Inertial Sensor based Analysis of Gait for Children with Cerebral Palsy

Jessica Rose PhD, Department of Orthopaedic Surgery, Stanford University
Christine Azevedo PhD, Institut National de Recherche en Informatique et Automatique

Analysis of walking abnormalities is an important clinical assessment used for treatment of gait disorders in children with cerebral palsy (CP). Camera-based motion capture, the current gold standard, enables practitioners to perform gait analyses with high accuracy. However, the technology can only be used in the laboratory where motion capture is constrained to a limited space and incurs significant expense. Mobile systems are now possible using light-weight wearable sensors known as inertial measurement units (IMU). These sensor-based systems have potential to provide a more efficient, mobile alternative for movement analysis and can offer real-time feedback to patients for more effective rehabilitation. We propose an interdisciplinary collaboration between the Department of Orthopedic Surgery at Stanford University and the Institut National de Recherche en Informatique et Automatique (INRIA) in Montpellier. Our aim is to quantitatively assess walking problems associated with CP, using wearable technology. Despite their small size, ease-of-use, robust design and low-cost, numerous recognized technical issues make the use of IMUs relatively complex. Through a series of experiments we will combine our efforts and complementary skills to propose an IMU sensor system and software to extract meaningful gait parameters for rehabilitation of children with CP.