Optical goniometer for continuous knee monitoring application based on linear array photodiode

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ABSTRACT

Health monitoring devices have received great interests by researchers in sensor and instrumentation field. Knee monitoring application is one of the most popular topic in this area due to the importance of the knee joint in human's daily activities. Many non-optical for the knee monitoring application share common limitations including sensitive to temperature variation and signal drift. For optical-based goniometers, they have limited working range due to the optical characteristics of the fiber. In this paper, we propose an optical-based goniometer with mechanical assembly which has a working range between 0 and 160 degree in flexion direction. Moreover, it has a resolution of 0.08 degree, accuracy of 0.04 degree as well as independent to temperature variation. Initial study to demonstrate the range of detection angle of the proposed sensor have been carried out to validate the theoretical design of the sensor. Further analysis on the reliability of the sensor under different operators as well as the consistency of the measurement output under repetitive usage will be presented in separate reports.

ACKNOWLEDGEMENTS

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