

G.E.M.I.N.I. Guidance System Project Deviations

A prospectus was created on December 2, 2019, in order to detail the specifications of the project. However, throughout the course of the building phase, problematic situations with the original design were discovered and had to be adjusted accordingly in order to optimize functionality. The deviations of the final product specifications from the original prospectus specifications are documented below.

Prospectus Specs.	Final Product Specs.	Explanation
The base of the gyroscope axle will be secured using nuts and washers.	The base of the gyroscope axle was secured using a lubricated bearing.	The nuts and washers resulted in excess friction that prevented the axle from spinning smoothly, which hindered the effectiveness of the gyroscope. The original method was effective in theory, however, bearings were an effective alternative due to them having less friction.
The axle of the gyroscope will be secured at a single location at the base of the sphere.	The axle of the gyroscope was secured at two opposite points of the sphere.	Extra mass was added to the gyroscope, which was not accounted for. The unexpected increased mass led to complications of the gyroscope system, including an imbalance of forces. A second axis that follows the same path as the first was added for additional stability purposes.
The gyroscope pivot will hold the rotor, disc, and LED.	Clay was added to the gyroscope pivot that held the batteries, battery case, rotor, disc, and LED.	The batteries for the rotor needed to be added onto the axis in order to prevent tangling. The weight of the gyroscope was again unbalanced, which hindered the system's effectiveness. Extra pieces of clay were added in order to create a weight equilibrium.

An LED will be used as a constant light source.	An LED flashlight was used as a constant light source.	The LED originally shared a power source with the rotor. The rotor drew an unexpectedly large amount of energy and caused the LED to emit a dim and non-constant light. This was substituted for an independent light with its own power source.
The gyroscope system will be housed in a single rectangular casing for transport.	The gyroscope system was housed in separate cubical compartments, which were then secured into a larger rectangular casing.	A single rectangle casing was difficult to operate with, and thus more compartments were created which provided for more convenient access and better organization.
Stepper motors will be used to turn the disc for the gyroscope.	DC motors were used to turn the disc for the gyroscope.	Stepper motors are more massive and slower than DC motors, thus DC motors (faster, lighter) were used because they are better fit for spinning the disc.
The Arduino will be set at the base of the casing for the gyroscopes.	The Arduino will be set upon its own compartment within the casing of the gyroscopes.	Giving the Arduino its own compartment would greatly increase the project's accessibility and reduce its complexity.
The fins will be placed at the back end of the casing.	The fin positions were adjusted to be at the closest position to the gyroscopes.	Due to the nature of the wires and the Servo motors, more optimal placements for the fins were chosen that would be more stable structurally and would provide a better connection with the Arduino.