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# United States Patent [19]

Liang et al.

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[54] **SYSTEM FOR MONITORING EYES FOR DETECTING SLEEP BEHAVIOR**

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[52] U.S. Cl. .... **128/745; 340/575; 351/206; 351/211**

[58] Field of Search ..... **128/745; 351/206, 351/209, 211, 221; 340/573, 575**

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[57] **ABSTRACT**

A system for monitoring eyes of an individual includes a human interface for obtaining images of the individual and for providing feedback to the individual and a processor for analyzing the images. The processor transforms an image sequence into a one dimensional signal by extracting relevant features from the images. Analysis of the signal generated then occurs to detect sleepiness. Transformation of the image sequence includes eye localization, eye tracking and eye motion signal generation. The system takes advantage of the relatively high horizontal-contrast density of the eye region to determine eye positions in a greyscale image of a human face.

**16 Claims, 9 Drawing Sheets**

