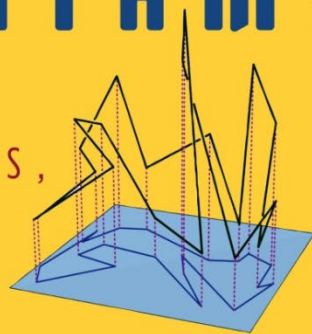
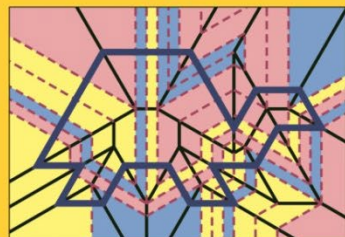


Geometric Folding Algorithms

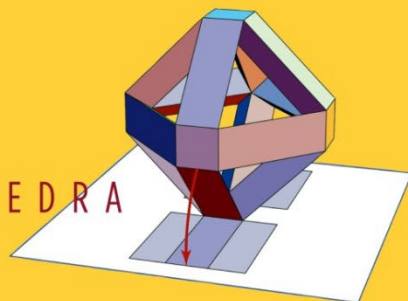
LINKAGES,



ORIGAMI,



& POLYHEDRA



ERIK D. DEMAINE & JOSEPH O'ROURKE

幾何的な Geometric FOLDING ALGORITHMS 折りアルゴリズム

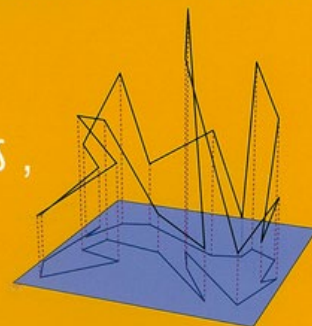
リンケージ, 折り紙, 多面体

エリック・D・ドメイン & ジョセフ・オルーク 著

ERIK D. DEMAINE & JOSEPH O'ROURKE

上原隆平 訳

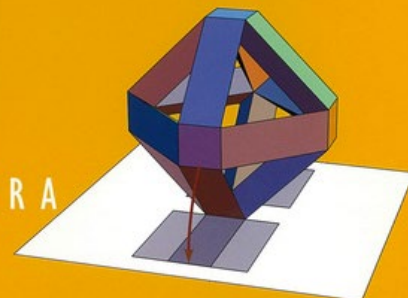
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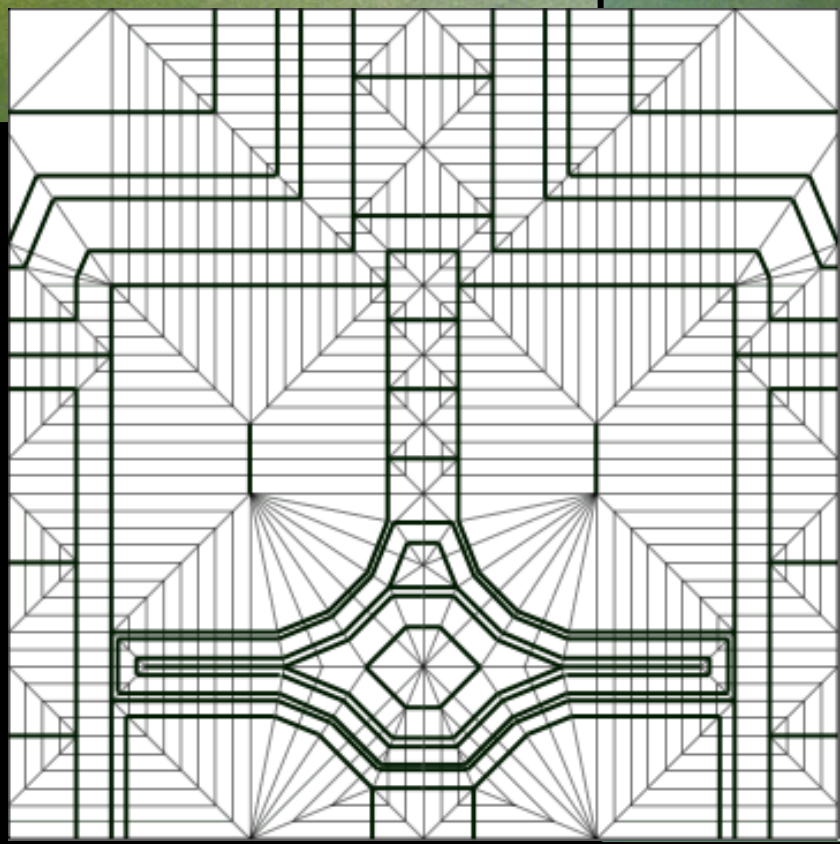
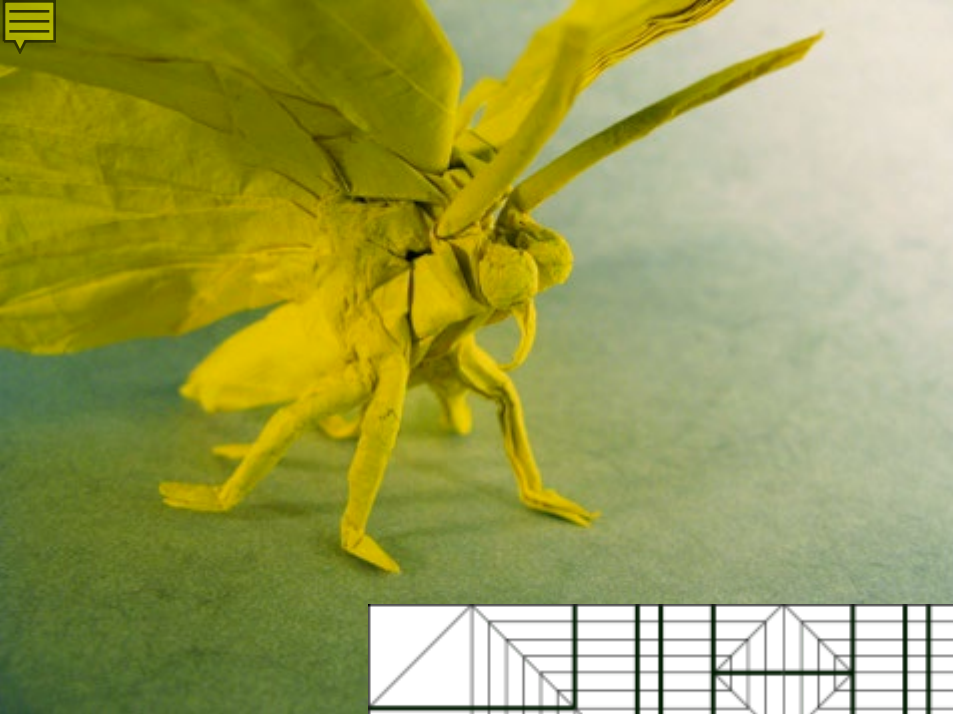
ORIGAMI,



