Analyzing the Effectiveness of Hoeken’s Linkage in Legged Locomotion

Hemund, Andrew

Currently, the majority of walking robots use either the Jansen or Klann linkages to propel themselves. Although both are effective, one flaw associated with using the linkages is that the robot is not propelled at a constant velocity. The purpose of this project is to create a walking robot using the Hoeken linkage that moves with a constant velocity. Following the engineering design process, a design was created and 3D-printed to utilize the linkage. The design was composed of six legs, each leg using one Hoeken linkage. Each pair of legs were mounted on a wooden board with a single motor, resulting in three parallel boards connected with PVC and three motors. There are multiple situations in which the design could be beneficial. One example could be crossing uneven terrain; environments like sand, gravel, snow, or any non pavement surface could be better traversed using a step rather than a roll. Another example could be military applications, such as duties performed by unmanned ground vehicles (UGVs). Tasks like scouting and neutralizing minefields and other obstacles are easier accomplished with a step, as wheeled robots can flip over as a result of uneven terrain.

Awards Won: