SIPPC: Self-Initiated Prone Progressive Crawler VCU #10-027

Applications

- Adaptive technology to assist in prone locomotion of infants
- Mobility aid for children with CP, Down's syndrome, or Spina-Bifida
- Can also be used for normally developing children
- Encourages motor development and environment exploration

Advantages

- Collects data from infant, assists in facilitating their intended movement
- Adapts to changes in intended movement
- Records progress in motor development over time.
- Safety has been addressed through hardware and software limits.

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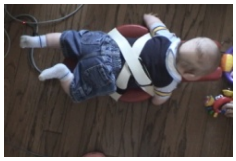
Market Need

Self-generated mobility via locomotion is a key for the cognitive, social and motor development of young infants. Children with disabilities such as cerebral palsy, Down's syndrome, or Spina-Bifida do not usually explore their environment like typically developing children. Currently in physical therapy, therapists use a skate board type of device and manually propel the child based on their judgment of the child's intended movement. However, this lacks efficiency and is subject to human error.

Technology Summary



The Self Initiated Prone Progressive Crawler facilitates crawling in infants who are unable to perform the act of locomotion independently. It senses the infant's intent and provides gentle encouragement to assist the movement using a controller, motors, and input transducers.

This device has four modes of operation: passive mode, active trackball mode, active forceplate mode, and active accelerometer mode. In passive mode, the motors are non-active and the device collects movement, force, center-of-pressure data from the trackball, motor encoders and load cells. In the active trackball mode, the device commands motors using input from the trackball. In active forceplate mode, the device responds to changes in the center-of-pressure recorded between the infant and the device via the forceplate. Lastly, in active accelerometer mode, the device responds to movement data acquired from the limbs and trunk of the infant.

Safety has been addressed on several levels including padded top surface, head support, and infrared proximity detectors to eliminate contact between the device and vertical surfaces. Additionally the motors and controllers are designed to limit propulsion speeds via both software and hardware limit switches. Propulsion distance is also limited following an activation event.

Technology Status

A third generation prototype has been developed and previous versions have been tested on typically developing children and those with cerebral palsy and Down's syndrome. Early data suggests that it does provide facilitated movement.

US Patent Issued: US 8,942,874

This technology is available for licensing to industry for further development and commercialization.