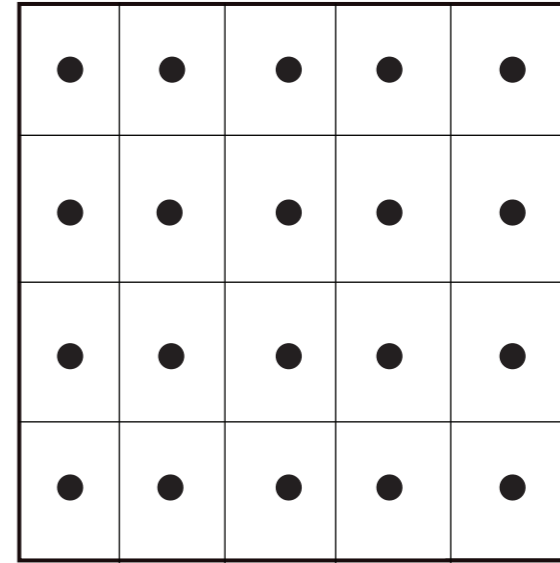
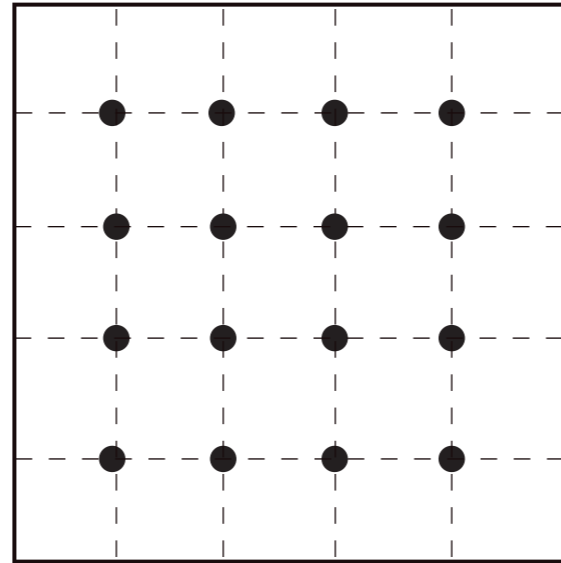
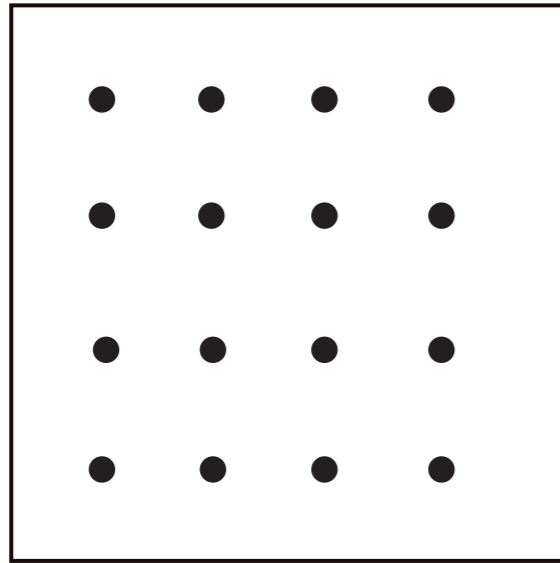


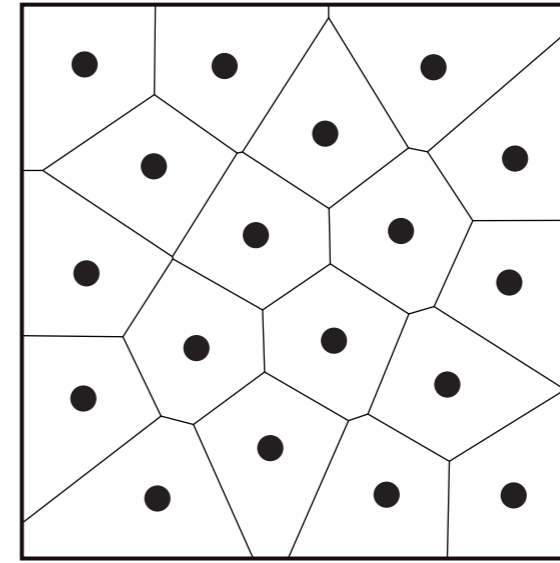
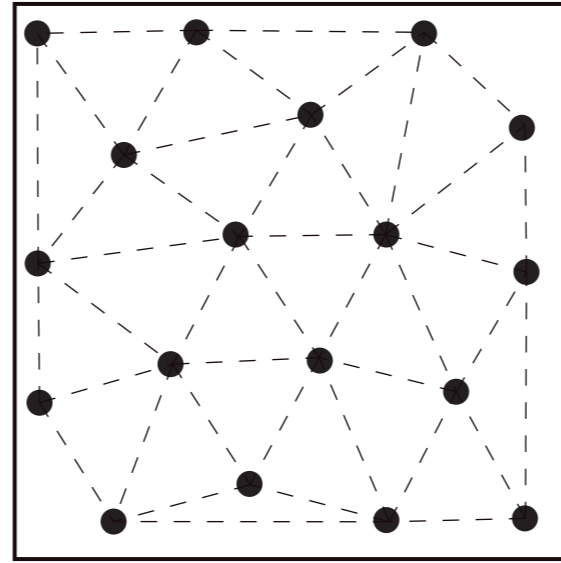
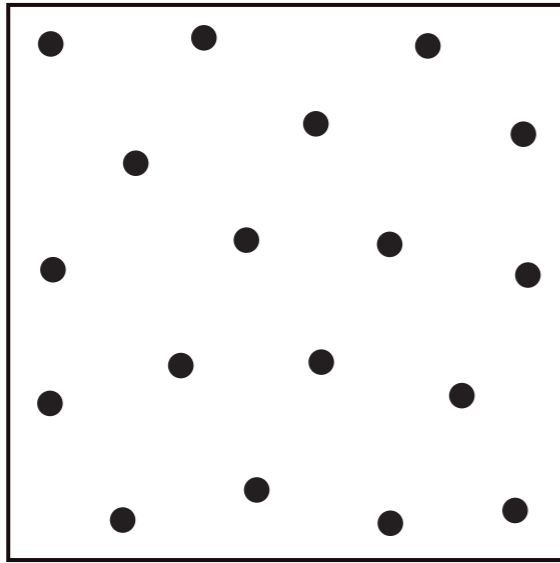
Group 2
Bottom-up swarming modules

