

Granular Matter Project Options

1. Clogging in Granular Flow Through a Bottleneck (preferred)

- Scientific focus: how grain size, friction, orifice diameter affect clogging probability.
- Why it works: clear question, strong literature, easy visualizations, simple simulation.
- Simulation: simplified DEM or cellular automaton with gravity and collisions.
- Typical results: probability of clogging vs. orifice size, discharge time, arch formation snapshots.

2. Avalanches and Angle of Repose in Granular Piles

- Scientific focus: how friction or grain shape affects the angle of repose and avalanche onset.
- Why it works: well-defined metrics, highly visual, easy to simulate, rich physics.
- Simulation: sandpile model or CA with slope-dependent toppling rules.
- Typical results: angle of repose curves, avalanche frequency distributions, height maps.

3. Granular Segregation (Brazil Nut Effect)

- Scientific focus: why larger particles rise during vibration.
- Why it works: famous phenomenon, striking visuals, clear variables to manipulate.
- Simulation: particle system with vertical vibration; size and density differences.
- Typical results: size profiles over height, segregation timescales, vibration amplitude effects.

Each project fits well in a 2-person team with 9-page report, 10–20 references, and 5–9 figures.