

Microgravity, also known as free fall, occurs when all forces acting on an object cancel out. In free fall the only force left is gravity. Studying free fall is important for understanding what happens to objects when they are in space. The best example of free fall on earth is an object that falls with a propulsive force that speeds it up, just as strong as the drag force that is slowing it down. When these forces are equal, the object experiences free fall. Current methods of achieving free fall on Earth are expensive. The Florida Space Grant Consortium sponsored groups from different Florida universities. These universities competed to see which team's machine sustained free fall for the longest amount of time while still being able to recover it for re-use.

On competition day, a drone lifted our machine 900ft high, and then released it towards earth. At this point our machine detected the disconnect and started speeding up to combat the drag force. We then sped up the machine using a battery powered motor and used a force sensor to see if the machine was experiencing free fall during its descent. The data from this sensor determined the university team that wins the competition. A computer controlled the speed of the motor to keep the device in freefall. After falling for at least 4 seconds, a parachute launched from the back of the machine that slowed it down for safe recovery. After safely recovering the machine, each team launched their machine again to get accurate data readings. In conclusion, designing a new, cheap method for testing free fall will expand research opportunities and help the future designs of space systems like rockets and satellites.