



# Developable Mechanisms on Developable Surfaces

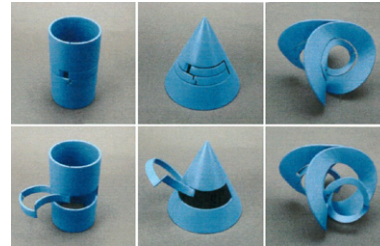
BYU #2018-032

## DESCRIPTION

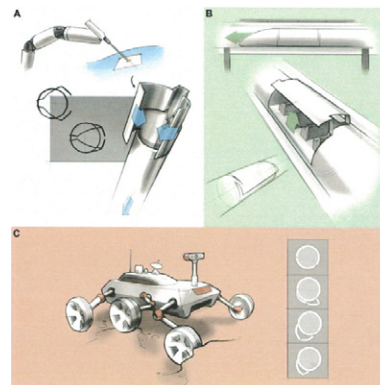
Developable surfaces consist of shapes that a flat sheet can take without tearing or stretching, and they represent a wide range of manufactured surfaces. Developable mechanisms are devices that emerge from or conform to developable surfaces and are made possible by the discovery that aligning joint axes with ruling lines of developable surfaces results in specific mechanism types: generalized cones map to spherical mechanisms, generalized cylinders to planar mechanisms, planes to lamina emergent mechanisms, and tangent developed surfaces to spatial mechanisms.

## PROBLEM SOLVED

There is an increasing demand for ultra-compact mechanical systems that are capable of complex tasks and developable mechanisms are envisioned as next-generation mechanical systems to meet these needs.



Embedded and actuated configurations of physical developable mechanism prototypes



Possible applications:  
(A) A minimally invasive surgical grasper;  
(B) A high-speed train door;  
(C) Mechanisms incorporated into surfaces like wheels enabling multi-functionality.

## KEY ADVANTAGES

- » Can incorporate both traditional rigid and compliant components
- » Capable of sophisticated tasks
- » Hyper compact

## APPLICATIONS

Developable mechanisms can be used in diverse applications such as spacecraft, automobiles, ships, architecture, furniture, clothing construction, and medical devices. The invention makes possible new mechanisms in highly constrained spaces (e.g. medical implants, next generation electronics, equipment, and deployable aerospace components), and applications with limited manufacturing processes available (e.g. high-volume production and cost-sensitive applications).

**Offer:**  
License  
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**IP Status:**  
Patent Pending



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