Agent Based Sytem
Each Module as Autonomous Agents

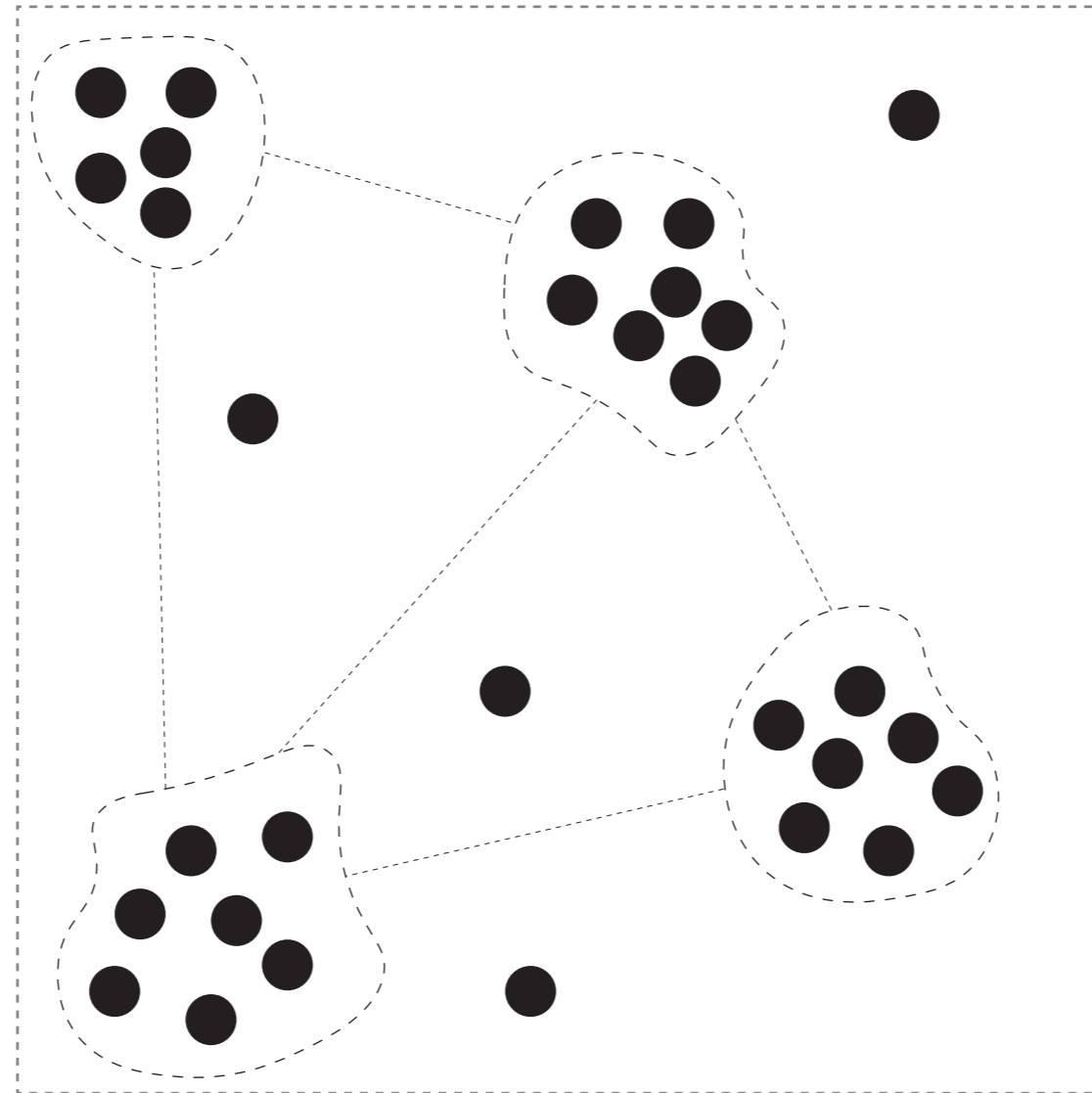
Typical Top Down Approach



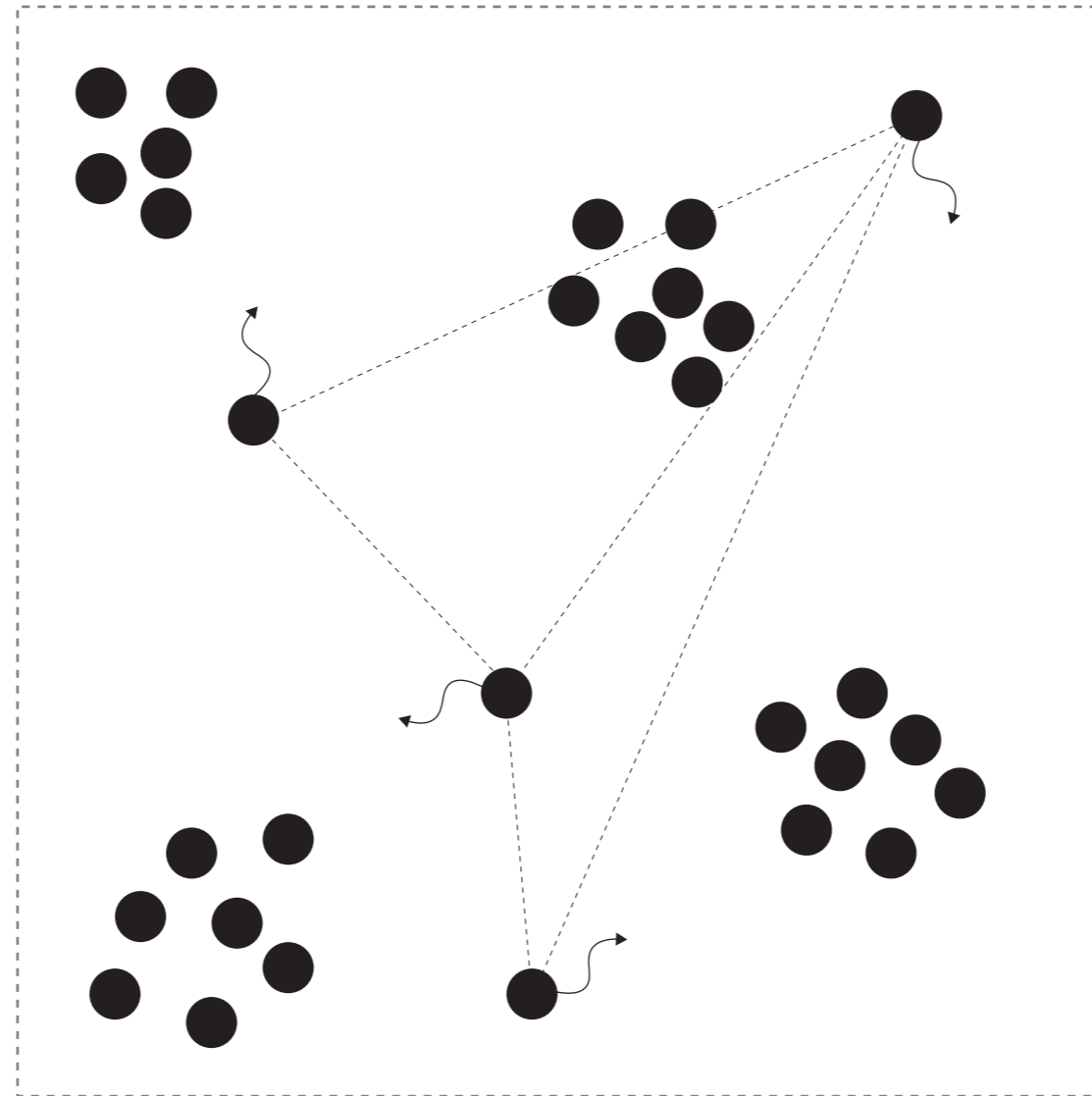
Top Down Approach
Imposing Pre-determined Configuration of Elements in Space



Bottom Up Approach



Weighted Clustering According to Required Programs of Site or Other Inputs

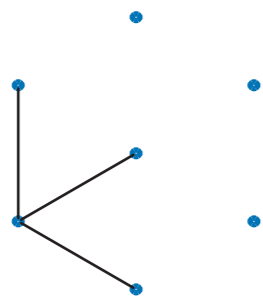


'Free Agents' Remain Dynamic and Interact with Public to Solidify Intervention Territory

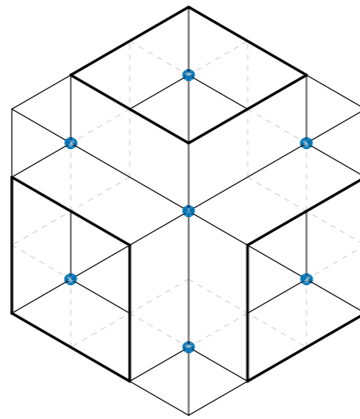
Module Geometry

Actuation Possibilities within Global Grid Pre-Defined by
Logic of Initial Geometry of Module

