STEAM in Education

SCIENCE ON STAGE TURKU 2024

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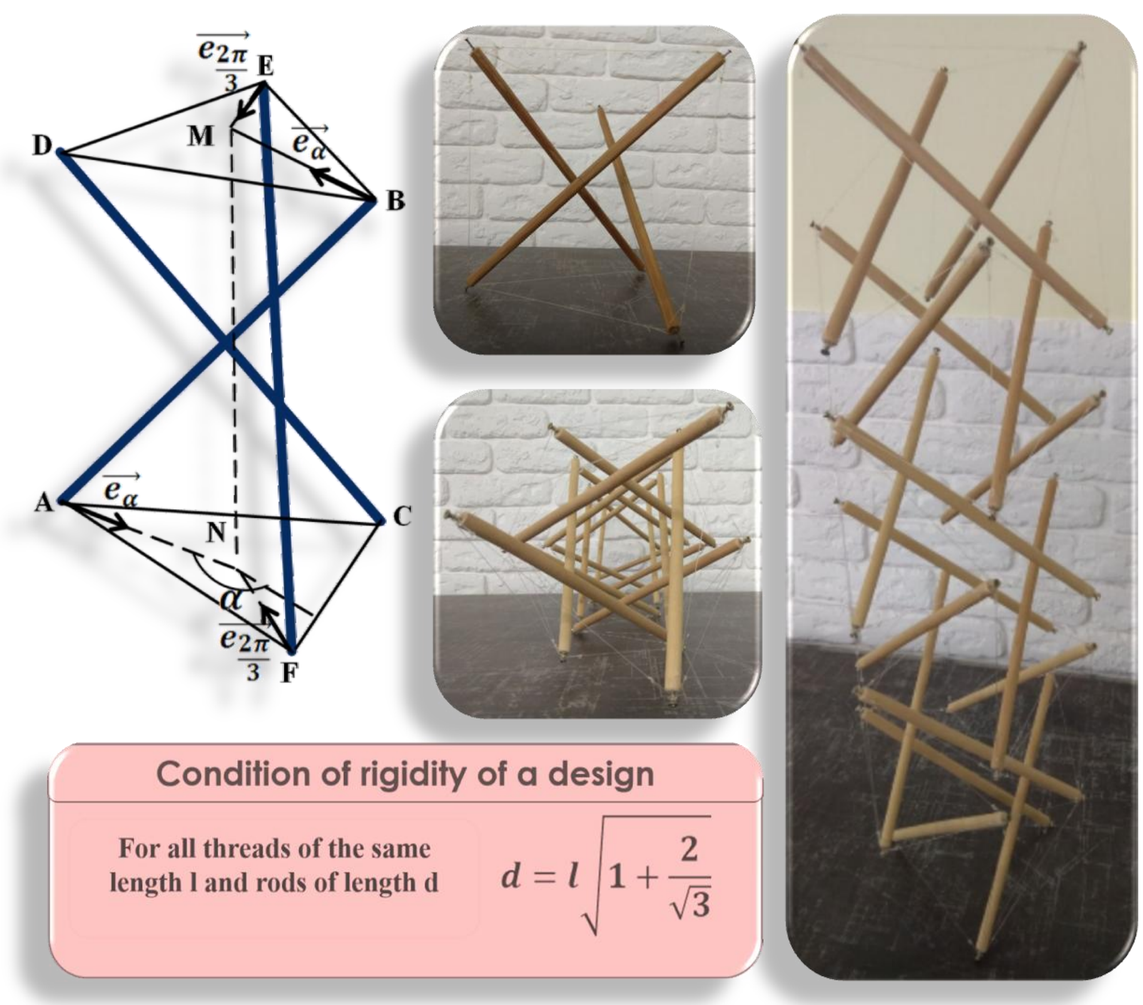
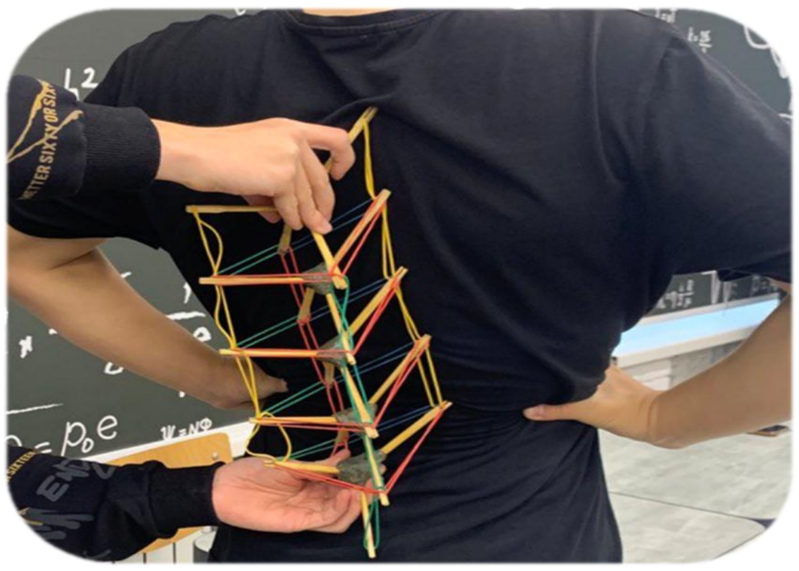
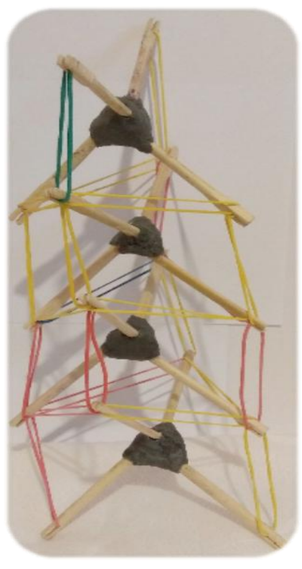
Creation of Self-Stressed Structures

