Kino-Dynamic Algorithms for satellite maneuvering around small bodies of interest

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The celestial space is more unknown than known and my curiosity is provoked to bridge the gap by using satellites as my instruments of exploration. Bodies like asteroids and comets are admired owing to their demographics and knowing more about their formation and existence, has always inspired engineers and scientists to establish missions with cutting-edge technology for rendezvous and flybys to gather more information.

Motivated to explore small bodies in space, my research intends to establish safe motion algorithms for satellites to maneuver around small bodies of interest with advanced path planning algorithms using the arbitrary gravitational field of the body under consideration.

The motion plan considers surface-distributed points, realizing the body to be a continuous mass distribution and forward propagates a kino-dynamic optimal path plan for the most viable heuristic. During the orbital motion, the satellite shall be experiencing the gravitational attraction forces which will be constantly updating the ground-truth gravity model hence providing updated knowledge of the unevenly distributed gravity of the asteroid. This gravity model shall be useful in analyzing the mass - density distribution and estimating the external demographics of the body that shall useful for pre-planning flybys and even landing missions.

My research explores a novel approach to satellite motion and safe navigation in space by providing insights to space exploration techniques with advanced space engineering.