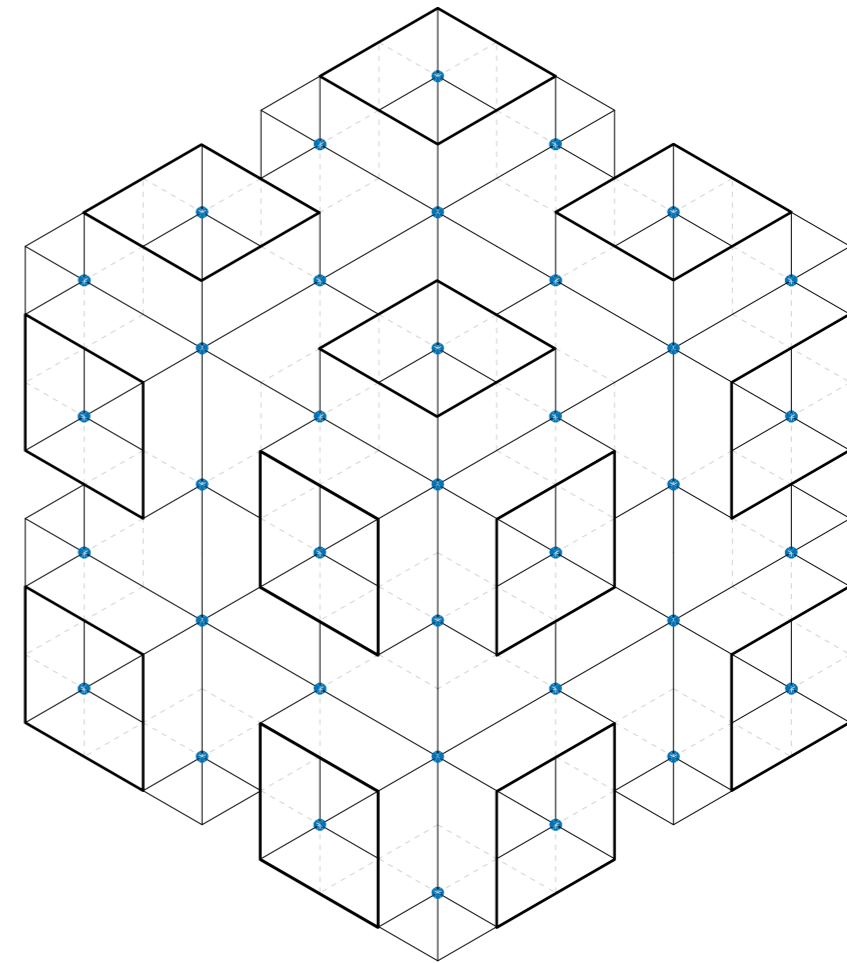
Angle



Single Module

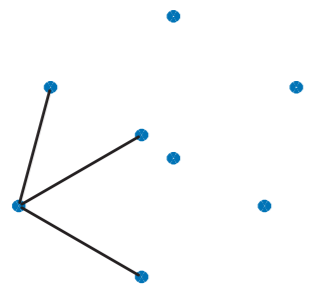


Module Repeated in grid

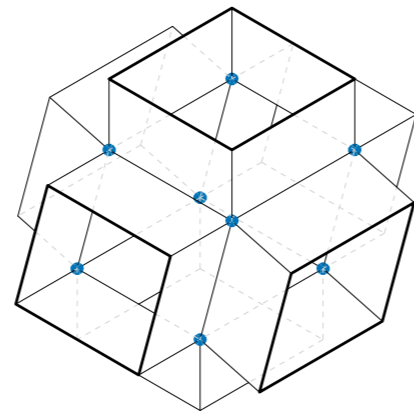


Exemplary Illustration of 1 of 3 Angluar Movement

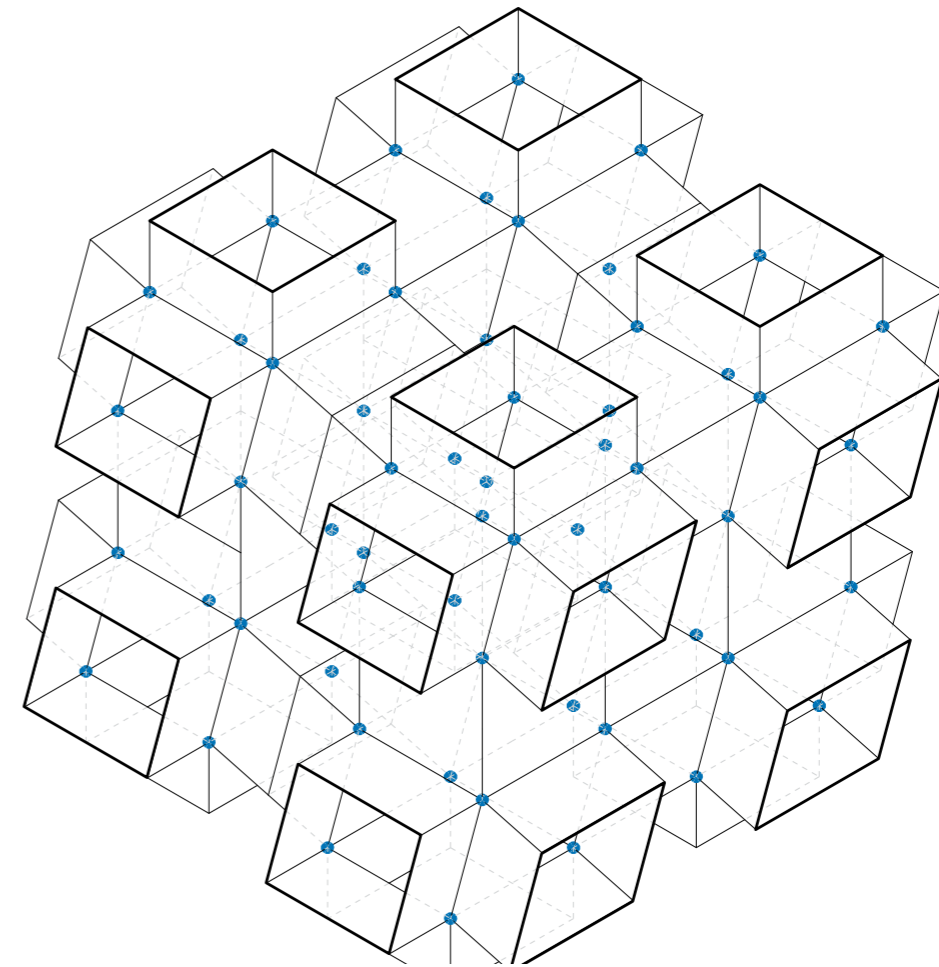
Angle



Single Module

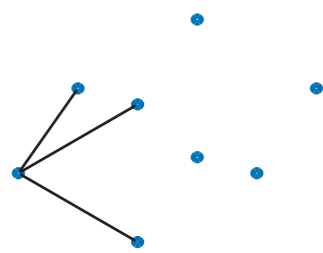


Module Repeated in grid

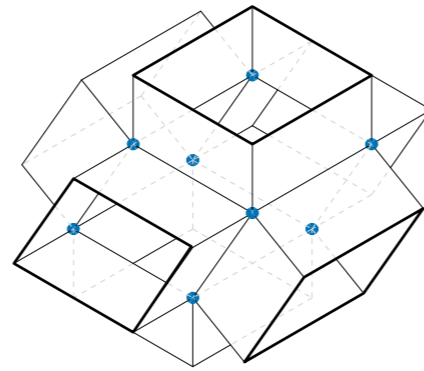


Exemplary Illustration of 1 of 3 Angluar Movement

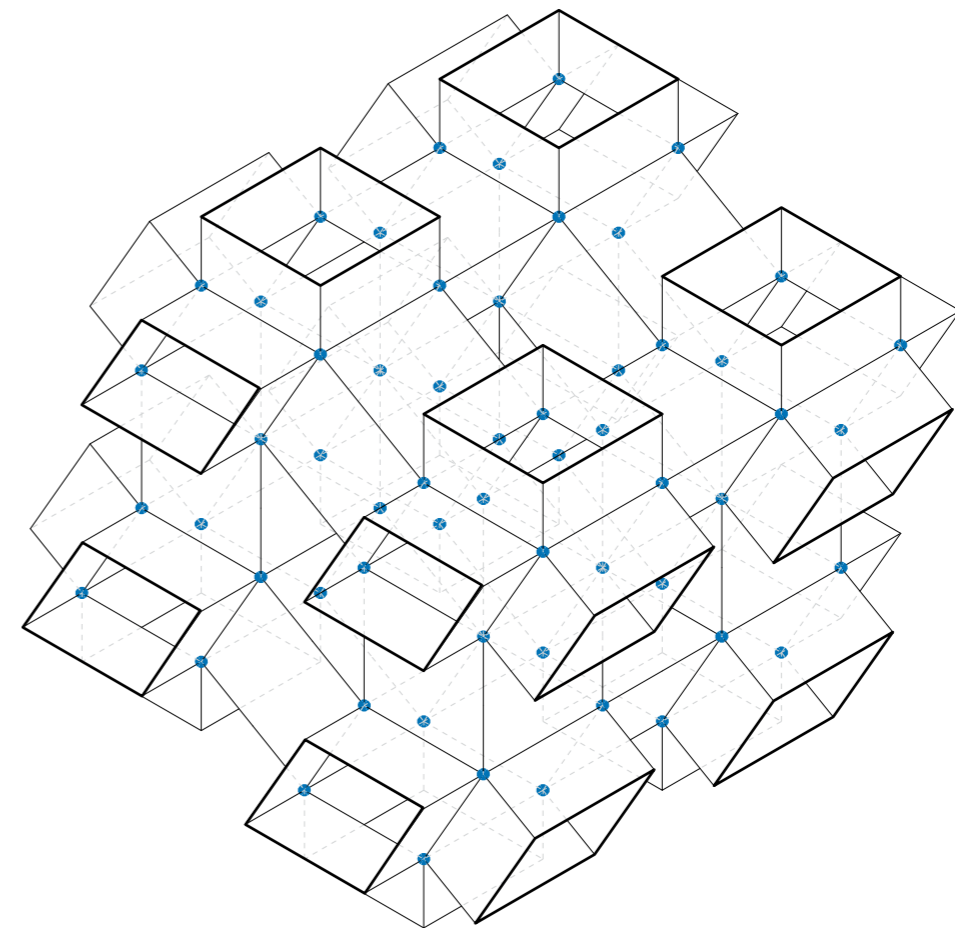
Angle



Single Module

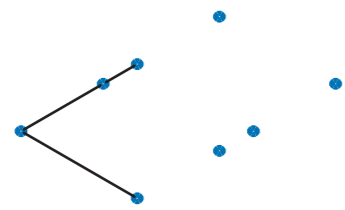


Module Repeated in grid

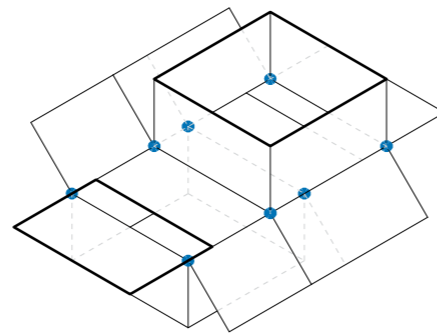


Exemplary Illustration of 1 of 3 Angular Movement

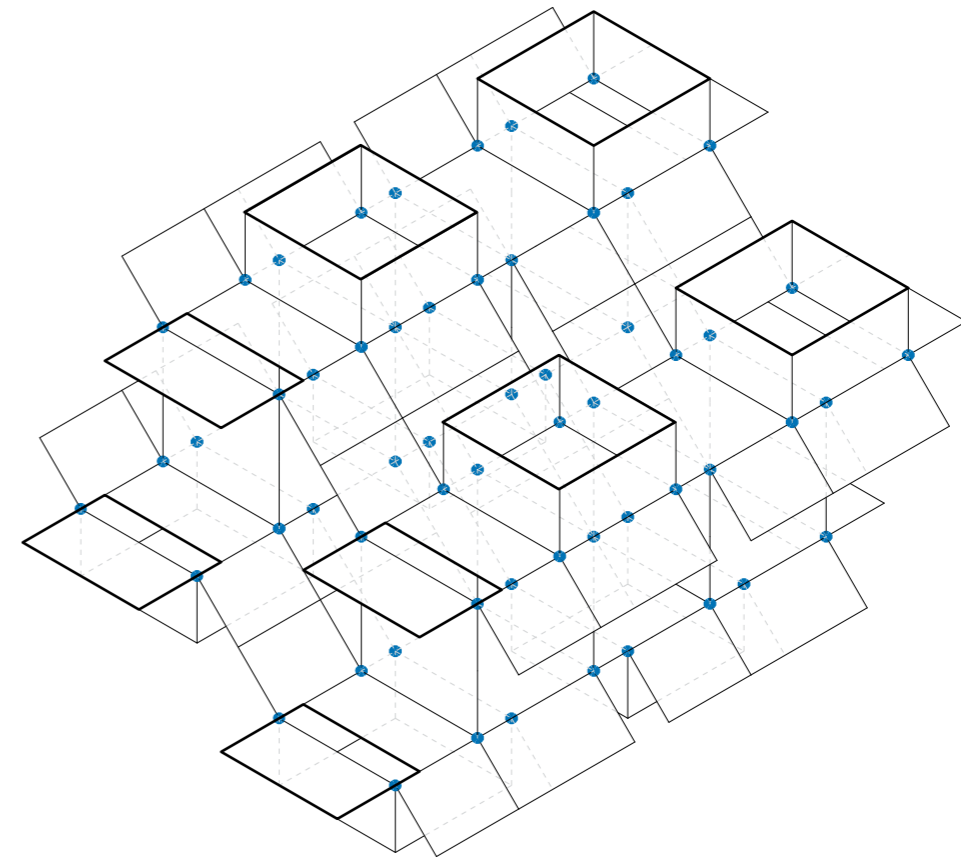
Angle



Single Module

