

ABSTRAK

SISTEM DETEKSI KADAR GULA DARAH, KOLESTEROL, DAN ASAM URAT *NON-INVASIF* BERBASIS *INTERNET OF THINGS* (IOT) DENGAN METODE REGRESI POLINOMIAL

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Pemantauan kesehatan sangat penting untuk mencegah terjadinya penyakit sejak dini. Namun, Metode pemeriksaan umum yang masih digunakan hingga saat ini masih bersifat invasif, yaitu melalui pengambilan sampel darah dengan jarum suntik. Karena tidak nyaman dan memerlukan biaya yang cukup tinggi, banyak orang yang tidak menjalani pemeriksaan rutin. Dalam penelitian ini, sensor optik MAX30105 digunakan sebagai alat ukur non-invasif yang dapat membaca pantulan cahaya inframerah dari ujung jari. Selanjutnya, data sensor diolah menggunakan metode regresi polinomial orde dua untuk menghitung kadar gula darah, kolesterol, dan asam urat. Percobaan kuantitatif dilakukan terhadap 15 partisipan, dan hasilnya menunjukkan kadar gula darah 91,50%, kadar kolesterol 86,07%, dan kadar asam urat 89,33%. Untuk pencatatan data historis, platform Adafruit IO digunakan karena mudah diintegrasikan dan mudah diakses. Selain itu, menggunakan MIT App Inventor sebagai visualisasi data IoT secara *real-time*. Penilaian awal Kualitas Layanan (QoS) menunjukkan latensi data rata-rata 500–700 ms dan tingkat keberhasilan transmisi Wi-Fi 97%. Hasil menunjukkan bahwa perangkat ini sangat bermanfaat dan mudah digunakan. Namun, akurasi pengukuran dapat dipengaruhi oleh beberapa faktor seperti kebersihan kulit, posisi jari, dan ketebalan jaringan kulit. Oleh karena itu, alat ini tidak dapat berfungsi sebagai pengganti standar medis umum. Namun demikian, sistem ini dianggap cukup layak untuk digunakan sebagai alat skrining awal untuk memantau kondisi kesehatan secara mandiri.

Kata Kunci: *Internet of Things (IoT)*, Non-Invasif, Regresi Polinomial, Sensor MAX30105

ABSTRACT

NON-INVASIVE BLOOD SUGAR, CHOLESTEROL, AND URIC ACID DETECTION SYSTEM BASED ON INTERNET OF THINGS (IOT) USING POLYNOMIAL REGRESSION METHOD

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Health monitoring is essential to prevent diseases early on. However, the common screening method still used today is invasive, which involves taking a blood sample with a needle. Due to the inconvenience and high cost, many people do not undergo regular check-ups. In this study, the MAX30105 optical sensor is used as a non-invasive measuring instrument that can read the reflection of infrared light from the fingertip. Furthermore, the sensor data is processed using the second-order polynomial regression method to calculate blood sugar, cholesterol, and uric acid levels. A quantitative experiment was conducted on 15 participants, and the results showed a blood sugar level of 91.50%, cholesterol level of 86.07%, and uric acid level of 89.33%. For historical data recording, the Adafruit IO platform was used because it is easy to integrate and easy to access. In addition, it uses MIT App Inventor as a real-time visualization of IoT data. The initial Quality of Service (QoS) assessment showed an average data latency of 500-700 ms and a Wi-Fi transmission success rate of 97%. The results show that the device is very useful and easy to use. However, measurement accuracy may be affected by factors such as skin cleanliness, finger position, and skin tissue thickness. Therefore, it cannot serve as a substitute for general medical standards. Nevertheless, the system is considered feasible enough to be used as an initial screening tool to self-monitor health conditions.

Keywords: *Internet of Things (IoT), MAX30105 Sensor, Non-Invasive, Polynomial Regression*