

Telerehab for Various Conditions

Overview and vision

<https://www.ncbi.nlm.nih.gov/pubmed/27885161> **A Rehabilitation-Internet-of-Things in the Home to Augment Motor Skills and Exercise Training**

“RIoT devices continuously measure the actual amount of quality practice; improvements and plateaus over time in strength, fitness, and skills; and activity and participation in home and community settings. Investigators may gain more control over some of the confounders of their trials and patients will have access to inexpensive therapies.”

Stroke rehab

Systematic review <https://www.ncbi.nlm.nih.gov/pubmed/21097560>

<https://www.ncbi.nlm.nih.gov/pubmed/26655433>

<https://www.ncbi.nlm.nih.gov/pubmed/23216861>

Cerebral palsy

proof of concept <https://www.ncbi.nlm.nih.gov/pubmed/28133379> “It is worth noticing that discussion between IT specialists, rehabilitants and patients was necessary to achieve good results.”

Maintained Hand Function and Forearm Bone Health 14 Months After an In-Home Virtual-Reality Videogame Hand Telerehabilitation Intervention in an Adolescent With Hemiplegic Cerebral Palsy free full text <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4290160/pdf/nihms314668.pdf>

[Arch Phys Med Rehabil.](#) 2010 Jan;91(1):1-8.e1. doi: 10.1016/j.apmr.2009.08.153. **In-home virtual reality videogame telerehabilitation in adolescents with hemiplegic cerebral palsy.**

Parkinson disease

[NeuroRehabilitation.](#) 2008;23(3):253-61. **Using the Internet to assess activities of daily living and hand function in people with Parkinson's disease.**

Spinal cord injury

it works for upper limb strengthening for wheel chair use for spinal cord injuries: full article <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4182115/pdf/nihms602454.pdf>

Orthopedics

knee <https://www.ncbi.nlm.nih.gov/pubmed/26230650>

proximal humerus fractures <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4353003/pdf/6158-24384-1-pb.pdf>

Bottom Line: Telerehab is coming for hand therapy, will be practical when CPT billing codes are developed (presently underway)

proof of concept for tele hand therapy

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4852541/pdf/jtehm-02-2299274.pdf> A Device for Local or Remote Monitoring of Hand Rehabilitation Sessions for **Rheumatic Patients**

[IEEE Trans Neural Syst Rehabil Eng.](#) 2007 Mar;15(1):43-9.  Telerehabilitation using the Rutgers Master II glove following **carpal tunnel release** surgery.

[Telemed J E Health.](#) 2008 Jan-Feb;14(1):69-75. doi: 10.1089/tmj.2007.0023. Health technology assessment of a homecare device for telemonitoring and telerehabilitation for patients after **hand transplantation**. From Italy: glove and instrumented keyboard and mouse

[IEEE Trans Rehabil Eng.](#) 2000 Sep;8(3):430-2. Virtual reality-based orthopedic telerehabilitation. "It is intended for rehabilitation of patients with **hand, elbow, knee and ankle impairments**. Data from the first patient treated with the telerehabilitation system is encouraging."