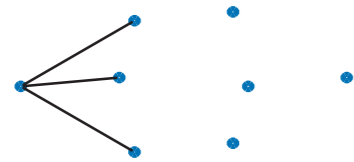


Module Repeated in grid

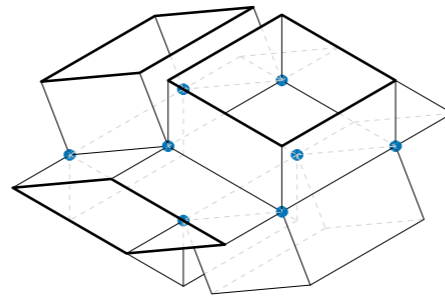


Exemplary Illustration of 1 of 3 Angluar Movement

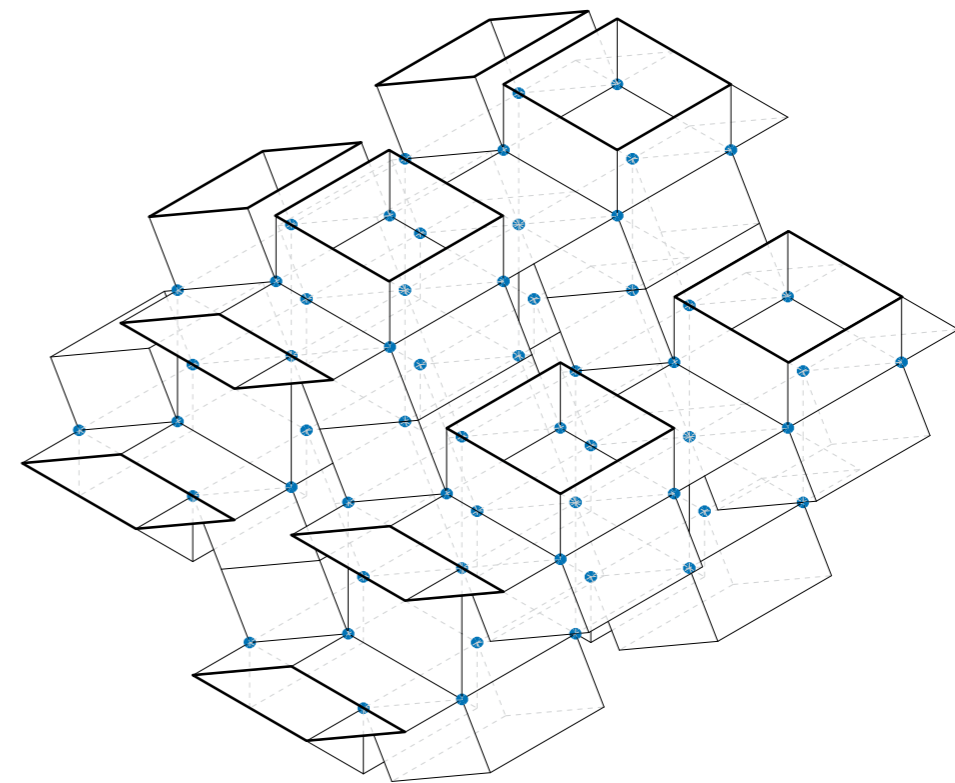
Angle



Single Module

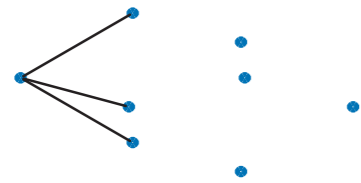


Module Repeated in grid

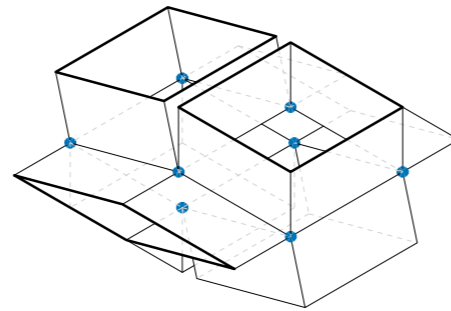


Exemplary Illustration of 1 of 3 Angluar Movement

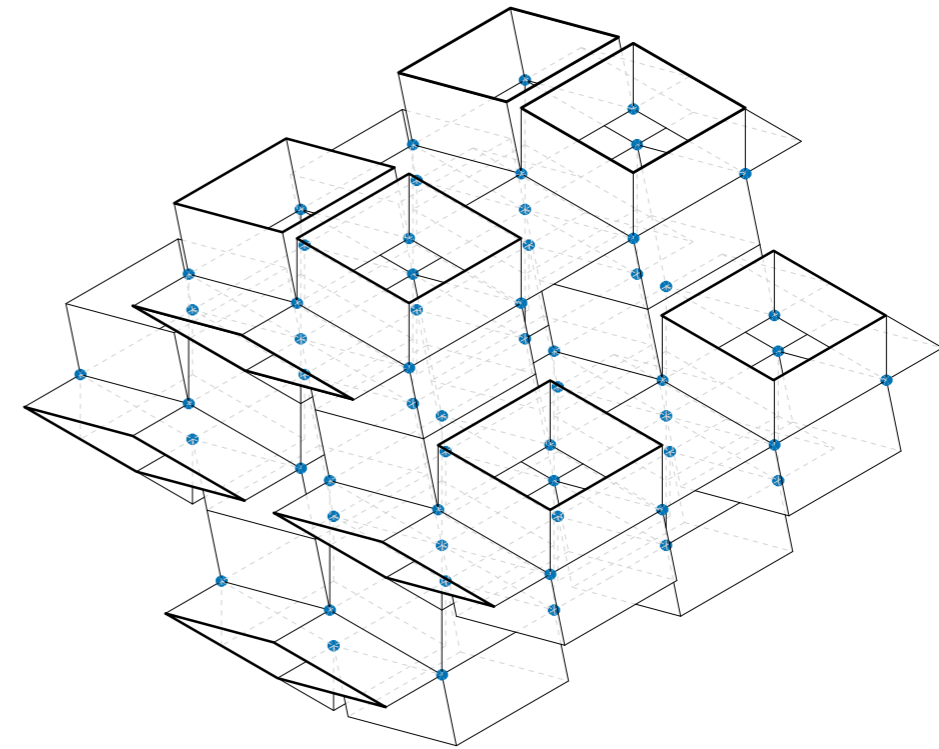
Angle



Single Module

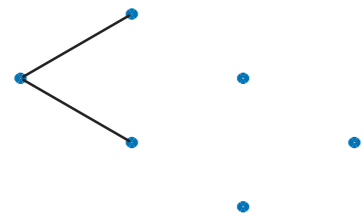


Module Repeated in grid

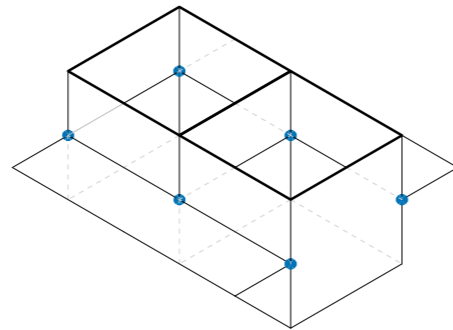


Exemplary Illustration of 1 of 3 Angluar Movement

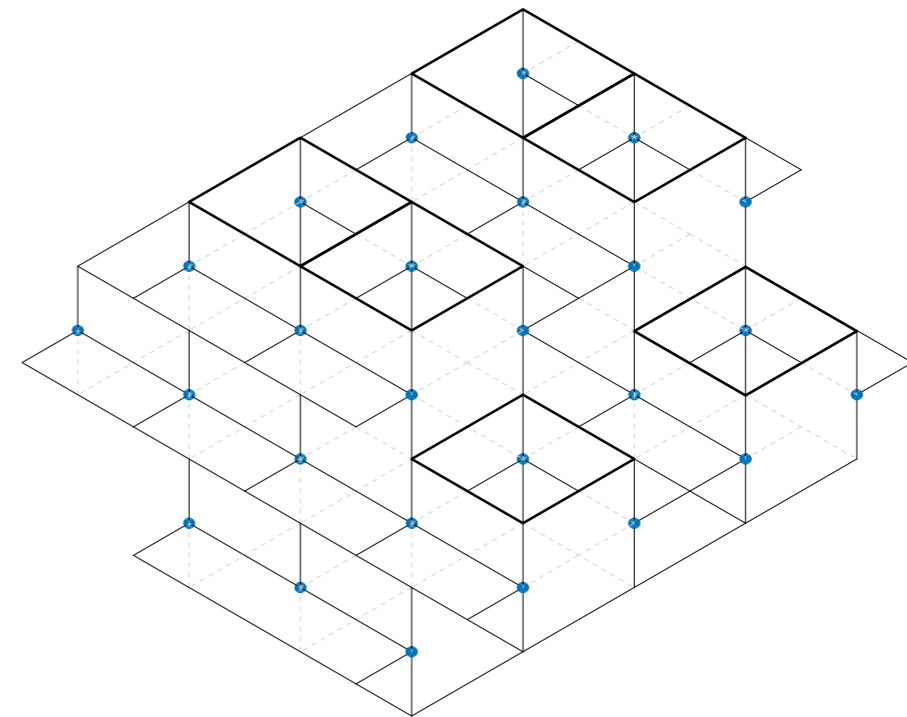
Angle



Single Module

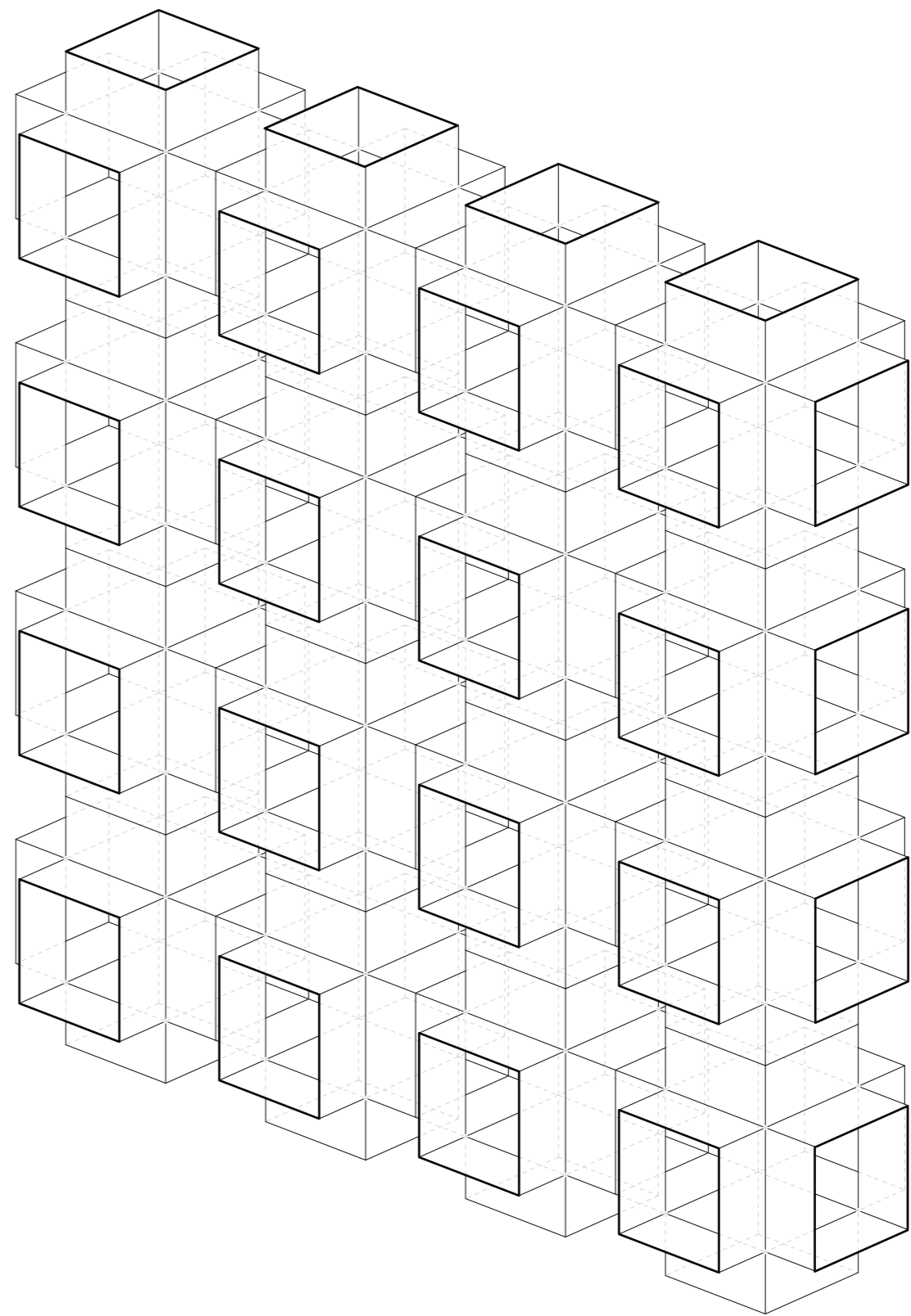
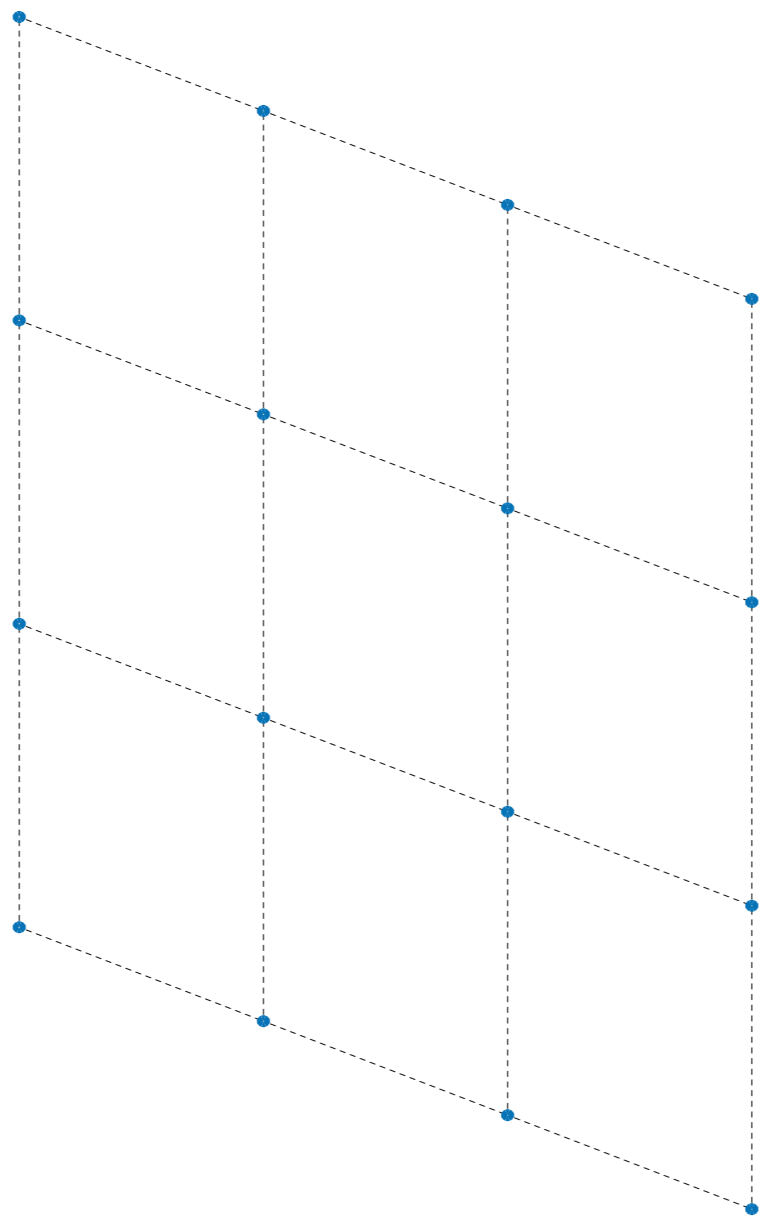


