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iNsert

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Dr. Jingtong Hu, Yawen Wu PhD, Zhenge Jia PhD

Knee injury is an extremely common and serious injury impacting most athletes, especially those who do frequent-jumping. The Sports Medicine Biodynamics Center and Human Performance Laboratory in Cincinnati reports that knee injuries account for up to 91% of season ending injuries and 94% of injuries requiring surgery in female and male high school basketball players. Further, retired athletes who incurred knee injuries have up to a 20% incidence of knee osteoarthritis (OA). The overall mean costs for medical treatment are $ 1131 per injury in females and $ 1097 in males. Improper angle of knees during a vertical jump is a direct contributing factor to knee injuries and currently there is no coinvent measurement method for knee angles. Now, platform systems are generally more accurate than in-shoe systems. However, due to the lack of portability of these platform systems and the constrain of the space, accurate and economical in-shoe systems are highly sought after. iNSERT provides simple, non-obstructive, and real time measurement of knee angles to avoid improper positioning and reduce knee injury risk for the athletes. And the customers will mostly for the trainer at the racket club and can also be used by orthotists/prosthetists.

Technology Description

iNSERT, a battery-less shoe insert, is the first wearable non-obstructive technology that infers users' knee angles and forces from the detected feet pressure distribution during a vertical jump, transmitting results to mobile devices wirelessly. Currently, there is no way to measure the knee angle without interfering the users' activities. The sensors should be attached to knee and a wire is connected to the sensor for data transmission and power supply. To provide non-obstructive knee angle detection, the inference model is designed to infer knee angles based on the given feet and knee pressure statistics. The shoe insole sensors can be powered by wireless radio signal to measure the total physiological load on both feet and load. The inferred knee angles will be delivered to app on mobile devices to provide users with feedback and correct jumping posture.

Advantages

- Non-obstructive and real-time knee angle detection
- No battery replacement required
- Real-time data visualization
- Quick jumping posture correction

Applications

- Protection of the athletes from knee injuries

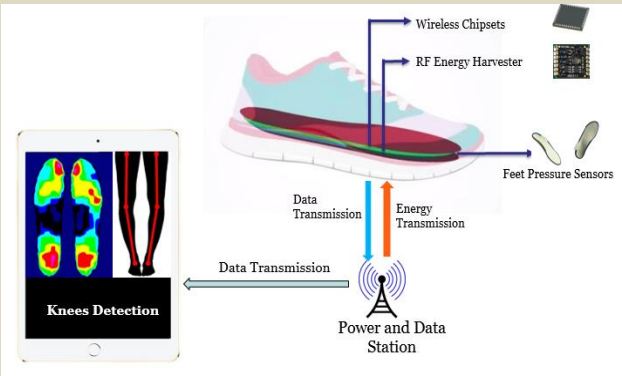

Diagram of iNsert measurement process

Stage of Development

We have developed a simulation model that will be used to mimic the industrial filtration process. We are currently verifying the model with both lab and industrial scale filtration process.

IP Status

University of Pittsburgh Invention Disclosure (Number: 04575)

University of Pittsburgh
Innovation Institute
200 Gardner Steel Conference Center
Thackeray & O'Hara Streets
Pittsburgh, PA 15260

George Coulston, PhD, MBA
Technology Licensing Manager
412-648-2236
gcoulston@innovation.pitt.edu