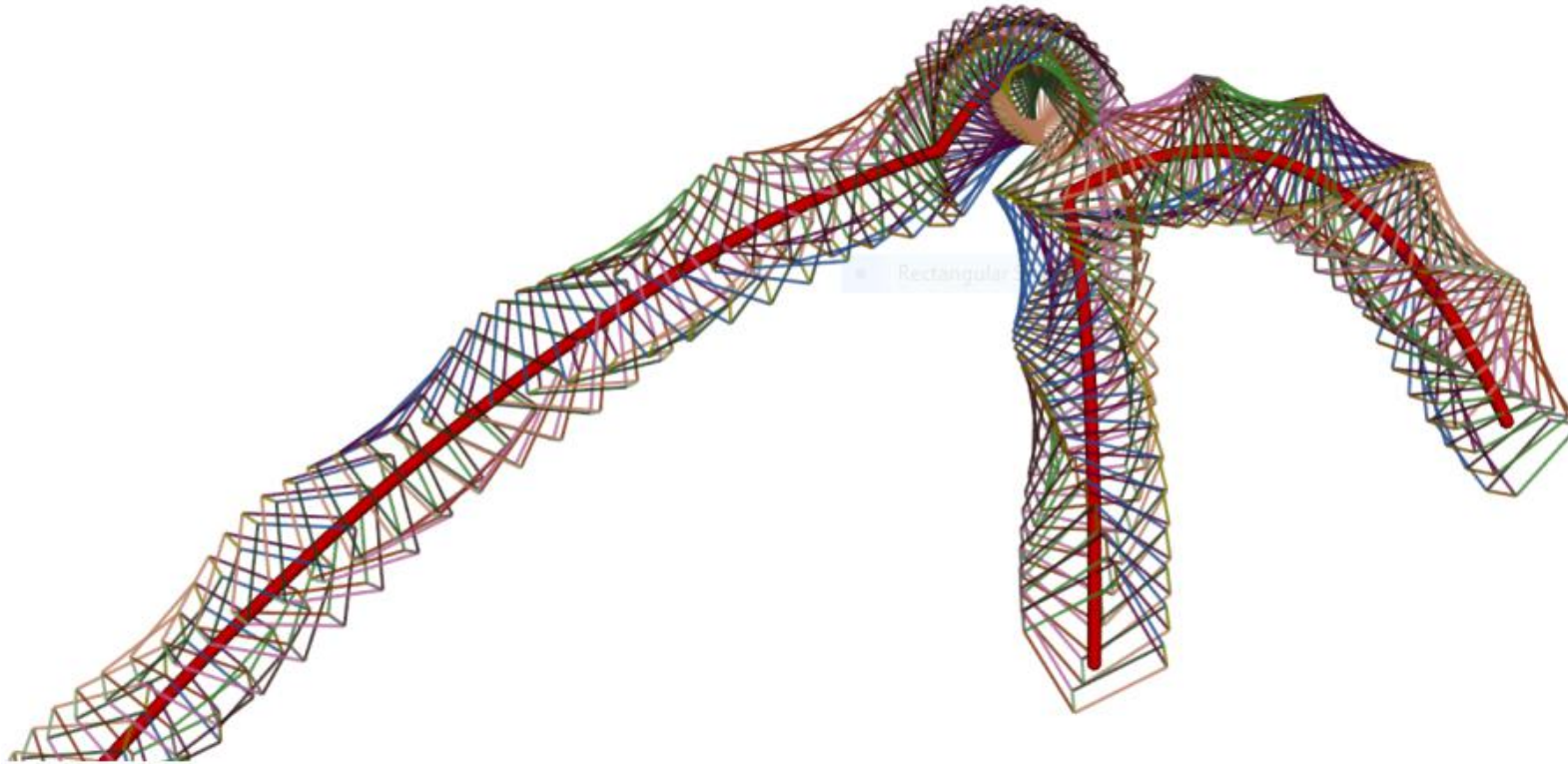


Rigid Body Motion from Video



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Problem Statement

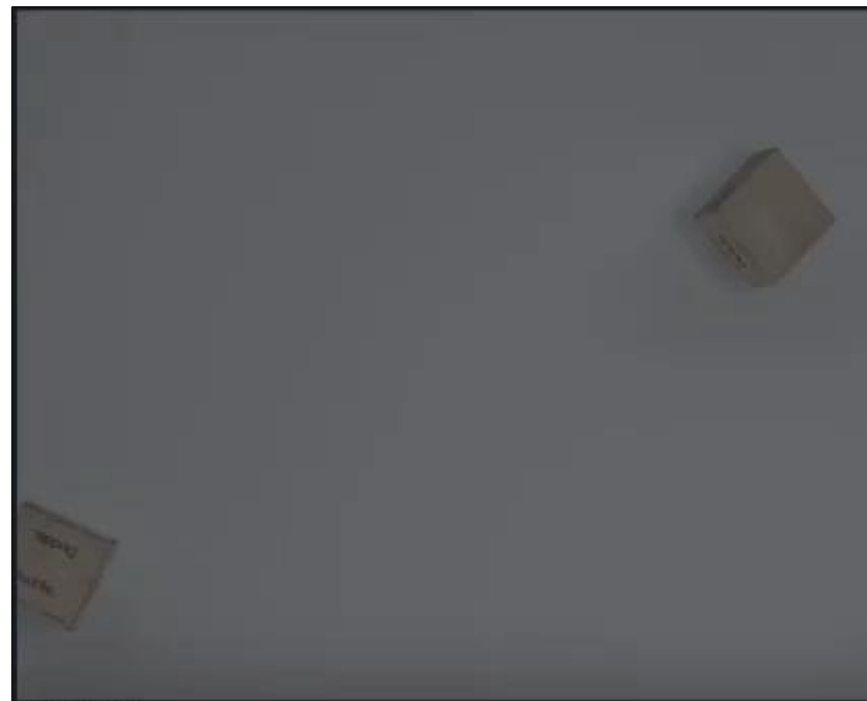
Input:

A video depicting collision of objects



Output:

Reconstructed physically valid collision



Applications

- Entertainment – Test collision without damaging real objects
- Estimate physical quantities – Coefficient of restitution of new objects

Solution Approach

1. Read collision parameters directly from input video

- Position – locating object centroids in keyframes
- Orientation – try various rotations of pre-scanned object in 3D, render, choose the one that matches the closest

2. Rigid body physics simulation

- Enforce constraints based on above parameters

Implementation

- Assumptions
 - Perfectly rigid body
 - No external force (except gravity)
- Libraries
 - OpenGL – Rendering
 - Bullet – Physics Simulation
- Method
 1. Initialize the scene – parameters are given manually
 2. Run the physics simulation, and render simultaneously

Next...

- Read parameters from video
- Enforce constraints in simulation