

(54) Title of the invention : DEVELOPMENT OF AN ASSISTIVE HAPTIC DEVICE HAPKID FOR REFINEMENT OF MOTOR SKILLS IN CHILDREN

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## (57) Abstract :

Children who have lost their use of fine motor skills have traditionally relied on occupational therapists for specialized training and assistance needed to overcome their disabilities especially in the classroom. However, Occupational therapy is expensive for the family and children tend to feel embarrassed and inferior to their classmates because of their constant dependence on the therapist. Also, due to the monotonous nature of conventional therapy, most of the children give up their therapy sessions before the desired objective is achieved. As an alternative, robot assisted training has great potential for rehabilitation and refining of motor skills. Robotic training has the advantage of being highly accurate, can be sustained for very long periods of time as it can be complimented by immersive virtual environment, can measure progress automatically (auditory/visual feedback), can produce a wide range of forces or motions and above all gives a certain level of independence to the specially abled. This paper presents a 2 Degree- of- Freedom haptic device ~HapKid™, possessing a pantograph planar structure, aesthetically designed in such a way that it visually appeals to children. The Developed device has the capability of computing and applying corrective/ resistive forces (in the form of haptic force-feedback) to the user to move their hand along the desired trajectory. The device is accompanied by immersive virtual environment that allow the user to perform their motor skill rehabilitation by tracing lines, shapes and alphabets as part of the virtual environment. Furthermore, ~HapKid™ takes rehabilitation to the next level by introducing cognition enhancement games having hierarchical levels of difficulty which would ensure that children enjoy their therapy sessions. All virtual environments developed possess eye-catching graphics which help in retaining the user™s interest in therapy and auditory/visual feedback provides them with much needed motivation to continue onto more rigorous levels of rehabilitation. Additionally, ~HapKid™ uses low-cost motors and encoders as part of its electromechanical constituents in order to achieve the desired corrective force-feedback such that the finished product is accessible to majority of India™s population at an affordable cost.

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