A Continued Study of a More Realistic Solution to Refugee Housing Using the Isoperimetric Honeycomb Conjecture

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Over 1.5 million people live in refugee camps around the world. Wind storms of over 80 miles per hour rip current refugee tents apart, destroying what little refugees have left. Regarding our irregular polyhedron, this year our objective was to transform our design into a final product. After testing in a wind tunnel and using aerodynamics calculations we found the wind resistance of our structure to be over 174.67 miles per hour. We designed inexpensive, waterproof connectors to securely hold the structure together. To make these, we calculated each dihedral angle of our structure by using multivariable calculus and Euclidean geometry. We used three-dimensional vectors to calculate the cartesian point of each vertex then drew normal vectors from each vertex using the cross product. The point of intersections of these normal vectors was then inserted into an inverse cosine function thus giving us the dihedral angles. Our final 5-6 person structure is waterproof and fire resistant lasts 20 years, and costs $96, which is 400-500 dollars cheaper than anything comparable on the market today. Our house follows the laws of special right triangles and therefore can be as small as a 1-2 person house or as big as a temporary hospital or school. Our efficient design, combined with the wind resistance of the structure, can help millions of refugees and has applications to help others such as military personnel or victims of natural disasters.

Awards Won:
Third Award of $1,000
U.S. Agency for International Development: USAID Science for Development First Place Award of $5,000.