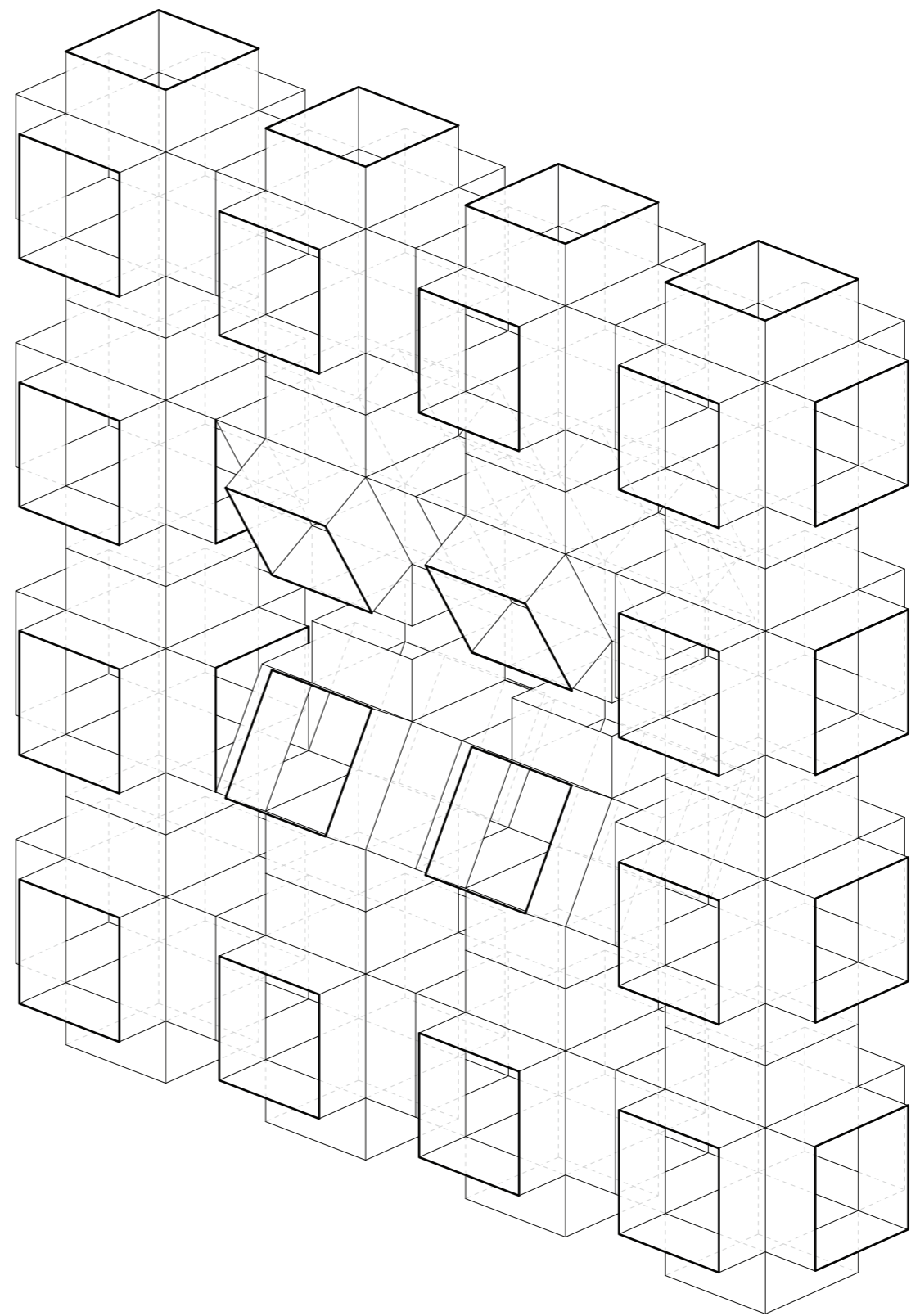
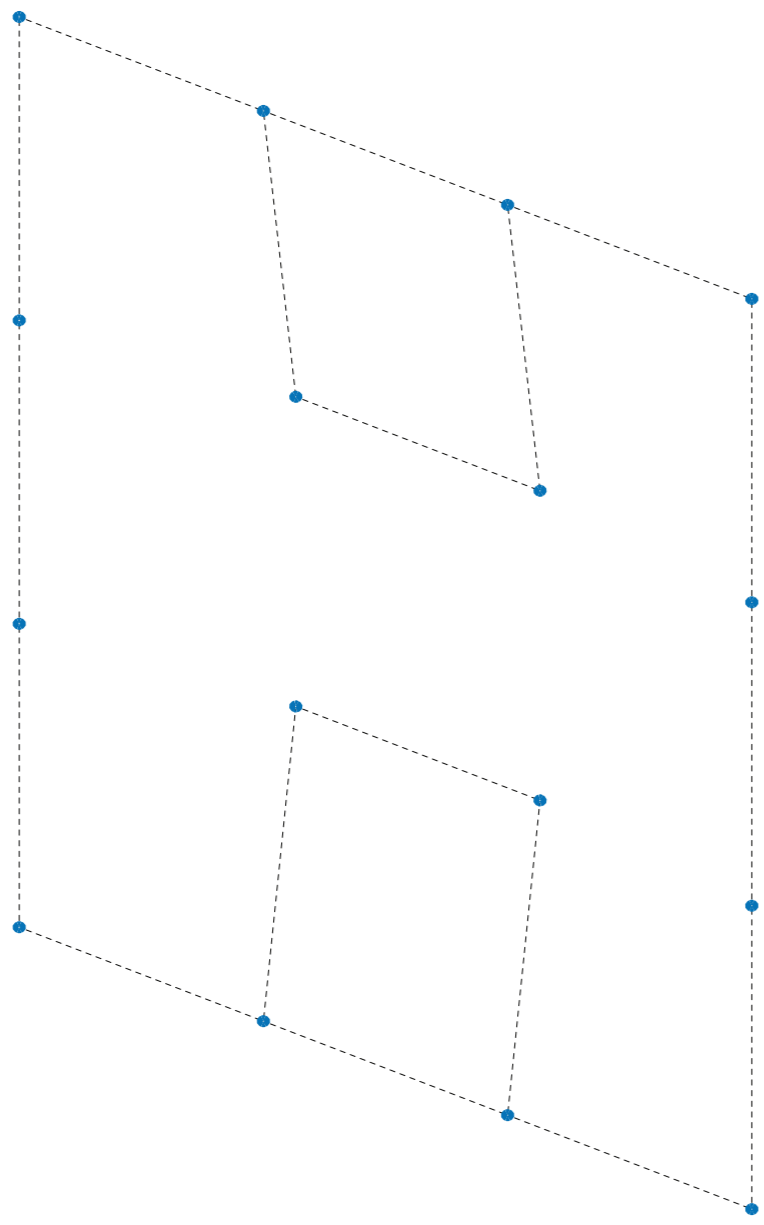
Module Repeated in grid

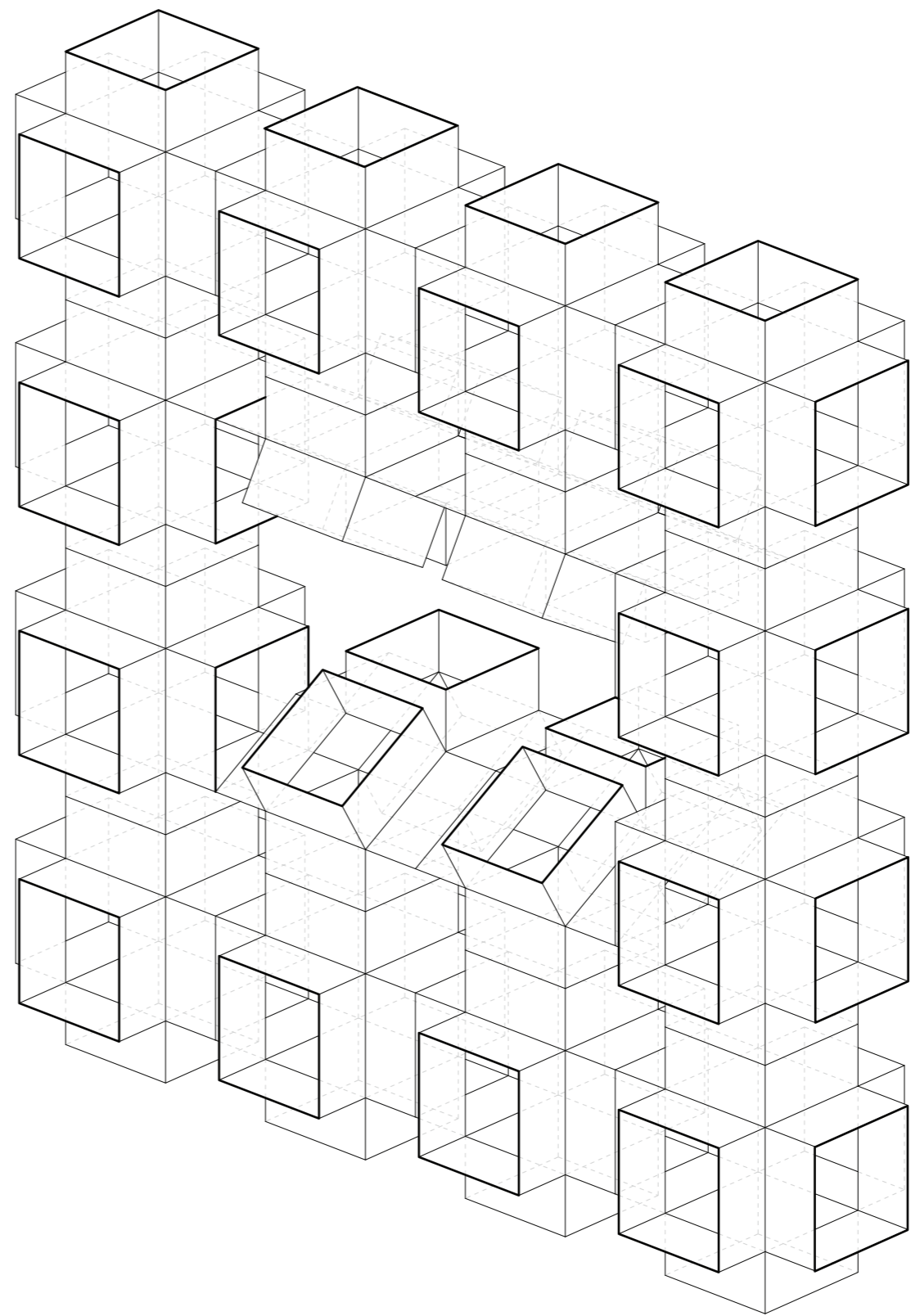
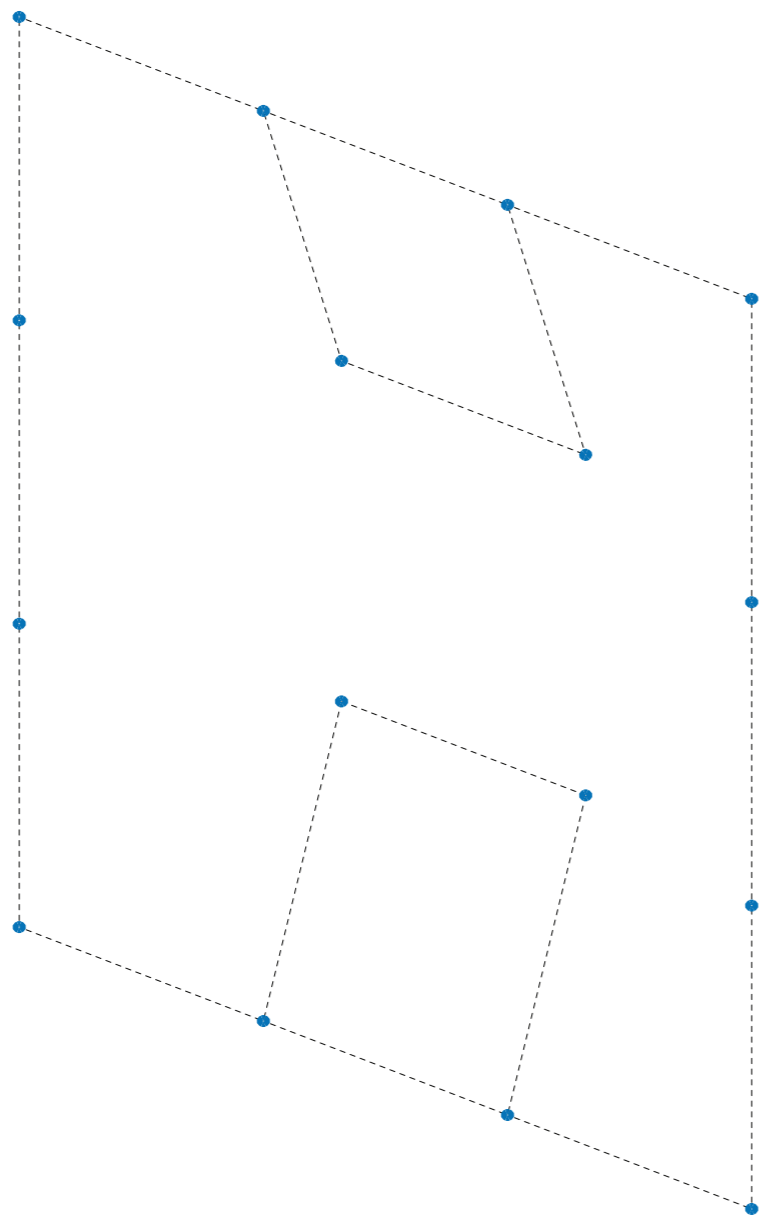


