

# Performance Evaluation of Mobile Intelligent Poultry Feed Dispensing System Using Internal Model Controller and Optimally Tuned PID Controllers

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## ABSTRACT

This paper presents the performance evaluation of a mobile intelligent poultry liquid feed dispensing system by using a Genetic Algorithm (GA) tuned Proportional Integral Derivative (PID) controller, a Particle Swarm Optimization (PSO) tuned PID controller and an Internal Model Controller (IMC). The performances of the various controllers were evaluated using system responses in terms of the transient response as well as the Integral Absolute error. The obtained results showed that the IMC has the least performance as compared to the optimally tuned PID controllers with respect to the rise time, settling time and internal of the Absolute error. However, the IMC proffers a better solution with respect to the zero overshoot. On the overall the PSO Tuned PID controller offers significant performance enhancement to the system, thus ensuring a better and improve return on investment, reduced human involvement as well as improved productivity on the use of the system.

**Keywords:** PID controller, Particle Swarm Optimization, Genetic Algorithm, Feed Dispensing Internal Model Controller

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## 1. BACKGROUND TO THE STUDY

Intelligent Systems are systems that mimic and imitate human intelligence through the ability to learn through sensing of the environment they exist in as well as making corresponding decision to stimuli around them via the use of probabilistic principles (Rosenblat, Kneese and Boyd, 2014). According to Sen (2006), all control systems are intelligent to a certain extent, but the more intelligent the system is, the more its ability to handle complex situations and make complex decisions. The behaviour of an intelligent system is determined with the use of an intelligent controller (Meystel and Messina, 2000). Intelligent poultry feed dispensing systems are systems that attempt to replicate the activities of the human poultry farmer by dispensing feed to the poultry birds at specific time intervals (Olaniyi et al., 2015). These intelligent poultry feed dispensing systems are designed to reduce wastage of the feed, reduce the level of human involvement, reduce the contamination of the feed as well as reduce the stress and fatigue associated with monitoring of the poultry birds manually.