

ABSTRAK

Resistor merupakan komponen dasar elektronika yang nilai resistansinya dapat dibaca melalui gelang warna. Namun, pembacaan secara manual masih dapat menimbulkan kesalahan, terutama bagi pengguna yang belum memahami kode warna resistor. Penelitian ini bertujuan untuk merancang dan mengimplementasikan aplikasi OhmSistor sebagai pendeteksi nilai resistansi resistor berbasis Android menggunakan pendekatan *computer vision*. Sistem bekerja dengan mengambil citra resistor melalui kamera *smartphone*, kemudian memproses citra melalui tahapan deteksi posisi resistor, pembentukan *Region of Interest* (ROI), segmentasi warna menggunakan model HSV (*Hue, Saturation, Value*), validasi *chip* warna, dan perhitungan nilai resistansi berdasarkan kode warna resistor. Pengujian dilakukan menggunakan resistor 4 gelang dengan variasi konfigurasi kamera, jarak pengambilan citra, kondisi pencahayaan, serta pengujian pada beberapa *smartphone* Android. Hasil pengujian menunjukkan bahwa konfigurasi terbaik diperoleh pada kamera utama dengan jarak 15 cm dan pencahayaan menggunakan *flash* kamera sebesar 425 lux, dengan akurasi deteksi warna sebesar 92,85%, akurasi perhitungan resistansi sebesar 71,42%, dan rata-rata waktu proses 0,59 detik. Pengujian menggunakan kamera makro menghasilkan akurasi deteksi warna sebesar 85,71%, akurasi perhitungan resistansi sebesar 57,14%, dan rata-rata waktu proses 1,60 detik. Aplikasi ini juga berhasil melewati pengujian fungsionalitas (*blackbox testing*), serta pengujian *usability* menggunakan *System Usability Scale* (SUS) memperoleh skor 71 dengan kategori *acceptable*. Selain itu, fitur *game* edukasi yang ditambahkan pada aplikasi menunjukkan peningkatan skor pemahaman pengguna terhadap kode warna resistor berdasarkan peningkatan nilai rata-rata dari 50 pada *pre-test* menjadi 86 pada *post-test*. Dengan demikian, aplikasi OhmSistor dapat digunakan sebagai alat bantu pendeteksi nilai resistansi serta menyediakan fitur *game* edukasi untuk mendukung pemahaman pengguna mengenai pembacaan kode warna resistor.

Kata kunci: Android, *computer vision*, *game* edukasi, HSV, pengolahan citra digital, resistor.

ABSTRACT

A resistor is a basic electronic component whose resistance value can be identified through its color bands. However, manual reading may still lead to errors, particularly for users who do not fully understand resistor color codes. This study aims to design and implement OhmSistor, an Android-based application for detecting resistor resistance values using a computer vision approach. The system captures resistor images using a smartphone camera and processes them through several stages, including resistor position detection, Region of Interest (ROI) formation, color segmentation using the HSV (Hue, Saturation, Value) model, color chip validation, and resistance value calculation based on resistor color codes. Testing was conducted using four-band resistors with variations in camera configuration, image acquisition distance, lighting conditions, and several Android smartphones. The results showed that the best configuration was obtained using the main camera at a distance of 15 cm with camera flash lighting of 425 lux, achieving a color detection accuracy of 92.85%, a resistance calculation accuracy of 71.42%, and an average processing time of 0.59 seconds. Testing using the macro camera achieved a color detection accuracy of 85.71%, a resistance calculation accuracy of 57.14%, and an average processing time of 1.60 seconds. The application also successfully passed functional testing (black box testing), while usability testing using the System Usability Scale (SUS) obtained a score of 71, which falls into the acceptable category. In addition, the educational game feature integrated into the application improved users' score understanding of resistor color codes, as indicated by an increase in the average score from 50 in the pre-test to 86 in the post-test. Therefore, OhmSistor can be used as a supporting tool for detecting resistor resistance values while also providing an educational game feature to support users' understanding of resistor color code reading.

Keywords: Android, computer vision, digital image processing, educational game, HSV, resistor.