Optical Sensor Assembly on knee Brace for continuous knee monitoring application

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ABSTRACT

Purpose

Knee joint is an important part of human body. People with poor knee condition generally have limited physical movement, rendering to mental stress and agony. Current technology to support the knee diagnosis and treatment procedures are limited to the use of manual goniometer, x-ray and magnetic resonance imaging (MRI). Alternative devices with continuous measurement capability for knee monitoring are minimum at this time, mainly due to the difficulties to cover the wide angle of the knee fexion. X-ray and MRI technologies are useful to have some insight on the knee problem, but they are not applicable for continuous monitoring. Aside from being expensive for general use of MRI, x-ray on the other hand can cause short-term side efects due to radiation exposure.

Methods

The method aimed in this paper is to demonstrate the use of optical sensor integrated with mechanical gear system as a knee monitoring device. A plastic compartment, made by using 3D printer is used to place the sensor and the gear system. The design of the overall device allows direct attachment on a knee brace for easy placement on the knee.

Results

Based on current study, the proposed sensor has a range of motion between 0 deg. to 160 deg., 0.08 deg. Resolution as well as support continuous monitoring of the knee.

Conclusion

The sensor performance has been demonstrated for gait motion, ascending and descending stairs, sit-to-stand movement and maximum knee fexion applications.

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