

Expanding Polygon Linkages

The intent of assignment two is to explore expanding polygon linkages according to the mechanisms outlined in class. Use one or a subset of the following avenues to explore and demonstrate your understanding of the above topic to the class.

Physical Mechanism - Build a tangible expanding polygon linkage that you can demonstrate to the class.

Interactive Software Tool - Create a tool to facilitate creative exploration of expanding polygon linkages and demonstrate user interaction capabilities to the class.

Virtual Design - Create a design utilizing expanding polygons that incorporates some of these features: simulation of kinematic behavior, aggregation of multiple expanding polygons or integration with other systems, and/or engineering detail (interferences, tolerances, three-dimensionality). All designs, at minimum, should show movement as an animation or a sequence of positions.

Mathematical – Possibilities include: Formalize and analyze the algorithm for making an expanding version of an arbitrary polygon structure; demonstrate mathematically how two links, as outlined in the lecture, can be arranged to produce an invariant angle; or show that Gruebler's equation and Laman's theorem are equivalent.

Submission details: You are responsible for two deliverables: 1) a class demonstration on Monday February 25th and 2) what you have come up with needs to be documented and submitted in electronic form to the TA (andy@csail.mit.edu) before class. Acceptable forms of documentation include: videos, a series of photos, animations, executable programs, proofs, or some other appropriate digital form. Please limit submissions to 10 mb. In order to fully understand your contribution and depending on the format of your submission, brief accompanying text may be a good idea (i.e. descriptive captions, a readme, etc.).