

A Historical Review of Polyhedral Linkages

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Abstract: Polyhedral linkages are linkages that resemble polyhedral shapes at different configurations. I will summarize the necessary geometrical fundamentals of polyhedral geometry and present a historical and critical review of the polyhedral linkage designs available in the literature. Basic definitions of polyhedral geometry and operations are needed to comprehend and design polyhedral linkages. First, early works on polyhedral linkages will be presented, where flexible polyhedra with rigid faces and flexible edges are issued. Next part is reserved to conformal polyhedral linkages, which go through shape transformations while plane, dihedral and solid angles are preserved. Conformal polyhedral linkages will be examined in four categories: 1) Jitterbug-like linkages with screwing polygonal links connected to each other with dihedral angle preserving links, 2) polyhedral linkages with planar kinematic chains in radial motion planes, 3) polyhedral linkages with planar kinematic chains on faces, that are connected to each other with dihedral angle preserving links, and 4) other conformal polyhedral linkages.