Eggtricity: The 3-D Printed Buoy that Generates Sustainable Energy Using Wave Movement

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The purpose of this project was to create a buoy capable of generating a sustainable source of energy by harnessing the natural oscillating motions of waves. The buoy is designed with a smooth outer curve shell similar to an egg in order to keep the inner core condensed and theoretically to assist with its flotation. The buoy uses a coil and magnet inner design to generate voltage. The inner design of the 3-D printed buoy is a hollow cylinder containing a 3-D printed spool. This spool has a coil of more than 1000ft of 0.36 gauge enameled copper wire around it. Inside the spool is a 50 mm by 30 mm neodymium disc magnet for the purpose of generating a large magnetic field. 3-D printed springs were placed in a chamber above and below the magnet to provide the magnet with the necessary assistance to bounce with the oscillating motion of waves. This motion induced an alternating current in the copper wire by changing the amount of magnetic field going through the coil. Trials displayed a substantial amount of growth of over 200% in the production of voltage just from changing the magnetic wire's gauge. This exponential growth only continued through the use of thinner wire to create more loops around the spool. In the real world, this project can provide emergency life sustaining power to areas impacted by natural disasters such as Puerto Rico due to the buoy's mobility and ability to function without the need of significant infrastructure.

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