POLYHEDRA



近代科学社

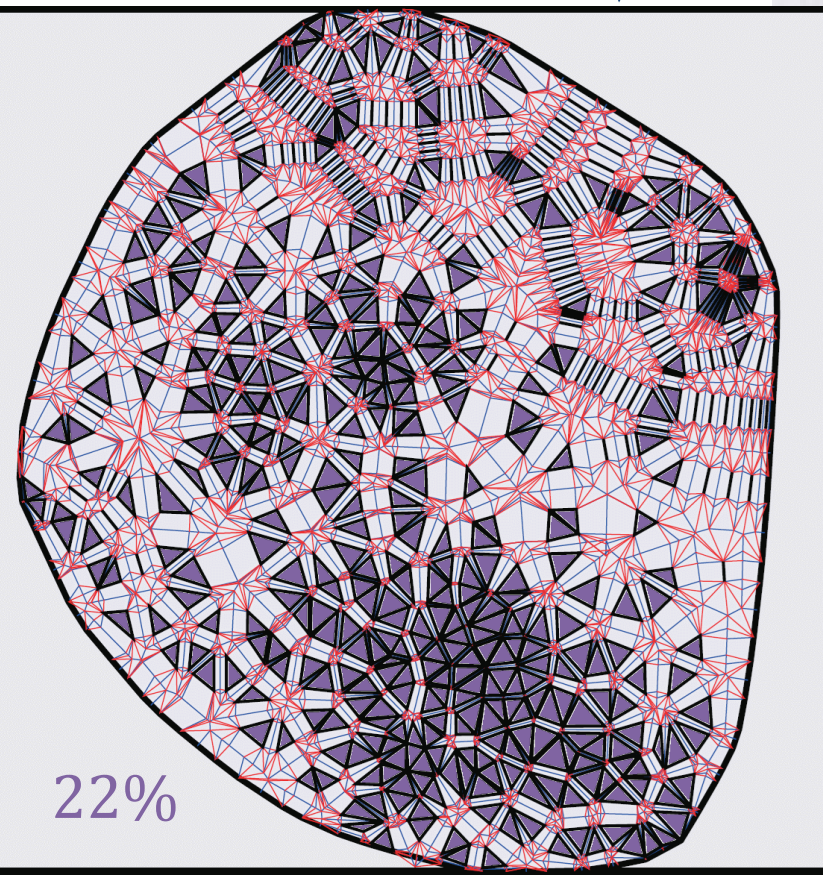
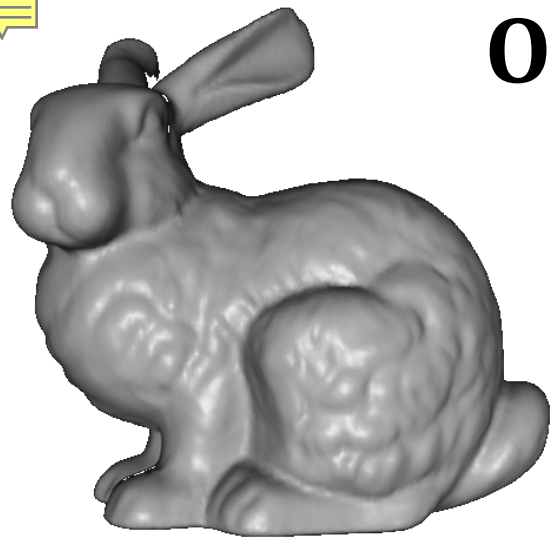