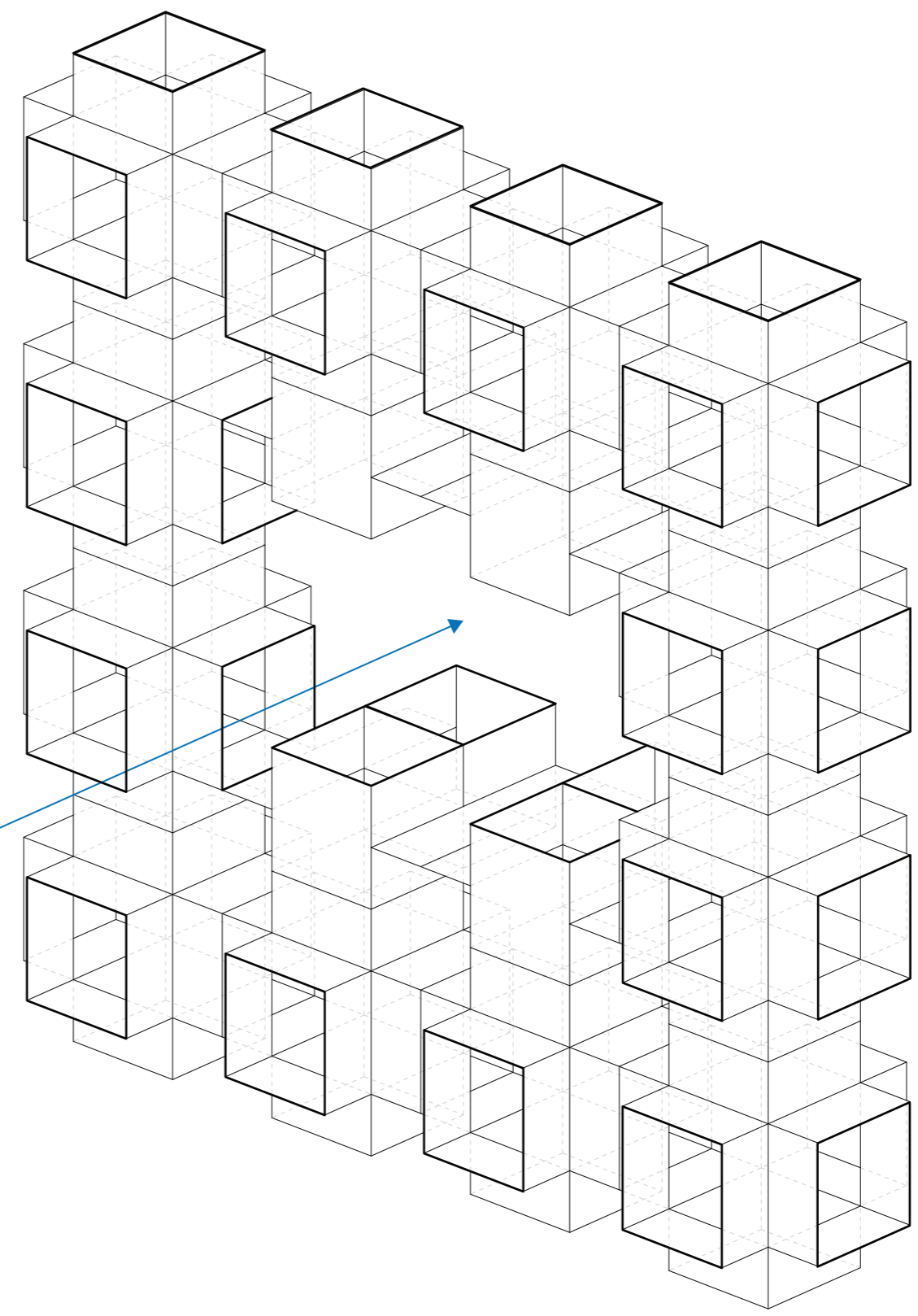
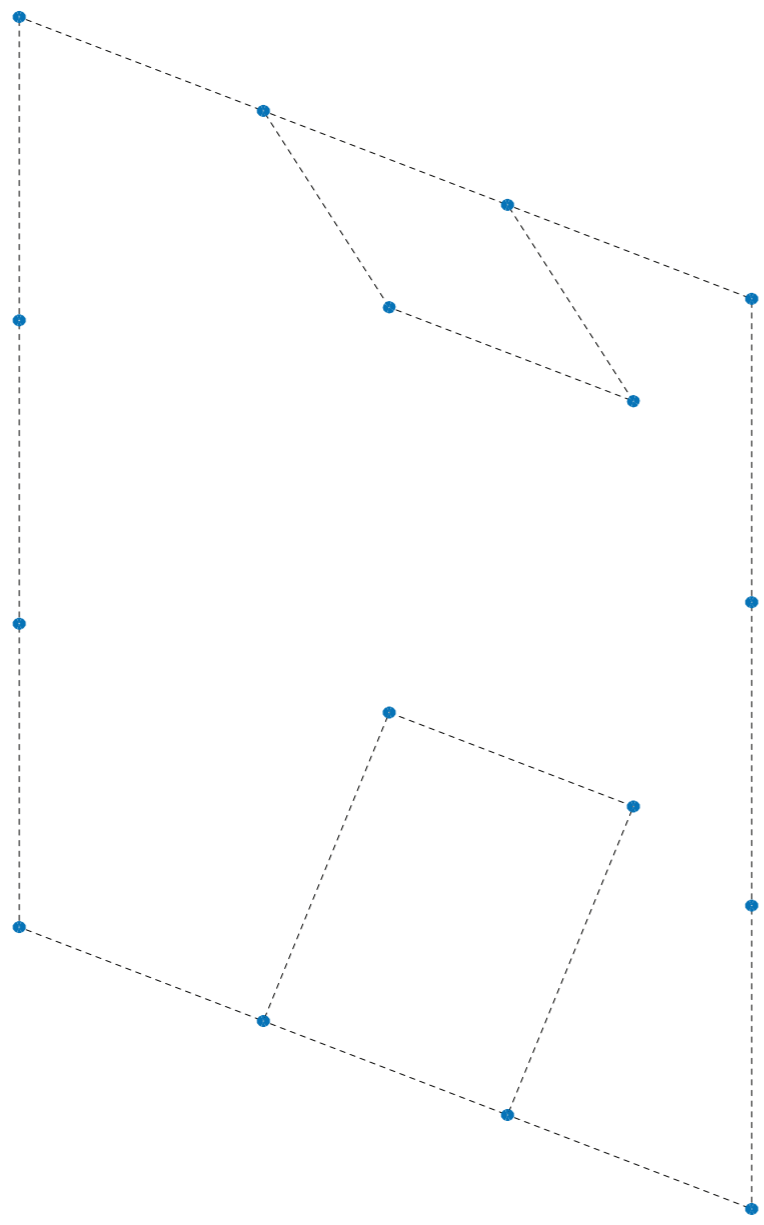
Exemplary Illustration of 1 of 3 Angluar Movement

Connection/Disconnection



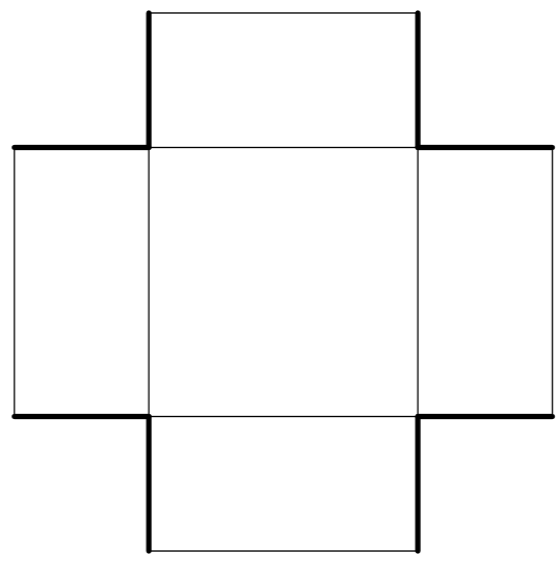
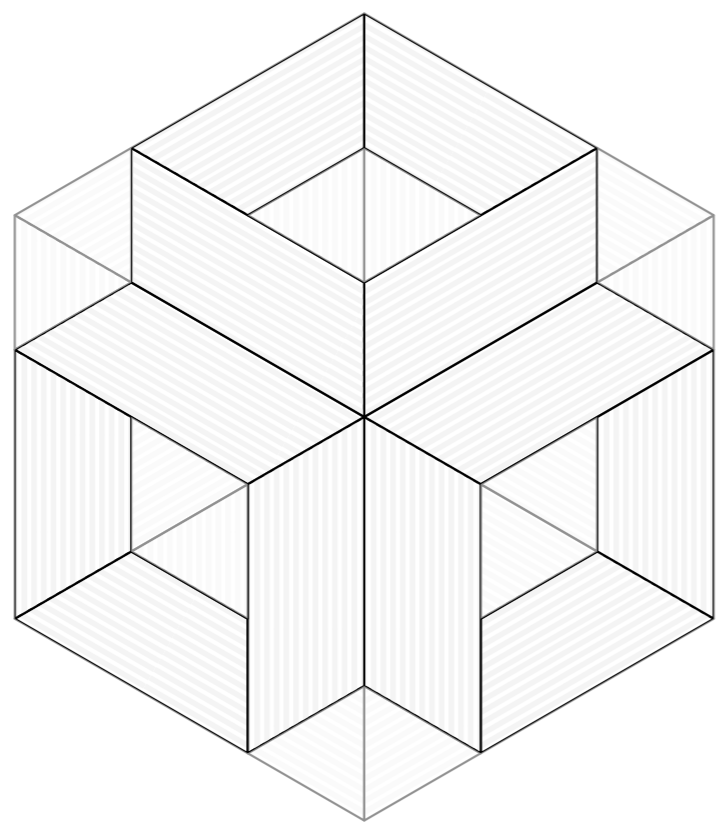


