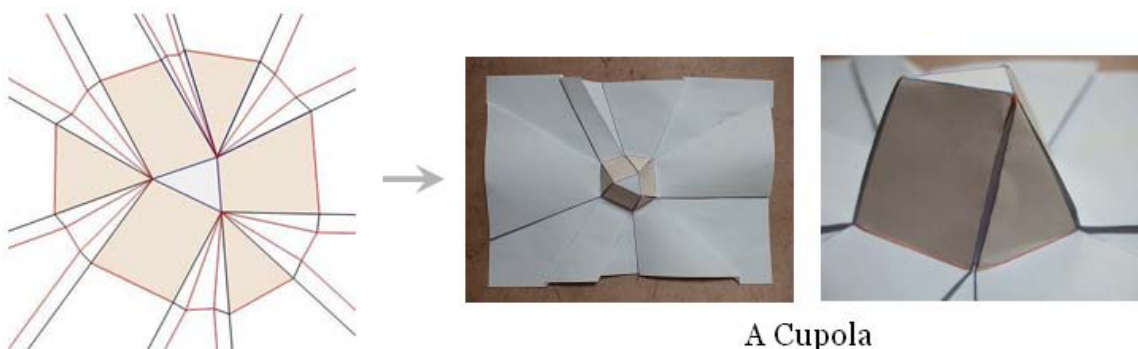


Folding Prismatoids with 3D Origami

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Prismatoids are a group of polyhedra that have their vertices on two parallel planes. By drawing a crease pattern on a piece of paper and folding on the lines, one can fold certain prismatoids sticking out of the paper. Some algorithms were created to help one fold a desired prismatoid by drawing the crease pattern on paper using geometry. These algorithms helped fold prisms, frusta, pyramids, wedges and cupolas.



A Cupola

Some mathematical formulas were derived using trigonometry, taking measurements of initial conditions to predict and help solve certain problems that could crop up in the algorithms. A final algorithm was also created to obtain the relevant measurements of the target prismatoid without having to construct a model of it in real life. This was done by using geometry to produce the required lengths and angles in 2D space. A computer program was also created to allow users to specify initial conditions of prismatoids through a user interface and generate the crease pattern. The program and all the algorithms mentioned above were then generalized to apply to polyhedra whose vertices lie on two planes which may not necessarily be parallel.

The significance of having the prismatoids “pop out” of otherwise flat surroundings is that folders may treat the paper as “flat” and fold another origami model with it, as long as folds do not enter the “pop out” prismatoid. This means that on any uninterrupted flat surface of an origami model, one could theoretically make a prismatoid pop out from it. This possibility was explored and applied to create compound shapes from combining prismatoids.