Butterfly 2.2
Jason Ku

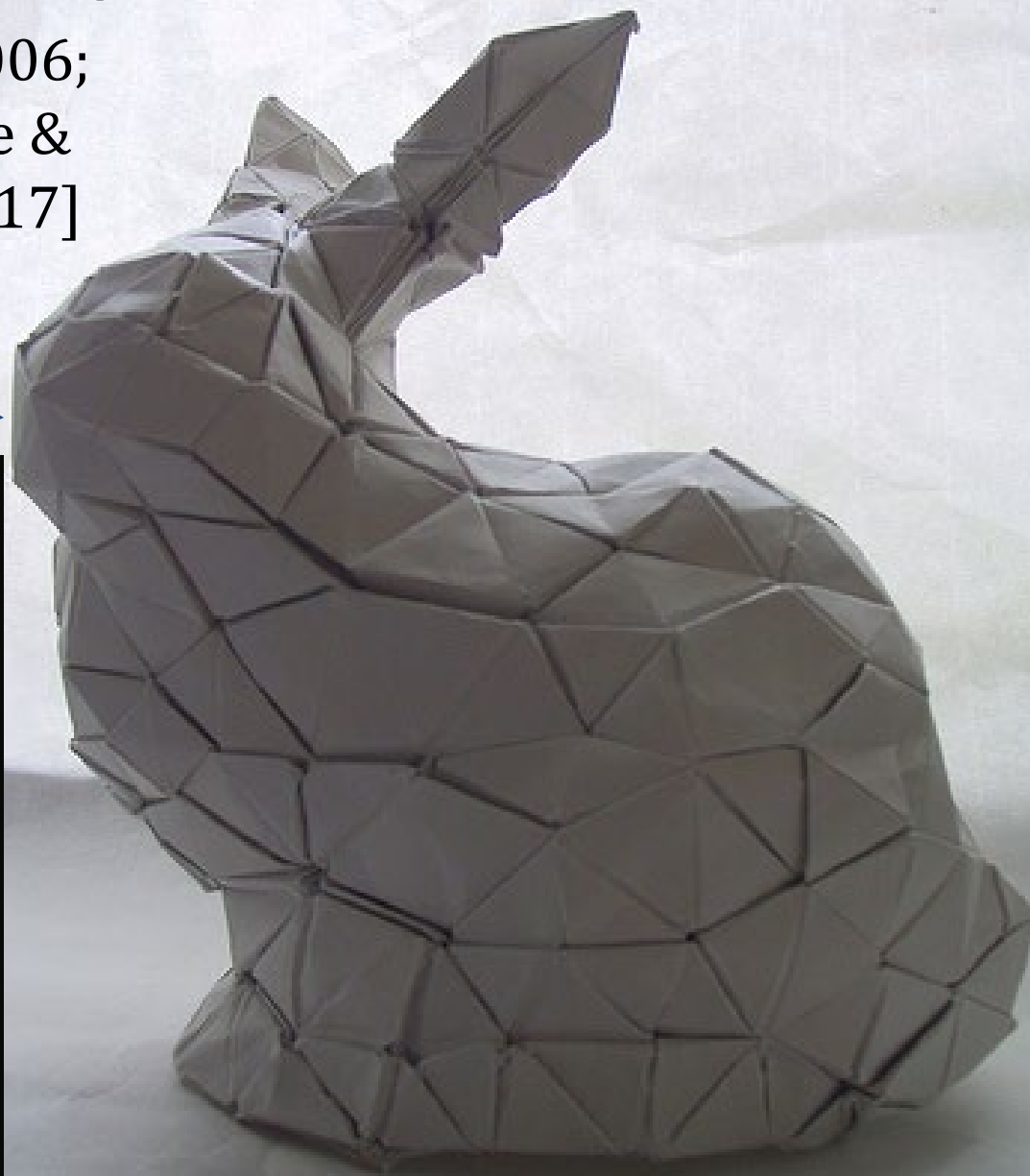


Origamizer

[Tachi 2006;
Demaine &
Tachi 2017]



