1 Solution Distribution

Figure A shows the effect on the solution distribution of adding Gaussian noise $\sigma$ to the input poses. For up to four poses, there are an infinite number of solutions that traverse the input poses exactly. However, for five poses there is only one solution. Hence, by adding a Gaussian noise $\sigma > 0$ to the input poses, a greater variation of solutions can be obtained in all cases potentially producing a more desired linkage solution.

![Solution Distribution](image)

Figure A. Solution distribution. The blue dots represent the solutions for the fixed joints at the initial pose, and the best linkages are shown. As the Gaussian noise $\sigma$ for the input poses increases, more variation of solutions can be obtained, which enables our approach to find a better solution.
2 Effect of the Number of Bodies

Figure B shows the effect on the solution distribution of increasing the number of moving bodies from 1 to 3. Increasing the number of moving bodies increases the number of unknowns and constraints, which makes the number of valid solutions decrease significantly. Nevertheless, a similar improvement can be observed by adding the Gaussian noise to the input poses.

Figure B. **Effect of number of moving bodies.** The blue dots represent the solutions for the fixed joints at the initial pose, and the best linkages are shown. Increasing the number of moving bodies adds more constraints, which reduces the valid solutions. Adding the Gaussian noise still improves the variation of the solutions, which improves the best solution in terms of our soft constraints.
3 Cost Evolution with the Particle Filter

As discussed in Section 6, we use $\lambda = 20$ to facilitate the convergence of the particle filter. Figure C shows the cost evolution using the particle filter for some of our examples. The high value of $\lambda$ in Equation 10 helps a quick convergence of the cost distribution of the particles. One hundred particles are resampled at each iteration.

Figure C. **Cost evolution through the particle filter.** The cost distribution quickly converges thanks to a high $\lambda = 20$. The blue lines represent the 95% confidence interval, and the black lines represent the mean cost.
4 User Study

Figure D shows the linkages designed by the participants of the user study. While all eight participants successfully finished the first task, three did not complete the second task; hence, only five linkages are shown for the second task.

Figure D. Linkages designed during the user study. All the linkages designed by the eight participants are shown for Task 1. For Task 2, three participants gave up without completing the task, so only five results are shown.