

ABSTRAK

SISTEM *MONITORING* DAN DETEKSI FERTILITAS TELUR AYAM KAMPUNG PADA INKUBATOR BUATAN MENGGUNAKAN YOLOv8 BERBASIS IOT

(2026: xv + 83 Halaman + 48 Gambar + 15 Tabel + Daftar Pustaka + Lampiran)

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Proses inkubasi telur ayam kampung memerlukan pengendalian suhu dan kelembapan yang stabil serta pemantauan kondisi inkubator secara berkelanjutan. Selain itu, identifikasi fertilitas telur melalui proses *candling* umumnya masih dilakukan secara manual sehingga bergantung pada kemampuan pengamat dan berpotensi menimbulkan kesalahan klasifikasi. Pengembangan sistem ini bertujuan mengembangkan sistem *monitoring* dan deteksi fertilitas telur ayam kampung berbasis *Internet of Things* (IoT) menggunakan algoritma YOLOv8 untuk mendeteksi dan mengklasifikasikan telur fertil dan infertil secara *real-time*. Sistem dibangun menggunakan Arduino Mega 2560 sebagai pengendali utama, ESP32 sebagai modul komunikasi IoT, sensor DHT22 untuk memantau suhu dan kelembapan, sensor PIR untuk mendeteksi pergerakan anak ayam setelah menetas, kamera CCTV sebagai media akuisisi citra, serta *platform* Blynk IoT sebagai media *monitoring*. Model YOLOv8 dilatih menggunakan dataset citra hasil *candling* yang telah dianotasi dan selanjutnya diimplementasikan untuk mendeteksi fertilitas telur secara otomatis. Hasil pengujian menunjukkan bahwa model YOLOv8 mampu melakukan deteksi fertilitas telur dengan nilai *Precision* sebesar 0,997, *Recall* sebesar 1,000, *mAP50* sebesar 0,995, dan *mAP50-95* sebesar 0,950. Sistem *monitoring* juga mampu mempertahankan suhu inkubator pada kisaran 37–38°C dan kelembapan 55–65% RH, serta menampilkan informasi suhu, kelembapan, deteksi gerakan, dan hasil deteksi fertilitas telur secara *real-time* melalui aplikasi Blynk IoT. Hasil tersebut menunjukkan bahwa sistem yang dikembangkan mampu mengintegrasikan teknologi *computer vision* dan *Internet of Things* untuk mendukung proses *monitoring* inkubator serta identifikasi fertilitas telur ayam kampung secara otomatis.

Kata kunci: YOLOv8, fertilitas telur ayam kampung, *candling*, *Internet of Things* (IoT), Blynk IoT

ABSTRACT

MONITORING SYSTEM AND FERTILITY DETECTION OF NATIVE CHICKEN EGGS IN AN ARTIFICIAL INCUBATOR USING YOLOv8 BASED ON THE INTERNET OF THINGS

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The incubation process of native chicken eggs requires stable temperature and humidity control, as well as continuous monitoring of the incubator conditions to achieve optimal hatching performance. In addition, egg fertility identification through the candling process is generally performed manually, making it highly dependent on the observer's experience and potentially leading to misclassification. This study aims to develop an Internet of Things (IoT)-based monitoring and fertility detection system for native chicken eggs using the YOLOv8 algorithm to detect and classify fertile and infertile eggs in real time. The system consists of an Arduino Mega 2560 as the main controller, an ESP32 module for IoT communication, a DHT22 sensor for monitoring temperature and humidity, a Passive Infrared (PIR) sensor for detecting chick movement after hatching, an IP camera for image acquisition, and the Blynk IoT platform for remote monitoring. The YOLOv8 model was trained using annotated candling image datasets and subsequently implemented to automatically detect egg fertility. The experimental results showed that the YOLOv8 model achieved a Precision of 0.997, a Recall of 1.000, an mAP50 of 0.995, and an mAP50-95 of 0.950. Furthermore, the monitoring system successfully maintained the incubator temperature within the range of 37–38°C and the humidity within 55–65% RH while displaying temperature, humidity, movement detection, and egg fertility detection results in real time through the Blynk IoT application. These results indicate that the developed system successfully integrates computer vision and Internet of Things technologies to support automatic monitoring of incubator conditions and real-time fertility detection of native chicken eggs.

Keywords: YOLOv8, native chicken egg fertility, candling, Internet of Things (IoT), Blynk IoT