22%



Tomohiro Tachi

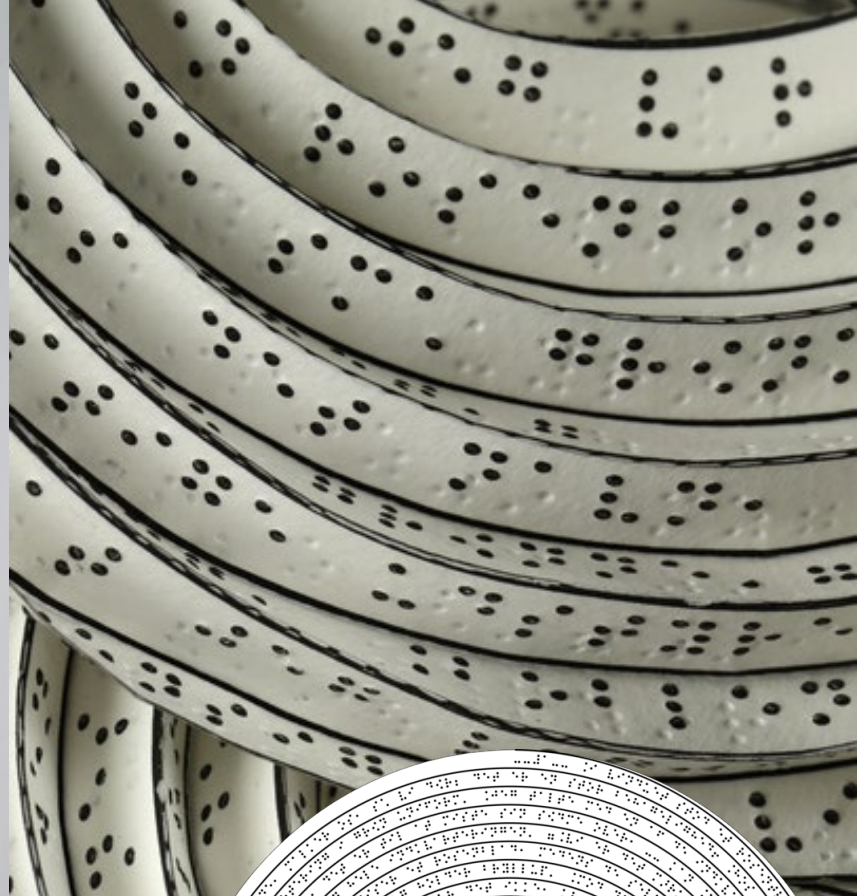


American Craft
photo by Cary Wolinsky



Braille Series

Demaine,
Demaine,
Parra Rubio
2023



MUSEUM
FOR
PAPIRKUNST



41,732
people

“Hanging Out”
Bass, Demaine, Demaine 2023
14' tall, ½ km of creases/cuts



**"All Curves
Are Beautiful"**
Demaine,
Demaine,
Nguyen,
Parra Rubio
2023



Shoe Soles

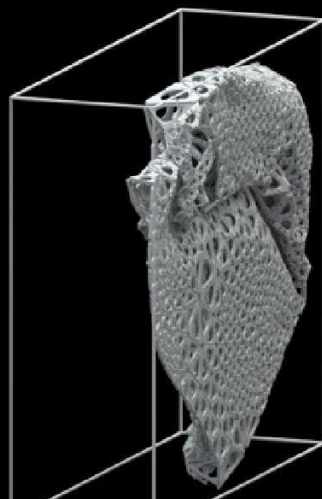
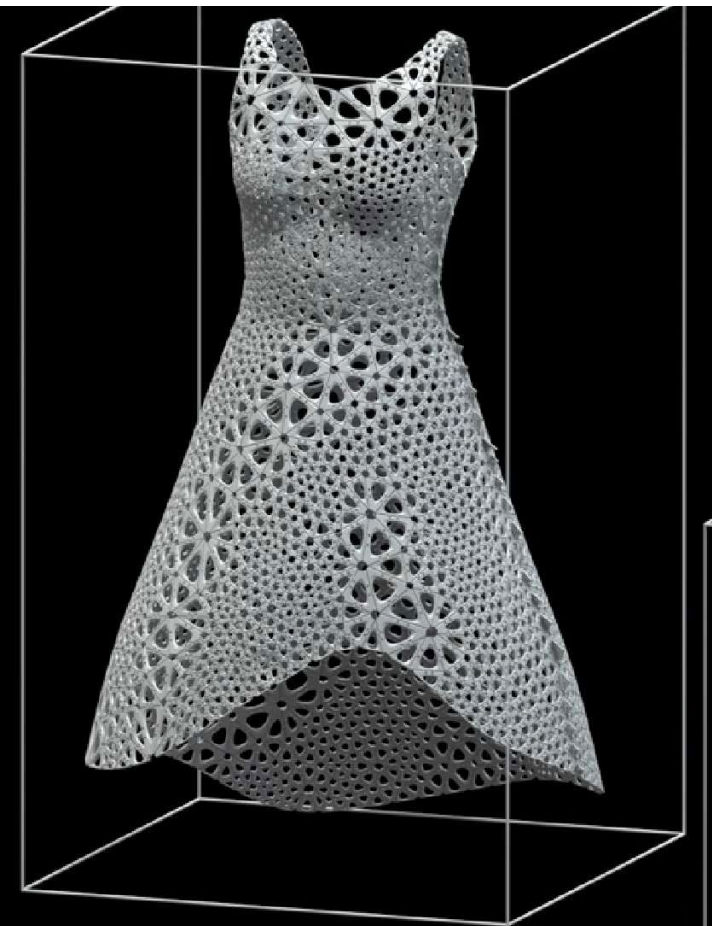
[Calisch &
Gershenfeld 2018]



Nervous System

3D Printed Dress

2014



[https://n-e-r-v-o-u-s.com/
projects/albums/
dress-in-motion/](https://n-e-r-v-o-u-s.com/projects/albums/dress-in-motion/)

Deployable Origami Structures

5m prototype of 100m
space telescope lens
[Lang & LLNL 2002]

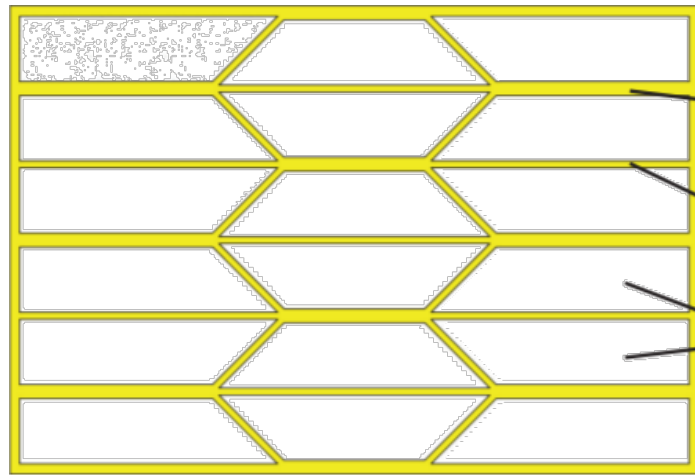
Origami stent

[You & Kuribayashi 2003]



