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(57) Abstract :
The present invention relates to an intelligent wearable phototherapy apparatus for real-time, adaptive treatment of dermatological conditions. The apparatus comprises a wearable facial mask embedded with a multi-spectral LED matrix, an imaging unit, and an edge-based processing system. Real-time skin images captured by the imaging unit are locally processed to segment and classify skin conditions, which are mapped to corresponding LED zones using spatial calibration. Illumination parameters including wavelength, intensity, and exposure duration are dynamically adjusted in a closed-loop manner based on skin condition and physiological response. The system operates entirely on local edge computing hardware, ensuring low latency, enhanced privacy, and autonomous operation. Neuroadaptive learning further personalizes treatment across sessions. The invention enables precise, personalized, and safe phototherapy for dermatological and cosmetic applications.

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