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(57) Abstract :
The present invention relates to a smart contact lens device (100) for ocular health monitoring and management. The lens features an optical frame having contact lens (102) with a lens case constructed from a soft silicon hydrogel material, known for its high oxygen permeability and moisture retention properties, ensuring prolonged comfort during wear. Embedded within the lens are innovative sensors, including a pressure sensor (106) positioned beneath the upper eyelid to detect blink rate and duration, a miniature temperature sensor (108) for measuring ocular surface temperature, and a plurality of miniature biosensors (110) for analyzing chemical and biological components of tears. The lens incorporates multiple power sources, including a wireless charging unit (118) and miniature batteries (112) integrated into the lens case, offering flexibility in energy supply. Additionally, miniature solar cells (122) are integrated into the lens case to explore alternative power generation. The collected data undergoes processing, analysis, and report generation facilitated by a microprocessor (114) within the lens. Further, a wearable module/smart watch (120) with a miniature antenna unit (104) configured to the optical frame for receiving and displaying ocular health data.

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