Research Summary

My research will focus on the use of granular particles in two- and three-dimensional systems designed for impact energy trapping, redirection and dissipation. I will concentrate on numerical simulations and experimental testing of these systems. The highly non-linear dynamic response of these granular systems provides a new approach to manipulating impact energy when compared to conventional engineering materials used as protective layers. By varying particle size, material, arrangement, and potentially geometry, I plan to investigate the energy absorption capabilities of these metamaterials.

Shown here is and example of how a basic particle arrangement alone can greatly effect the energy propagation through a two-dimensional setup. Spherical particles were placed in a hexagonal packing and impacted, in-plane, by another particle (as shown on right). The numerical simulation (without dissipation) shown below plots the magnitude of the average particle forces over time.