

Designing DNA origami devices with programmable motion has emerged as a promising approach for nanorobotic systems with applications including molecular computation and information transmission. However, little work has explored transport of DNA origami structures along a DNA origami track in a controlled manner. Building on DNA walkers, we developed a new transmission system consisting of a “gear” rolling along a “track” much like a rack and pinion gear system. The motion is mediated by DNA base-pairing and strand displacement. The rolling component, or gear, is a ring 60nm in diameter with overhangs around the perimeter that bind to overhangs on the track via intermediate strands, and the gear moves along the track using strand displacement. We designed and fabricated the system and demonstrated binding and motion of the gear system. Future work will consist of creating more gear-track systems capable of transmitting material or data with embedded logical control.