ABSTRAK

DETEKSI VISUAL PERTUMBUHAN AYAM MENGGUNAKAN *DEEP LEARNING* PADA *AUTOMATIC CHICKEN COOP*

(2026: 110 Halaman + 51 Gambar + 10 Tabel + Daftar Pustaka + Lampiran)

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Pemantauan pertumbuhan ayam kampung secara manual masih menghadapi keterbatasan efisiensi dan objektivitas dalam sistem peternakan konvensional. Penelitian ini mengembangkan sistem deteksi visual pertumbuhan ayam menggunakan YOLOv11n dan *Gated Recurrent Unit* (GRU) pada *Automatic Chicken Coop* berbasis IoT yang dilengkapi sensor DHT22, MQ-137, *load cell*, dan mikrokontroler ESP32. Model YOLOv11n mengestimasi tinggi, panjang, dan berat badan ayam secara *real-time* dari rekaman CCTV, dengan nilai R^2 gabungan sebesar 0,919; 0,823; dan 0,905 pada kandang tradisional, serta 0,887; 0,949; dan 0,942 pada *Automatic Chicken Coop*. Seluruh nilai MAPE pada kedua kondisi kandang berada di bawah 5% dan *F1-Score* di atas 91%. Model GRU dengan pendekatan *Strict Guarded Calibration* memprediksi pertumbuhan hari ke-41 hingga ke-50 dengan R^2 antara 0,96–0,99, MAPE di bawah 1,1%, dan *F1-Score* 100%. Hasil penelitian menunjukkan bahwa sistem yang dikembangkan mampu memantau dan memprediksi pertumbuhan ayam kampung secara akurat dan otomatis pada dua kondisi kandang yang berbeda.

Kata Kunci: YOLOv11, GRU, Deteksi Pertumbuhan Ayam, *Automatic Chicken Coop*, *Deep Learning*, IoT.

ABSTRACT

VISUAL DETECTION OF CHICKEN GROWTH USING DEEP LEARNING IN AN AUTOMATIC CHICKEN COOP

(2026: 110 Pages + 51 Figures + 10 Tables + References + Appendices)

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Manual monitoring of native chicken (*ayam kampung*) growth remains limited in efficiency and objectivity within conventional farming systems. This study develops a visual growth detection system using YOLOv11n and a Gated Recurrent Unit (GRU) integrated into an IoT-based Automatic Chicken Coop equipped with DHT22, MQ-137, load cell sensors, and an ESP32 microcontroller. The YOLOv11n model estimates body height, length, and weight in real-time from CCTV footage, achieving combined R^2 values of 0.919, 0.823, and 0.905 in the traditional coop, and 0.887, 0.949, and 0.942 in the Automatic Chicken Coop. All MAPE values across both conditions remained below 5%, with F1-Scores exceeding 91%. The GRU model with Strict Guarded Calibration predicted growth from day 41 to 50 with R^2 values of 0.96–0.99, MAPE below 1.1%, and a perfect F1-Score of 100%. The results demonstrate that the developed system effectively monitors and predicts native chicken growth accurately and automatically across two distinct rearing environments.

Keywords: YOLOv11, GRU, Chicken Growth Detection, Automatic Chicken Coop, Deep Learning, IoT.