Deployable Origami Shield

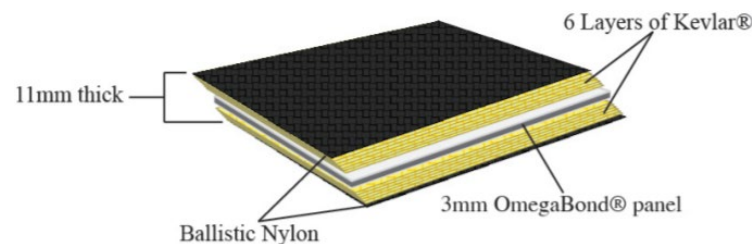
[Howell et al., BYU 2017]



Nesting Fold,
Gap Size 4.5 cm

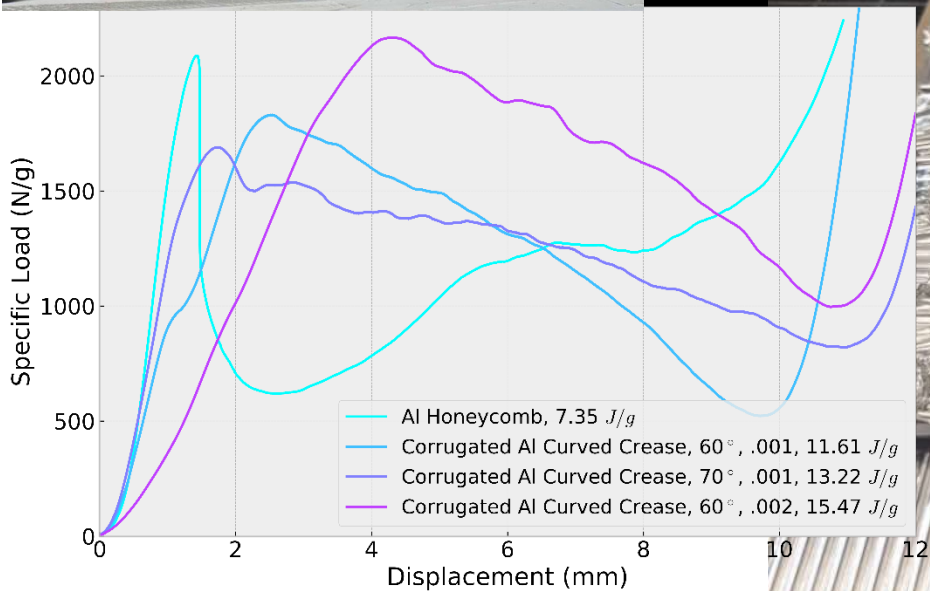
Non-Nesting Fold
Gap Size 2.0 cm

Rigid Panels



Energy Absorption

[Calisch 2019]





Tomohiro Tachi





Printable Robots

[MIT, Harvard, Penn]

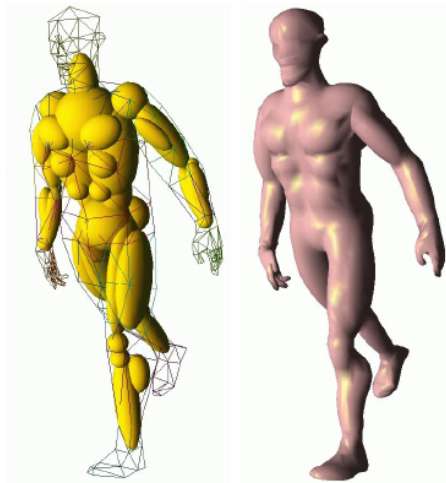
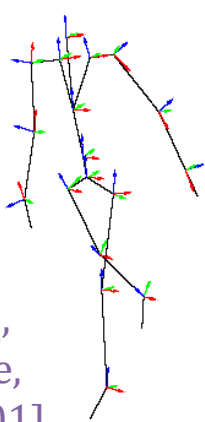
Applications of Linkage Folding



