

ABSTRAK

DETEKSI KEMATIAN BURAYAK IKAN CHANNA MENGGUNAKAN ALGORITMA YOLOv8

(2026: xv + 93 Halaman + 85 Gambar + 11 Tabel + Lampiran)

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Burayak ikan Channa memiliki tingkat sensitivitas yang tinggi terhadap perubahan lingkungan sehingga rentan mengalami stres dan kematian. Pemantauan secara manual memiliki keterbatasan karena ukuran burayak yang kecil dan membutuhkan pengamatan terus-menerus. Penelitian ini merancang dan mengimplementasikan sistem deteksi kematian burayak ikan *Channa* berbasis Raspberry Pi 4 menggunakan algoritma YOLOv8, serta memantau kualitas air sebagai data pendukung. Sistem menggunakan webcam untuk mendeteksi ikan hidup dan ikan mati secara *real-time* menggunakan model YOLOv8n yang dikonversi ke format NCNN. Pemantauan kualitas air dilakukan menggunakan sensor suhu DS18B20, pH, *Dissolved Oxygen* (DO), *Total Dissolved Solids* (TDS), dan *turbidity* yang dikelola oleh mikrokontroler ESP32. Data hasil deteksi dan kualitas air ditampilkan pada LCD 16×2 I2C dan Dashboard Blynk, serta disimpan otomatis ke Google Sheets setiap 5 menit. Pengujian dilakukan selama 15 hari dengan 28 data sampel. Sistem menghasilkan nilai *precision* 94,87%, *recall* 58,73%, dan *F1-score* 72,55%. Nilai *recall* yang rendah disebabkan oleh ukuran burayak yang kecil, posisi ikan yang saling bertumpuk, dan sensor yang menutupi area akuarium. Pergantian latar belakang akuarium dari hitam menjadi putih terbukti meningkatkan kontras sehingga membantu proses deteksi. Parameter suhu, DO, dan *turbidity* cenderung stabil selama pengujian, sedangkan pH dan TDS mengalami perubahan signifikan akibat gangguan teknis sensor pada periode awal. Kematian burayak tidak hanya dipengaruhi oleh kualitas air, tetapi juga faktor stres dan proses adaptasi lingkungan.

Kata Kunci: YOLOv8, Raspberry Pi 4, burayak ikan *Channa*, deteksi kematian ikan, kualitas air.

ABSTRACT

DETECTION OF CHANNA FISH FRY MORTALITY USING THE YOLOv8 ALGORITHM

(2026: : xv + 93 Pages + 85 Pictures + 11 Tables + Appendiks)

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Channa fish fry exhibit high sensitivity to environmental changes, making them prone to stress and mortality. Manual monitoring is limited due to the small size of the fry and the need for continuous observation. This study designed and implemented a Channa fish fry mortality detection system based on Raspberry Pi 4 using the YOLOv8 algorithm, along with water quality monitoring as supporting data. The system uses a webcam to detect live and dead fish in real time using a YOLOv8n model converted to NCNN format. Water quality monitoring was performed using DS18B20 temperature, pH, Dissolved Oxygen (DO), Total Dissolved Solids (TDS), and turbidity sensors managed by an ESP32 microcontroller. Detection and water quality data are displayed on a 16×2 I2C LCD and Blynk Dashboard, and automatically saved to Google Sheets every 5 minutes. Testing was conducted over 15 days with 28 data samples. The system achieved a precision of 94.87%, recall of 58.73%, and F1-score of 72.55%. The low recall was attributed to the small size of the fry, overlapping fish positions, and sensors obstructing the aquarium view. Replacing the aquarium background from black to white improved object contrast and aided detection. Temperature, DO, and turbidity remained stable throughout testing, while pH and TDS showed significant changes due to sensor interference in the early period. Fish fry mortality was not solely influenced by water quality, but also by stress and environmental adaptation.

Keywords: YOLOv8, Raspberry Pi 4, Channa fish fry, fish mortality detection, water quality.