Faculty Name:

Xuenan Li

Faculty Email:

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Lab:

Li's Applied Math Lab

Project Title:

Designing singular structures in bar-joint networks

Description:

The investigation of singular structures occupies a pivotal position within the field of mechanism and robot kinematics. A characteristic feature of most robotic systems is their under-constrained nature, affording them a degree of deformability without breaking the systems. Typically, the deformation space of these systems is described as "smooth," indicating that the kinematic properties of the system transition seamlessly during deformation. However, certain configurations, identified as singularities, prompt abrupt and significant changes in the kinematic properties of a system. Recognizing and understanding these singular structures, along with developing systematic strategies for their design, holds substantial practical significance.

For the forthcoming summer project, our goal is to numerically detect singular structures in a specific robotic system, namely the bar-joint network, utilizing a numerical saddle point search scheme. A prior understanding of singularity in robotic systems is not necessary. We will provide an introduction to the fundamental concepts of singular structures before proceeding to investigate them numerically, with the objective of enhancing our design skills concerning these structures.

Location of Research:

On Site

# of hrs/week:

20

Department/Program:

Applied Physics and Applied Mathematics

Eligibility:

BS, Second Year, BS, Third Year, BS, Fourth Year

To apply, please contact:

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