

## ABSTRAK

**Ica Alvi Anggraini**

### **RANCANG BANGUN ALAT POLYSOMNOGRAPH LEVEL III PORTABEL UNTUK DETEKSI SLEEP APNEA BERBASIS IOT SEBAGAI MONITORING JARAK JAUH (PARAMETER SPO2 DAN BPM)**

**xvi+ 85 Halaman + 8 Tabel + 3 Lampiran**

Sleep apnea adalah gangguan pernapasan saat tidur yang ditandai dengan henti napas sesaat secara berulang, dan berisiko menyebabkan komplikasi serius seperti penyakit jantung, stroke, dan gangguan kognitif. Deteksi dini penting dilakukan, namun metode seperti *polysomnography* di laboratorium memiliki kekurangan, seperti biaya tinggi dan ketidaknyamanan bagi pasien.

Sebagai alternatif, dikembangkan alat *Polysomnograph* Level III berbasis *IoT* yang dapat memantau *sleep apnea* secara *real-time* dan jarak jauh. Alat ini menggunakan sensor MAX30102 untuk mengukur *SpO2* dan *BPM*, dalam bentuk angka dengan data diproses oleh ESP32 dan ditampilkan melalui *Node-RED*. Sistem ini dilengkapi fitur notifikasi dan alarm buzzer jika terdeteksi indikasi *sleep apnea*.

Hasil pengujian menunjukkan alat bekerja dengan stabil dan akurat, dengan tingkat error hanya sekitar 0,005% - 0,006%, serta total error di bawah 5%. Dengan kemampuan ini, alat diharapkan menjadi solusi praktis untuk pemantauan dan deteksi dini *sleep apnea* secara jarak jauh, yang lebih nyaman dan efisien dibandingkan metode konvensional.

Kata kunci: *Sleep apnea, Polysomnograph* Level III, *IoT, SpO2, BPM, ESP32, Node-RED*.

Daftar bacaan : 21 buku (2013-2024)

## ABSTRACT

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***DESIGN AND DEVELOPMENT OF A PORTABLE LEVEL III  
POLYSOMNOGRAPH DEVICE FOR SLEEP APNEA  
DETECTION BASED ON IOT FOR REMOTE MONITORING  
(PARAMETERS: SpO<sub>2</sub> AND BPM)***

***xvi + 85 Pages + 8 Tables + 3 Appendices***

*Sleep apnea is a sleep-related breathing disorder characterized by repeated temporary pauses in breathing, which can lead to serious complications such as heart disease, stroke, and cognitive impairment. Early detection is important, but conventional methods like polysomnography in sleep laboratories have drawbacks, including high costs and discomfort for patients.*

*As an alternative, a Level III Polysomnograph device based on IoT has been developed to monitor sleep apnea in real-time and remotely. This device uses the MAX30102 sensor to measure SpO<sub>2</sub> and BPM in numerical form, with data processed by the ESP32 microcontroller and displayed via Node-RED. The system includes a notification feature and a buzzer alarm if signs of sleep apnea are detected.*

*Testing results show that the device operates stably and accurately, with an error rate of approximately 0.005% to 0.006%, and a total error below 5%. With these capabilities, the device is expected to be a practical solution for remote monitoring and early detection of sleep apnea, offering greater comfort and efficiency compared to conventional methods.*

*Keywords: Sleep apnea, Polysomnograph Level III, IoT, SpO<sub>2</sub>, BPM, ESP32, Node-RED.*

*References: 21 books (2013–2024)*