

**Harpoon-based sample Acquisition System.** J. B.<sup>1</sup>, D. W.<sup>2</sup>, J. N.<sup>3</sup> <sup>1</sup>Researcher  
(nightcobra1@gmail.com), <sup>2</sup>Mentor (donald.c.wegel@nasa.gov), <sup>3</sup>Mentor (joseph.a.nuth@nasa.gov)

Acquiring information about the composition of comets, asteroids, and other near Earth objects is very important because they may contain the primordial ooze of the solar system and the origins of life on Earth. Sending a spacecraft is the obvious answer, but once it gets there it needs to collect and analyze samples. Conceptually, a drill or a shovel would work, but both require something extra to anchor it to the comet, adding to the cost and complexity of the spacecraft. Since comets and asteroids are very low gravity objects, drilling becomes a problem. If you do not provide a grappling mechanism, the drill would push the spacecraft off the surface. Harpoons have been proposed as grappling mechanisms in the past and are currently flying on missions such as ROSETTA. We propose to use a hollow, core sampling harpoon, to act as the anchoring mechanism as well as the sample collecting device. By combining these two functions, mass is reduced, more samples can be collected and the spacecraft can carry more propellant. Although challenging, returning the collected samples to Earth allows them to be analyzed in laboratories with much greater detail than possible on a spacecraft. Also, bringing the samples back to Earth allows future generations to study them with instruments that have not been invented yet. This way we can use everything at our disposal to uncover the mysteries these near Earth object conceal.