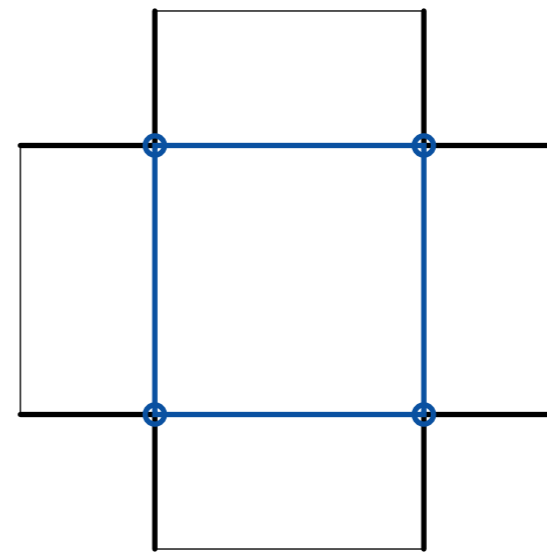
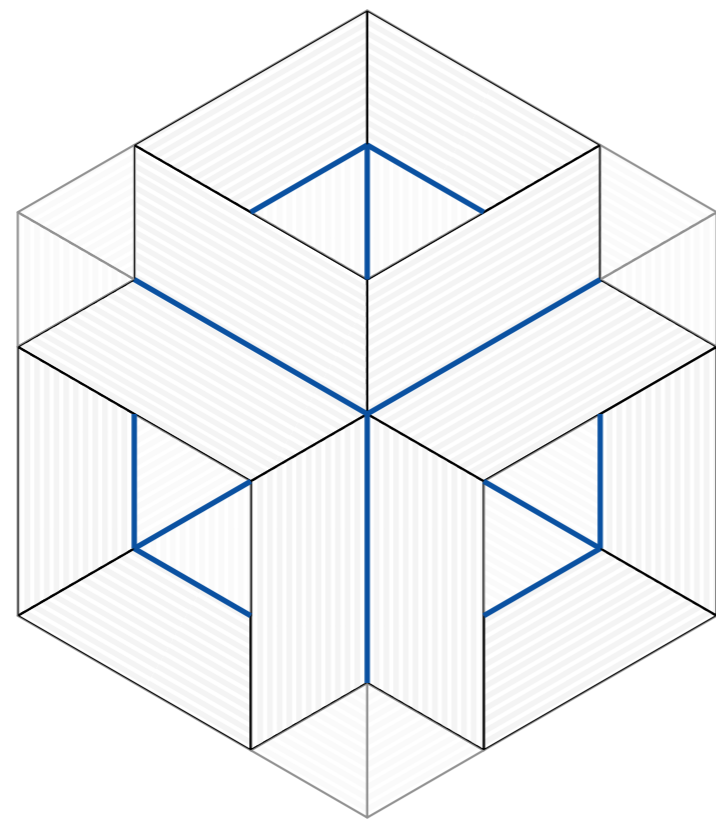




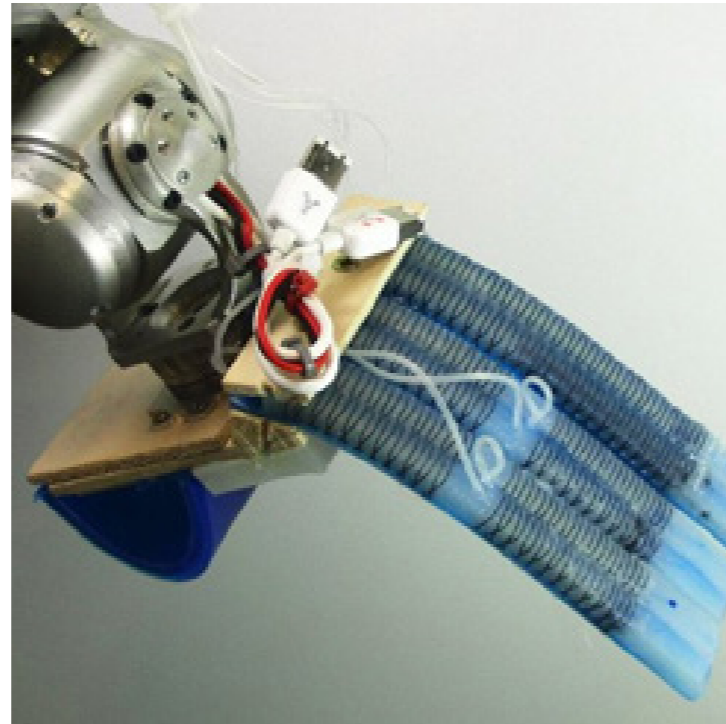
Materialization

Mechanism and Material Considerations

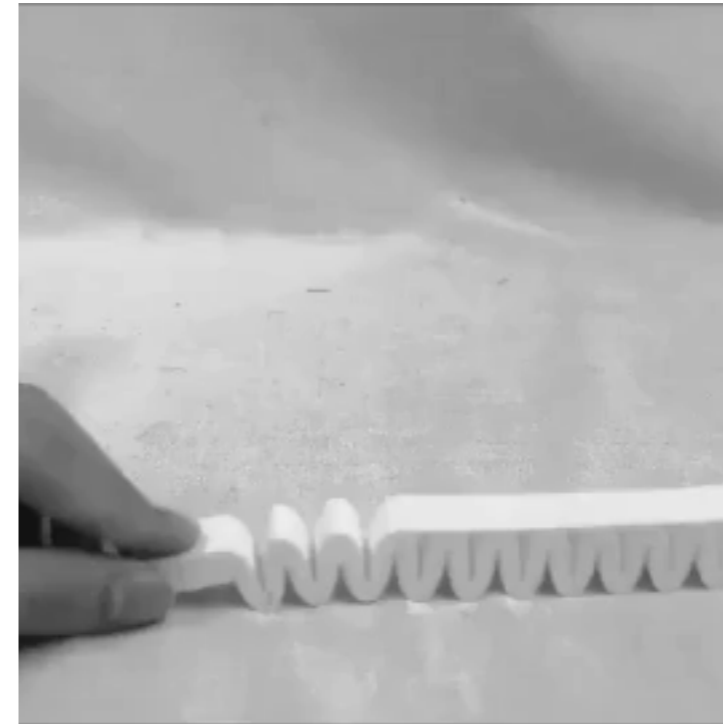




Edge Actuation



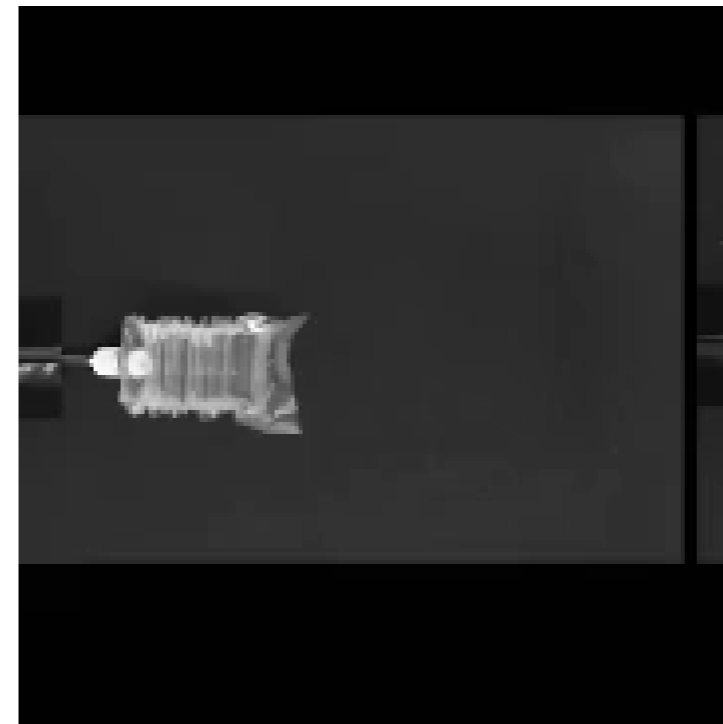
Soft multi-material fiber-reinforced bending actuator. The basic design consists of an elastomer bladder wrapped with inextensible reinforcements.



3D printed pneumatic actuator

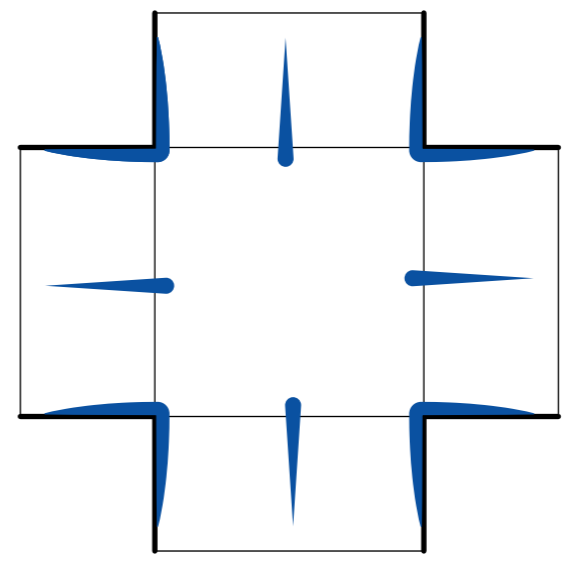
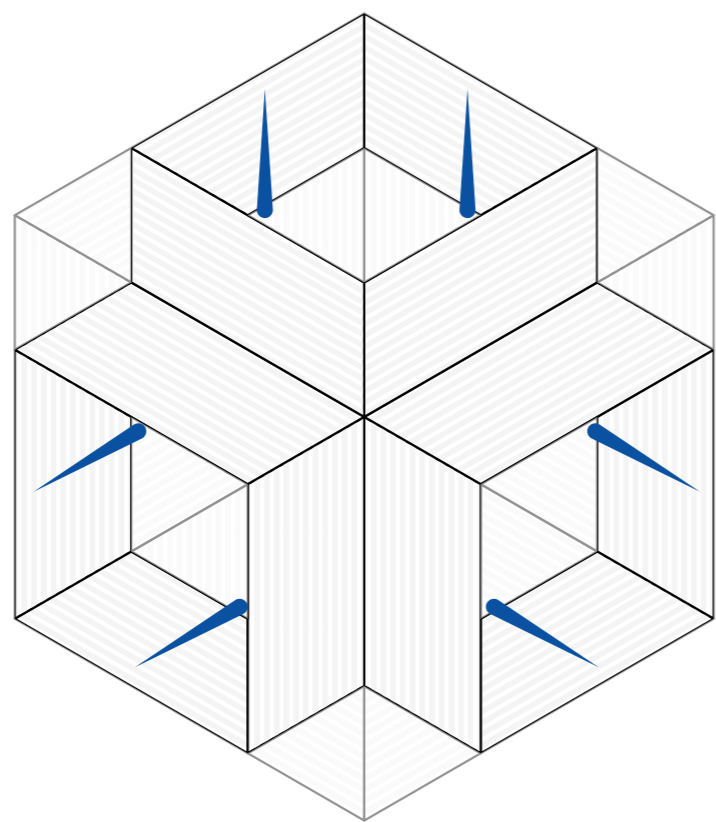


