High-Tech Infant Suit for Earlier Detection of Cerebral Palsy (#7949)

Collecting and analyzing quantitative data on infant kicking patterns to help understand motor development

This wearable device is designed to enable the quantitative measurement of an infant's motor development through their spontaneous kicking patterns, potentially providing earlier detection of motor dysfunctions and delays that are common in conditions such as cerebral palsy. The technology package includes a fabric circuit attached to infant pants and equipped with six sensors as well as a single voltage source and voltage regulator that wraps around the infant's leg. It utilizes gyroscopes and accelerometers at 100 Hz and then transfers kicking pattern data to a mobile application wirelessly. The technology displays the data graphically for a clinician's easy analysis.

By placing sensors on three areas of the leg—thigh, shin, and foot—Georgia Tech's innovative method for gathering information about the movements of each limb segment relative to the others and overall gross leg movement could provide a detailed assessment of motor development. This infant suit may allow for the long-term, in-home collection of quantitative kinematic kicking data outside of a clinical setting. In addition, clinicians could potentially analyze this data offline and, in turn, provide earlier detection of motor dysfunctions like cerebral palsy.

Benefits/Advantages

- **Advanced:** May allow for earlier detection of motor dysfunctions in order to begin therapeutic interventions as soon as possible
- **Robust:** Collects data from three limb segments on the leg for a multifaceted assessment
- **Long-lasting:** Uses one power source with regulated voltage in order to prolong the use of the device
- **Adjustable:** Enables the suit to grow with the infant

Potential Commercial Applications

- Cerebral palsy
- Dystonia
- Ataxia
- Myoclonus
- Other neurodevelopmental motor disorders

Background/Context for This Invention

Spontaneous kicking is one of the earliest displays of motor skills and is an important precursor to later voluntary motor control. Typically, evaluations for motor abnormalities are done qualitatively through observation of motor milestones in a clinical setting. This approach, however, does not always allow for diagnosis early enough to optimize an intervention's effectiveness and is sometimes unreliable because of differences in clinician opinion. This Georgia Tech infant suit device, method, and algorithms may provide a potential solution.

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More Information

International Application Filed - WO 2020/018886 A1

Publications

Atlanta Robotics Monthly Meetup, Video, November 23, 2019

Healthcare Robotics Traineeship Broadens Students' Academic Experiences and Community, October 12, 2017

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/high-tech-infant-suit-earlier-detection-cerebral-palsy

Images:

The automated sequential delivery of multiple fluids. A varying number of delay gates imprinted in the branches are shown in the figure.

COVID-19 and flu saliva test on paper: (A) The automatic sequential delivery of multiple reagents required for virus test; (B) Water pouring into the device triggers the virus assay, allowing the presence of SARS-CoV-2 and influenza A & B viruses to be visually identified by the color changes in the corresponding detection spot