The Study of Biomimicry in Architecture

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It is said that the triangle is one of architecture's strongest shapes, but what about in nature? What shape found in plant xylems is the strongest? Each plant xylem has a unique shape. For example, celery has a hexagon shape, onion has a quadrilateral shape, apple has an oval shape, and pear and potato both have a pentagon shape. For the current research completed in this project, a sample of each fruit or vegetable, apple, onion, pear, potato, and celery, is needed. A microscope is used to look at the xylem shape of each sample. Pictures were taken of the microscope views. From here, Fusion360 is used to superimpose the images and trace them. By doing this, each xylem's shape can be accurately drawn. Each xylem model is kept at the same size, to help maintain consistency in testing. The only model that isn't the same dimensions is the potato xylem, since the xylem itself is smaller than the rest. Now the files for the models are sent to a 3D printer to be printed. The prints are put through a compression force tester to determine which model can take the most pressure. In the end, it was concluded that the pear xylem was the strongest, since it could hold 301.47 pounds on average before cracking. The weakest xylem was the celery, which could only hold 56.37 pounds on average before breaking.

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