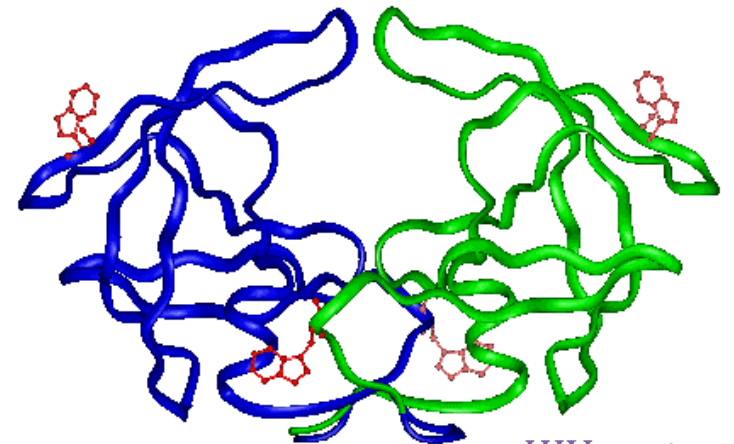
Mechanics



Robotics



Graphics



HIV protease

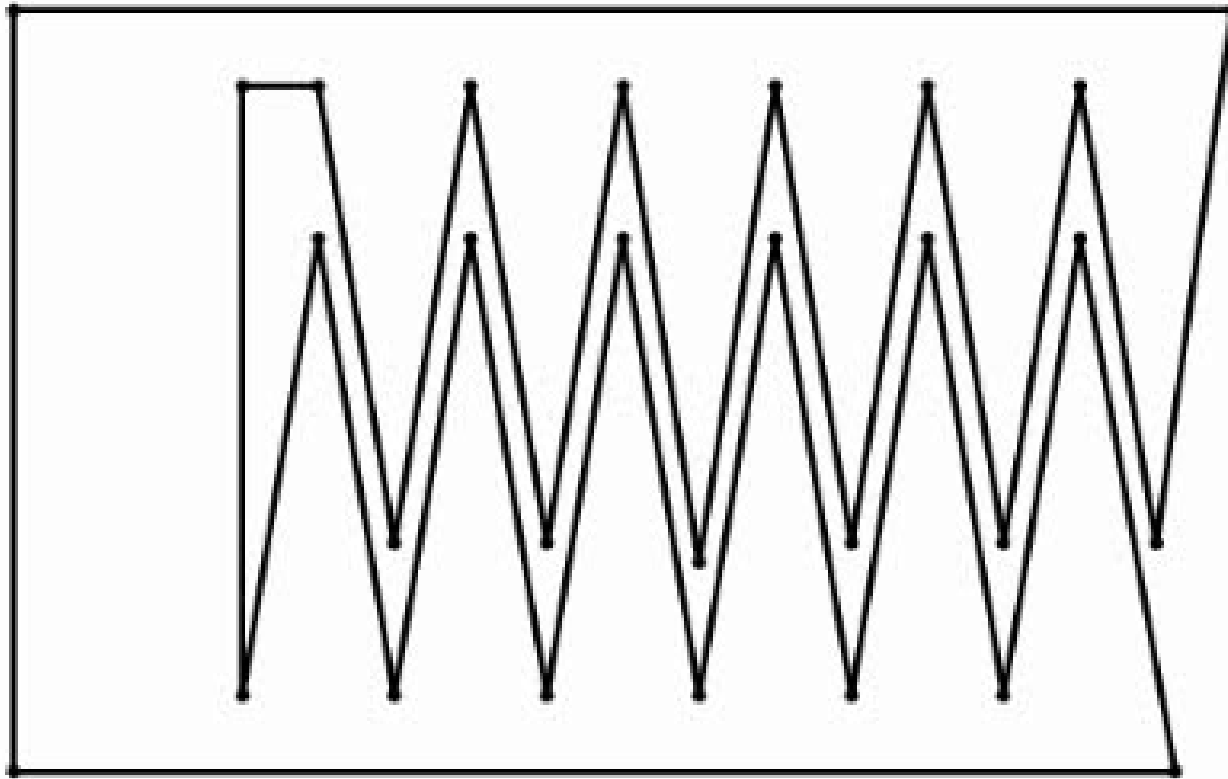
Biology

[Leclercq,
Akkouche,
Galin 2001]



Carpenter's Rule Theorem

[Connelly,
Demaine,
Rote 2000]



[Cantarella,
Demaine,
Iben, O'Brien
2004]



Hoberman Associates



2002

Hoberman Arch
2002 Winter Olympics, Salt Lake City, UT



Applications of Polyhedron Folding



[Lundström Design]

