# ABSTRAK

Pemilahan kematangan buah kopi sangat memengaruhi kualitas dan nilai jual kopi, namun masih banyak dilakukan secara manual sehingga kurang konsisten. Penelitian ini merancang sistem pemilah kematangan buah kopi berbasis *Arduino Uno* menggunakan metode *K-Nearest Neighbors* (KNN) dengan sensor warna TCS3200 untuk membaca nilai RGB dan mengklasifikasikan buah kopi ke dalam tiga kelas, yaitu mentah, setengah matang, dan matang. Sistem ini dilengkapi sensor *loadcell, buzzer* sebagai indikator batas berat, serta mini *conveyor* dan motor servo untuk proses pemilahan otomatis. Pengujian dengan variasi nilai K (1, 3, dan 5) serta rasio data 90:10, 80:20 dan 70:30 menunjukkan bahwa konfigurasi terbaik diperoleh pada K = 5 dengan rasio 80:20 dengan akurasi 98%, sedangkan akurasi terendah terjadi pada K = 1 dengan rasio 90:10 sebesar 65%. Hasil ini menunjukkan bahwa sistem mampu melakukan pemilahan kematangan buah kopi secara efektif dan berpotensi untuk dikembangkan lebih lanjut.

Kata Kunci: buah kopi, kematangan buah kopi, *K-Nearest Neighbors* (KNN), *Arduino Uno*, sensor TCS3200, *loadcell*, *mini conveyor, motor servo, buzzer*.

# ABSTRACT

The sorting of coffee cherry maturity plays a crucial role in determining coffee quality and market value; however, it is still commonly performed manually, resulting in inconsistent outcomes. This study proposes and implements an automatic coffee cherry maturity sorting system based on Arduino Uno using the K-Nearest Neighbors (KNN) method. The system utilizes the TCS3200 color sensor to acquire RGB values as the main features for classifying coffee cherries into three maturity levels: unripe, semi-ripe, and ripe. In addition, a Load cell is employed to measure the weight of the coffee cherries, while a buzzer functions as an alert when the weight exceeds a predefined threshold. The sorting process is automated using a mini conveyor and a servo motor as actuators to direct the coffee cherries according to the classification results. System evaluation was conducted using different K values (K = 1, 3, and 5) and data split ratios of 90:10 and 80:20. The results indicate that system performance is influenced by the choice of K and data ratio, with the best performance achieved at K = 5 and an 80:20 ratio, yielding an accuracy of 98%, while the lowest accuracy of 65% occurred at K = 1 with a 90:10 ratio. These findings demonstrate that the proposed system is effective for coffee cherry maturity sorting and has strong potential for further development and wider application.

Key words: coffee fruit, coffee ripeness classification, K-Nearest Neighbors (KNN), Arduino Uno, TCS3200 color sensor, Load cell, mini conveyor, servo motor, buzzer.