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****Abstract****

Whether one is prototyping, recreating, or even creating a new unique item there is no question that 3D printing is a positively helpful tool in the process of an item going from a fantastical idea to reality. The Robotics Club of Central Florida (RCCF) has found 3D printing an essential part of bringing forth an idea to the real world; however, this process is not without its challenges. With this paper, RCCF's Rapid 3D team presents the challenges of designing, developing, and testing a fully custom 3D printed hull designed around a central direct drive electric propulsion system. This system is based upon RCCF's direct expertise in robotics, specifically the need to keep component interactions simple, functional, and reliable. With that in mind, the drive assembly of the boat (Rapid 3D) features an optimized propeller, selected based on diameter and pitch to maximize thrust efficiency, a submersible pod electric motor for direct drive propulsion, and a custom-g geared rudder system for both enhance maneuverability and control. The power system integrates 4 LiFePO₄ and a LiPo battery, ensuring a balance of power efficiency, safety, and redundancy. \

Revision #1

Created 18 April 2025 17:46:28 by Caicheng Li

Updated 6 May 2026 00:31:11 by Caicheng Li