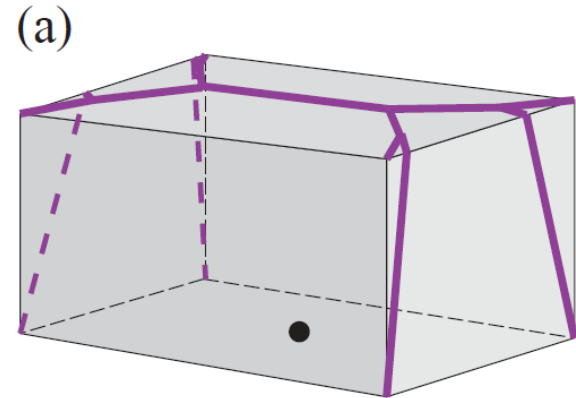


Sheet-metal
manufacturing

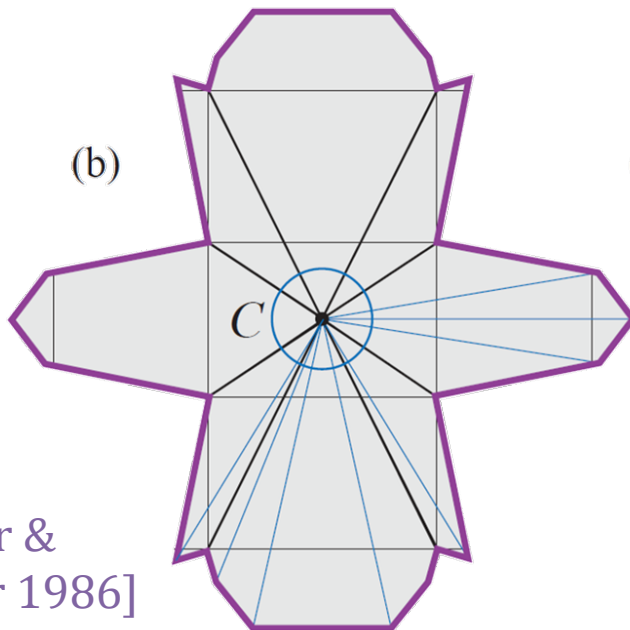


Theory of Unfolding Polyhedra

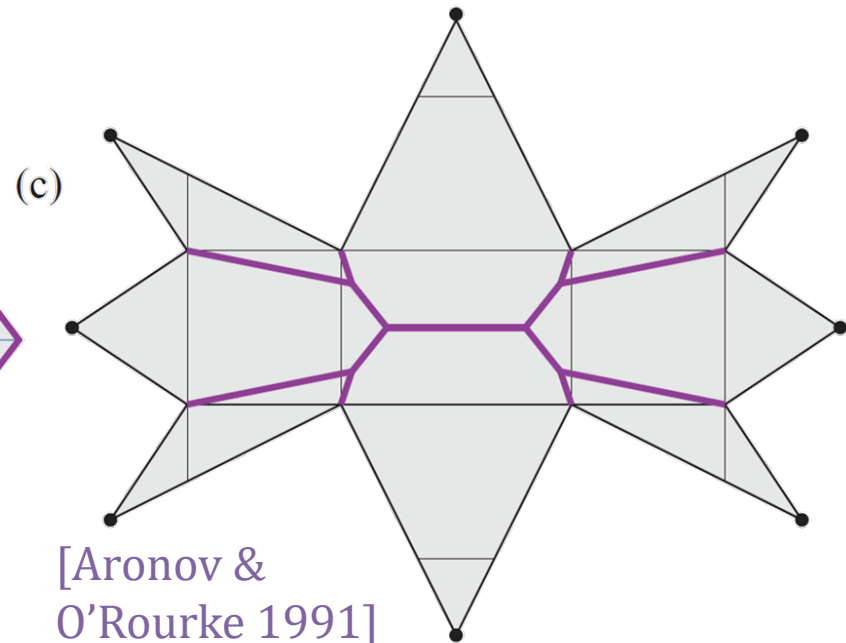
- **Convex** polyhedra always have a one-piece unfolding
- OPEN: Do **general** polyhedra?



[Demaine & Lubiw 2011]



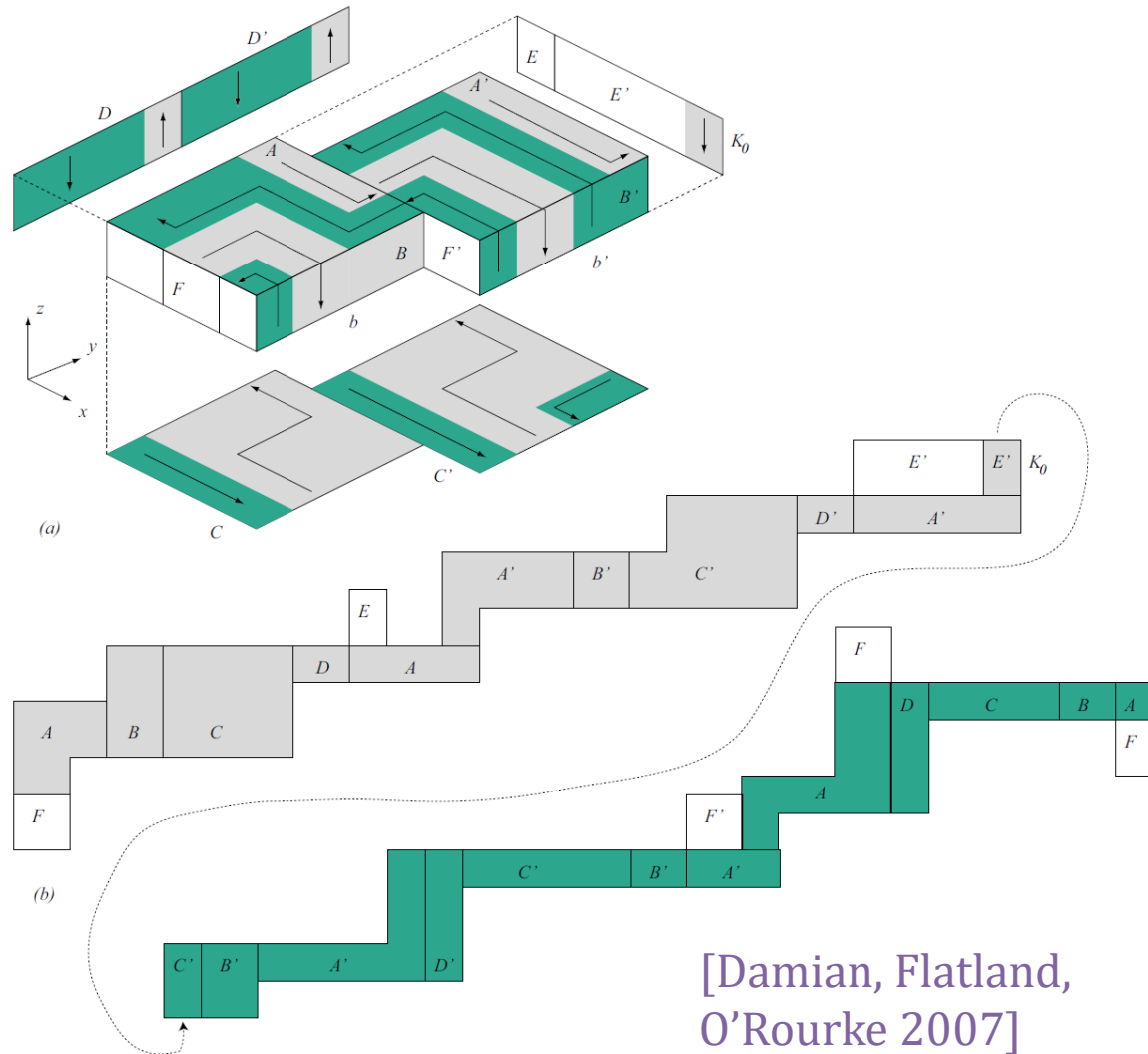
[Sharir & Schorr 1986]



[Aronov & O'Rourke 1991]

Theory of Unfolding Polyhedra

- **Orthogonal** polyhedra always have a one-piece unfolding
- OPEN: Do **general** polyhedra?