Bottom line: engineers doing their thing, not yet ready for general use

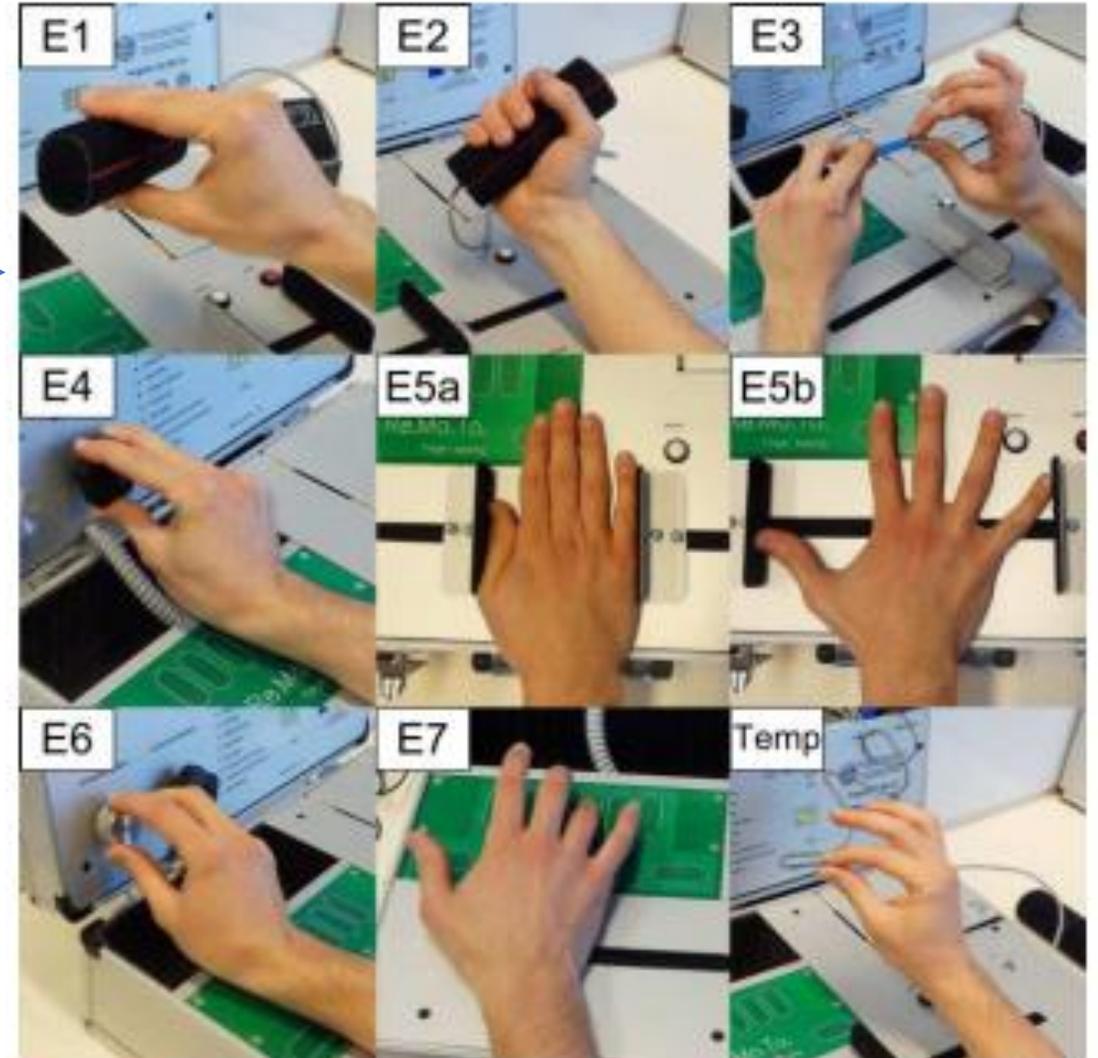


FIGURE 1. The different exercises and the related tools (plus the temperature sensor) supported by the proposed device.

Existing Tele Hand Therapy

[Kingston GA et al The experience of living with a traumatic hand injury in a rural and remote location: an interpretive phenomenological study.](#) Rural Remote Health. 2014;14(3):2764. PMID: 25018127 [Free Article](#)

[Follow-up survey: Kingston GA et al: Hand therapy services for rural and remote residents: Results of a survey of Australian occupational therapists and physiotherapists.](#) Aust J Rural Health. 2015 Apr;23(2):112-21.

Bottom line from the above two articles:

- Patients treated at centers and then returned to remote locations
- Seen by generalist OT or PT 1-4 times a month
- Videoconferencing usually available, rarely used because of logistical issues (before FaceTime)
- Different expectations between city/country therapists: uninsured farmers return to work with suboptimal result

<https://www.ncbi.nlm.nih.gov/pubmed/26945913> Home tele-rehabilitation for rheumatic patients: impact and satisfaction of care analysis

self-administered rehab with common objects, questionnaires and interviews **a year later: 80% dropout**

“The results suggest that the need for information on their rehabilitation progress and the technological challenge deserves further study to make patients more autonomous in cases of continuous rehabilitation.”