Cell forces with the saenopy MCP

What saenopy does, and how your AI app runs it for you

Cells pull on the gel around them. saenopy compares a relaxed and a deformed 3D stack of the gel, measures how far it moved, and calculates the forces behind it. The saenopy MCP server lets an AI app such as Claude, Codex, or Gemini run it on your computer.

Results are from a scripted test of this server on saenopy's organoid example; the requests show how you would ask.

Step 1. Install the saenopy MCP and collect your images

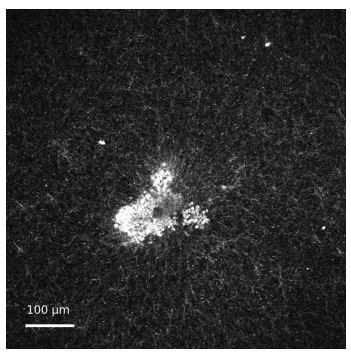
You need a relaxed z-stack of the gel (no cell forces, for example after cytochalasin D), a deformed one, the voxel size, and your gel's material values. Install Python 3.10, 3.11, or 3.12, then type these lines in Terminal. The second connects Claude Code; for other apps, see the README.

```
pip install git+https://github.com/surajinacademia/saenopy_mcp
claude mcp add saenopy -- saenopy-mcp
```

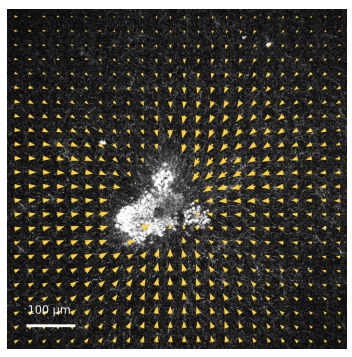
Step 2. Ask saenopy to measure how far the gel moved

Ask: **"Measure how far the gel moved around the organoid."**

It measured 1,637 points: median 4.4 µm, largest 8.4 µm, toward the organoid. saenopy run on its own gave the same result (correlation 0.99997).



Organoid in collagen

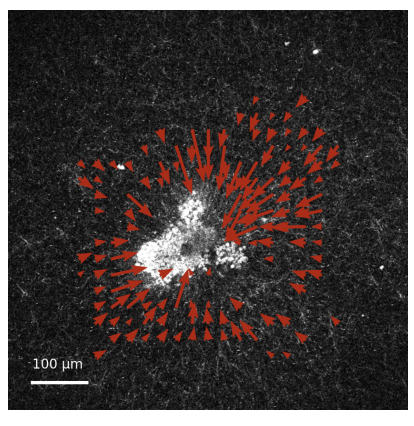


Movement, shown 3×

Step 3. Ask saenopy to fit the forces from that movement

Ask: **"Now fit the forces for this collagen."**

After 1,400 iterations and 2.7 hours, the largest force was 65 nN, and the strongest forces point toward the organoid. They match saenopy's published fit of this organoid (correlation 0.97). A wrong gel stiffness scales every force.

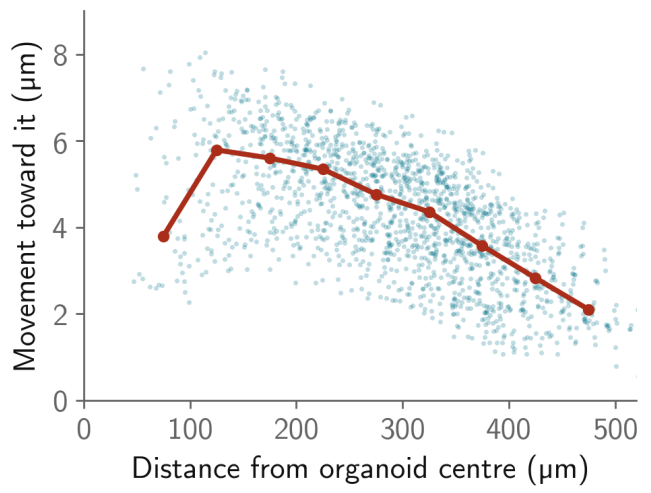


Forces on the gel

Step 4. Export the numbers and plot them against distance

Ask: **"Export the movement as a table."**

It saved a table with one row per point: position and movement in x, y, and z. From it, your AI app can plot movement against distance. Here, movement toward the organoid peaks near 6 µm at 125 µm from its centre and falls to about 2 µm at 475 µm.



Dots: points. Line: median.

saenopy MCP by Suraj Sahu, BSD-3-Clause: github.com/surajinacademia/saenopy_mcp. saenopy: Böhringer et al., Nature Physics (2024); MIT, GUI modules GPL-3.0. Logo: saenopy repository (MIT). Images: saenopy's OrganoidTFM example (v0.7.4).