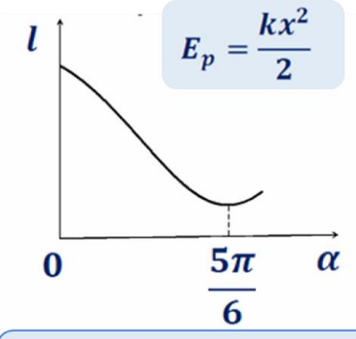
This project offers valuable benefits for STEM educators in fostering students' design and engineering skills, as well as nurturing their 3D imagination. It also presents opportunities for integrating science, technology, engineering, art, and mathematics. The project aims to achieve the following outcomes: 1) Introducing high school students to the innovative realm of tensegrity technology through hands-on models building. 2) Cultivating the creative and engineering abilities of students who consciously pursue careers in technology, engineering, and physics after graduating from school.







Tensegrity inside us: *bones are strong elements that experience compression and fascia, muscles are elastic elements that are stretched*
The principle of minimum potential energy *- all elements in the balance*



Graph of the dependence of the thread length on the rotation angle of the prism base

By using the vector method we found that the length of the thread l reaches a minimum at an angle of rotation of 150 ° of the upper base of the prism relative to the lower, ie the smallest stretching of the threads causes the least compression of the rods d:

$$l = d^2 - 2r^2 2\sin\frac{\pi}{3}\sin\left(\alpha - \frac{\pi}{3}\right)$$

The word TENSEGRITY is a combination of two words: tension and integrity, which means a tense connection. This is the principle of constructing structures from rods and ropes, where the rods work in compression and the ropes work in tension, the rods do not touch each other

Conclusion: The self-made models help demonstrate the transformation of figures, the principle of minimum potential energy, functional dependencies between sizes, and vectors in space during Physics and Mathematics lessons