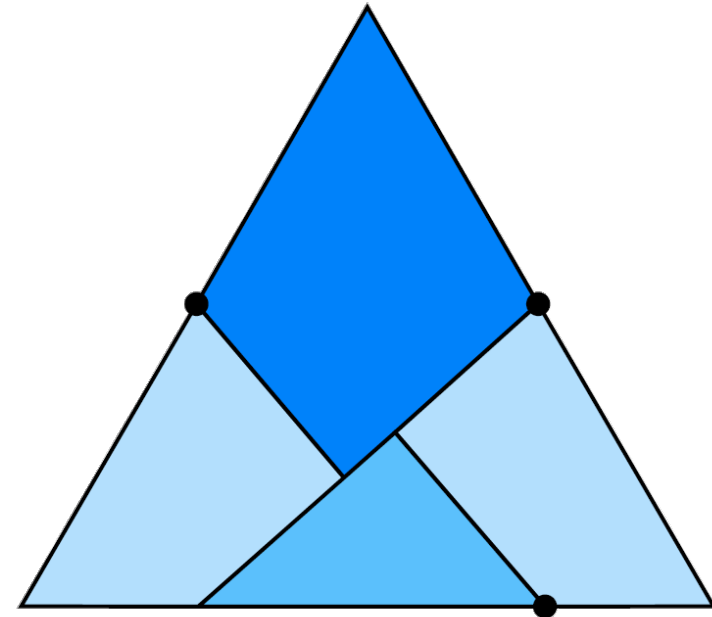
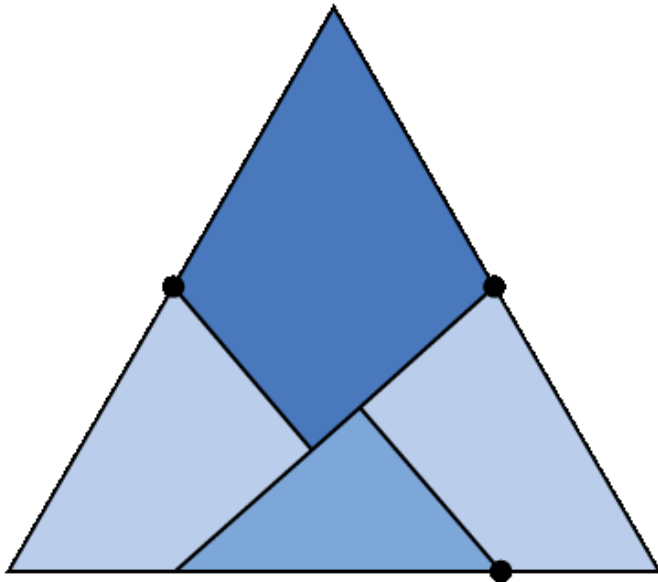
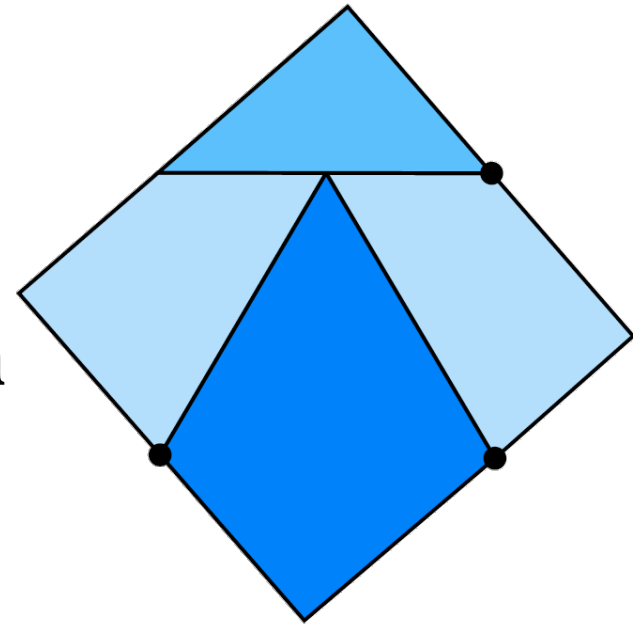


[Damian, Flatland,
O'Rourke 2007]

Hinged Dissections

- Any two polygons of the same area have a **hinged dissection**

[Abbott, Abel, Charlton, Demaine,
Demaine, Kominers 2008]



[Dudeney 1902]



<https://courses.csail.mit.edu/6.5310/spring25/>

Specifics

Class Time:	Tuesdays and Thursdays at 11:00am–12:30pm (or until 1pm for those who want to stick around)
Class Room:	MIT room 32 -082
First Class:	Tuesday, February 4, 2025
Office Hours:	Tuesdays and Thursday at 12:30pm–1pm

Professor:	Erik Demaine , edemaine <i>at</i> mit.edu
TAs:	Josh Brunner, brunnerj <i>at</i> mit.edu Jenny Diomidova, diomidova <i>at</i> mit.edu
Design Advisor:	Alfonso Parra Rubio, aprubio <i>at</i> mit.edu
Staff Email:	65310-staff <i>at</i> csail.mit.edu

Units:	3-0-9
Prerequisites:	6.1220 or equivalent background in discrete mathematics and algorithms. Alternatively, permission from the instructor.
Credit:	EECS, AAGS (Theoretical CS Concentration)