Shape Memory Composite Actuator

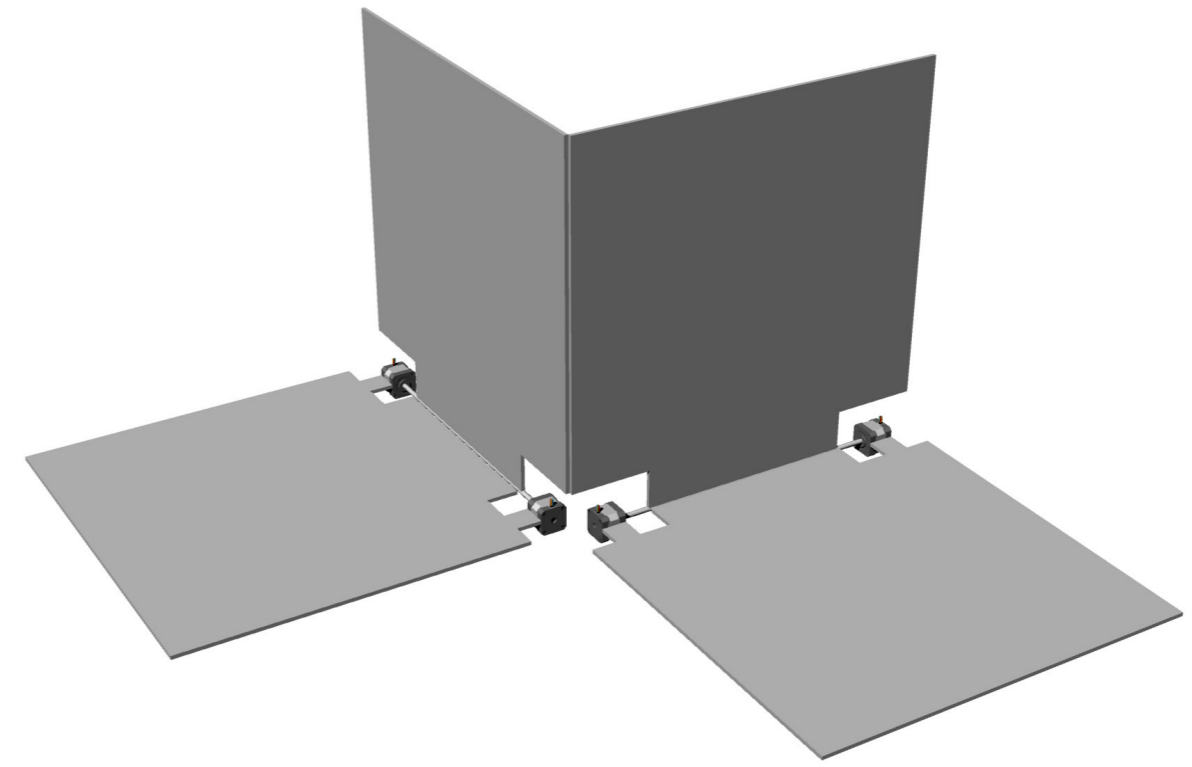


Origami-Inspired Artificial Muscles

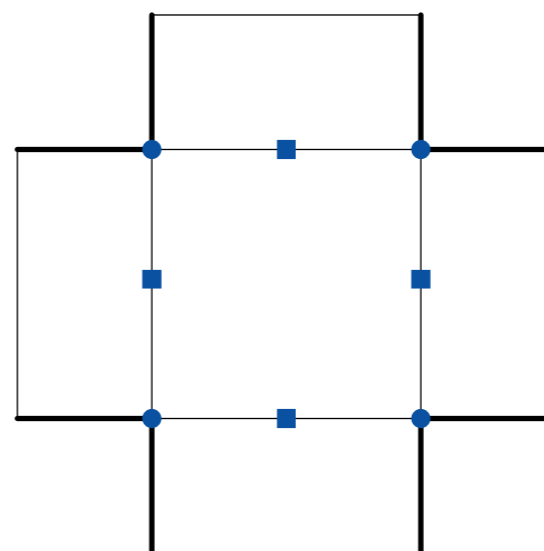
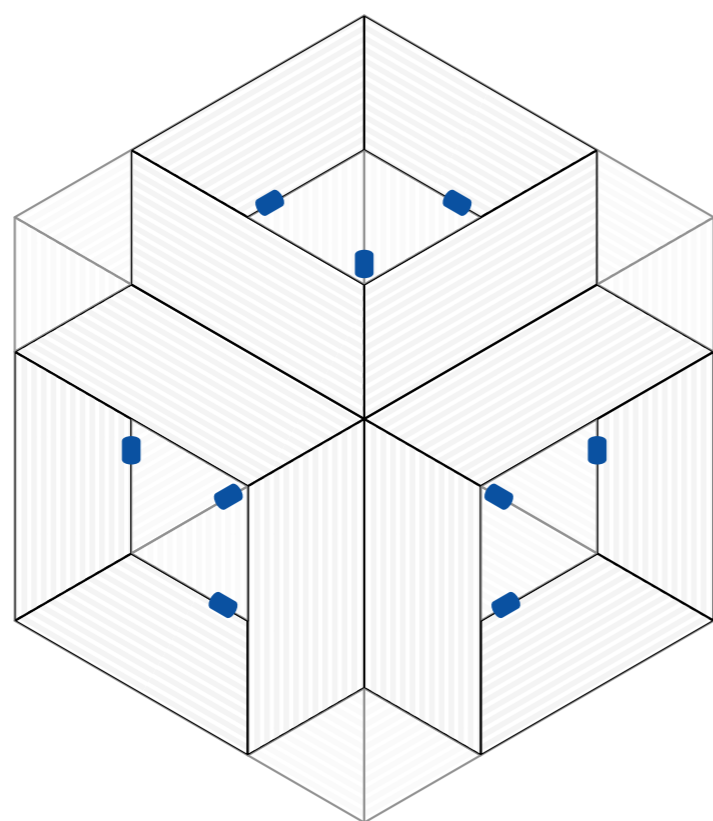
Edge Actuation



Edge Actuation

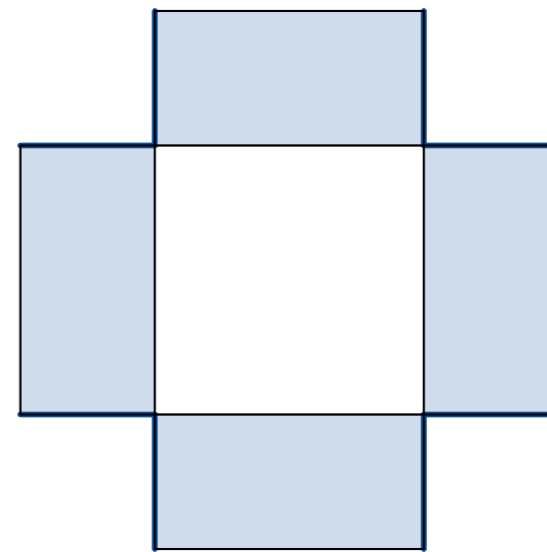
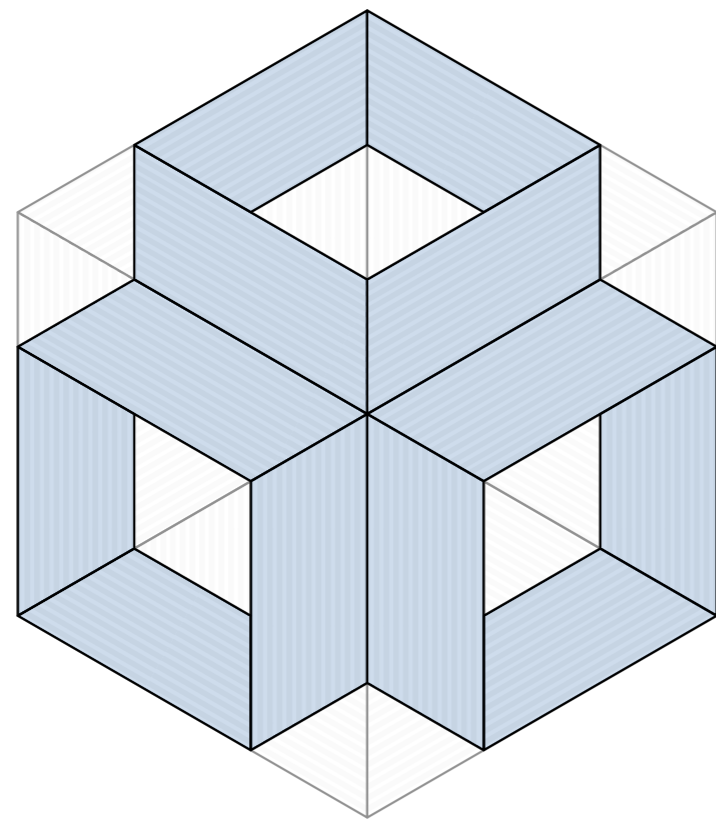


Edge Actuation with Step Motors

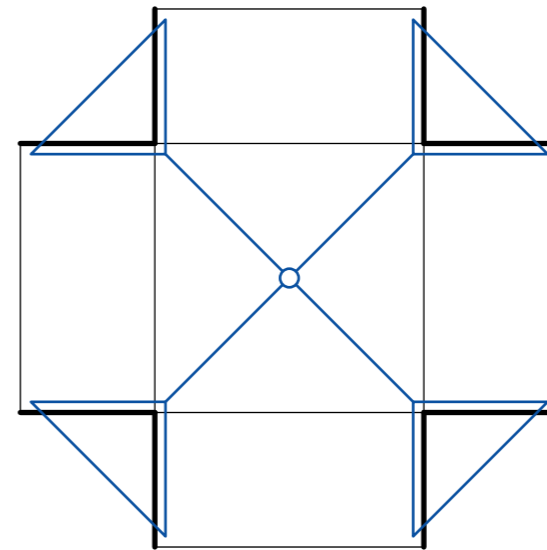
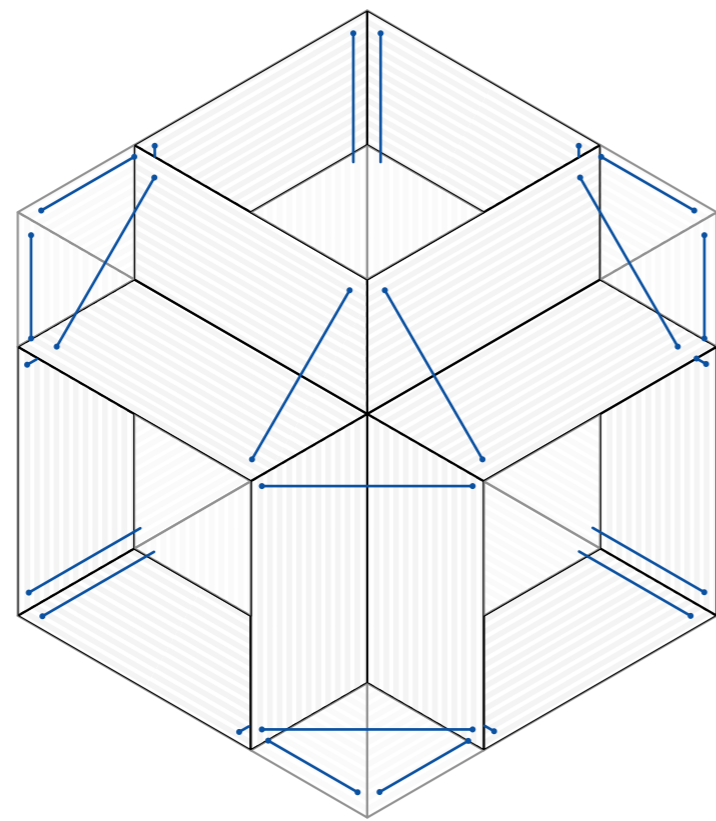




Surface Actuation with scarring a folding patterns



Surface Actuation with scarring a folding patterns



Tension Wires to Mechanically Close/Open Flaps