

Design of an Automatic Egg Turning System for a 200-Egg Capacity Duck Egg Incubator

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ABSTRACT

Egg turning is an essential process in duck egg incubation to support optimal embryo development. In large-capacity incubators, manual egg turning requires considerable time and labor, making the process less efficient. This study aimed to design an automatic egg turning system using an ESP32 microcontroller, BTS7960 motor driver, and DC 775 motors as the driving mechanism for the egg turning racks. The research method consisted of system design, hardware assembly, programming using the Arduino IDE, and system performance testing. The tests were conducted by evaluating the turning time, motor rotation angle, motor speed (RPM), and the overall performance of the automatic egg turning system. The results showed that the system successfully performed automatic egg turning every four hours with a 100% success rate throughout the testing period. The DC motors achieved a rotation angle of **540°** within **0.8 seconds**, resulting in a rotational speed of **112.5 RPM**. The use of two DC motors, each driving a separate egg rack, provided stable and balanced egg-turning performance. Based on these results, the proposed system operated according to the intended design and can be applied to a duck egg incubator with a capacity of 200 eggs.

Keywords : *duck egg incubator, automatic egg turning system, ESP32, BTS7960, DC motor.*