

NSF Project Title: **Simulating Autonomous Agents and the Human-Autonomous Agent Interaction**

Leading institution: University of Wisconsin-Madison.

Participating institutions: Georgia Tech, Carnegie Mellon University, Johns Hopkins University, University of Iowa, New Jersey Institute of Technology, Open Robotics

Thrust 1: Software Development

1. Methods for faster computational dynamics simulation
 - o Augment Differential Algebraic Equation solver with variable step size & half implicit integrator
 - o Hybrid, conventional-Lie integrators
2. Real-time, nonlinear FEA (Finite Element Analysis) solver for soft robotics
3. Evolving contact approach to handling friction and contact
4. Data-driven models (machine learning in modeling)
5. Chrono::Sensor upgrades for simulating automation/autonomy
6. Chrono for embedded devices
7. Expand terramechanics models for field robotics
8. National Advanced Driving Simulator software update
9. Chrono interfacing to Gazebo
10. Chrono-DualSPPhysics further integration in support of fluid-solid interaction simulation

Thrust 2: Development of domain libraries

1. Bio-inspired robot library
2. Field robotics library, emphasis on lunar environments
3. On-road environments for human-in-the-loop simulation
4. Reproducibility (collection of models from papers published by project team members during project duration)

