Control of a Balance Propeller System

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Abstract:

This project presents the design, modeling, and control of a balance propeller system, commonly used in aerospace, robotics, and naval engineering applications. The system, composed of a rotating axis, propeller, motor, and position sensor, requires precise control to maintain stability under varying operational conditions. Mathematical modeling was conducted using state-space equations to describe the dynamics of the system, enabling the calculation of controllability and observability matrices, which are essential for effective control design.

The controller was designed and tested using MATLAB, with poles and control matrices determined to optimize the system's response. The implementation phase involved coding in Arduino for data acquisition and control, with challenges arising during the electronic soldering process, which initially affected system performance. After troubleshooting, a precise and functional control system was achieved, highlighting the successful integration of physical and digital control systems.

Keywords:

Modeling, control, propeller system, aerospace, robotics.