

**SISTEM MONITORING DISTRIBUSI TEKANAN DUDUK BERBASIS
METODE K-NEAREST NEIGHBOR DAN RULE-BASED SEBAGAI
SUBSISTEM MONITORING POSTUR DUDUK BERBASIS SENSOR
TERINTEGRASI**



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**DEPARTEMEN TEKNIK KOMPUTER
FAKULTAS TEKNOLOGI INFORMASI
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PADANG

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ABSTRAK

Postur duduk asimetris (condong ke kiri/kanan) selama duduk berkepanjangan menyebabkan distribusi beban tidak merata dan berisiko memicu gangguan muskuloskeletal, terutama pada pekerja kantoran dan mahasiswa. Penelitian ini merancang subsistem monitoring distribusi tekanan duduk sebagai bagian dari sistem ErgoSense, menggunakan empat sensor FSR402 dan mikrokontroler ESP32. Klasifikasi pola tekanan (*Balanced*, *Lean Left*, *Lean Right*) dilakukan dengan metode K-Nearest Neighbor (KNN), sementara metode *rule-based* mendeteksi durasi postur asimetris dan duduk statis untuk memicu peringatan. Data dikirim secara real-time ke Firebase dan ditampilkan melalui aplikasi mobile Flutter dengan notifikasi dan feedback haptic. Hasil pengujian menunjukkan akurasi pengukuran tekanan sebesar 98,95% (error 1,05%) dan akurasi klasifikasi KNN sebesar 90% (K=5), melampaui target minimum 80%. Sistem juga terbukti mampu memberikan peringatan tepat waktu dan beroperasi baik pada pengguna nyata.

Kata kunci: distribusi tekanan duduk, *K-Nearest Neighbor*, *rule-based*, postur duduk, ErgoSense, FSR402

SITTING PRESSURE DISTRIBUTION MONITORING SYSTEM BASED ON K-NEAREST NEIGHBOR AND RULE-BASED METHODS AS A SUBSYSTEM OF SENSOR-INTEGRATED SITTING POSTURE MONITORING

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ABSTRACT

Asymmetric sitting posture (leaning left/right) during prolonged sitting causes uneven load distribution and may lead to musculoskeletal disorders, especially among office workers and students. This study designs a sitting pressure distribution monitoring subsystem as part of the ErgoSense system, using four FSR402 sensors and an ESP32 microcontroller. Pressure patterns (Balanced, Lean Left, Lean Right) are classified using the K-Nearest Neighbor (KNN) method, while a rule-based method detects the duration of asymmetric posture and static sitting to trigger alerts. Data is sent in real time to Firebase and displayed via a Flutter mobile app with notifications and haptic feedback. Test results show a pressure-measurement accuracy of 98.95% (1.05% error) and a KNN classification accuracy of 90% (K=5), exceeding the 80% minimum target. The system also proved capable of delivering timely alerts and operating reliably with real users.

Keywords: sitting pressure distribution, K-Nearest Neighbor, rule-based, sitting posture, ErgoSense, FSR402