Development of the wireless goniometer in measuring range of motion for lower extremities

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ABSTRACT

Human range of motion (ROM) is a measurement of human movement capability in the kinesiology study. To measure ROM a device known as goniometer is used specifically in the joint angle measurement. However, the current measurement is manually measured in static condition was performed by the traditional goniometer device which operated in an analog scale. Therefore, the objective of this project is to develop a wearable electronic goniometer that integrates with Arduino microcontroller that sense and record the motion of patient's knee wirelessly. Device will display the motion of knee joint angle through Android mobile phone via Bluetooth module either in static or in dynamic conditions. In this case, potentiometer will act as a rotation sensor by interpreting the analog data obtained by Arduino. The potentiometer is attached to patient's leg will measure the knee joint angle as potentiometer rotated. The knee flexion angle was selected for analyses due to the importance of identifying the knee osteoarthritis problem in the lower extremities. In fact an experiment was conducted on the treadmill under walking condition with 1.5 km/h speed. Results obtained from the device will be compared with the motion analysis data that will be recorded using high speed camera and Kinovea software specifically for angle measurement. It indicates that both methods can be used in determine ROM and the difference between data collected by both methods is just below than 3.4%. Hence, this study is potentially beneficial for the wireless monitoring system that can be applied in the sport and rehabilitation applications.