

Appendix

Article Name	Name of Game	Input Device Used	Software Used	Upper Limb - Lower Limb	Feedback (Audio, Visual, Haptic)	Technology used (2D, 3D VR, AR, Generic)	Number of target audience	Clinical or home-based study	Results of using game/games for rehabilitation	Commercial or Prototype (Game)	Time per session of rehabilitation therapy	Design Characteristics of the games discussed per study
Feasibility of Using the Sony PlayStation 2 Gaming Platform for an Individual Post stroke: A Case Report (Flynn et al., 2007)	Eyetoy: Play 2	Sony PlayStation 2 (PS2) (model number SCPH-75001)	NA	Upper Limb	Sound and visual feedback	VR	1	Home	Game was motivating as per the participants and these low-cost systems can be used for home rehabilitation.	Commercial	1 hour/session	Real time feedback to the patient to keep them encouraged, Sound and visual feedback is used, availability to play the game in sitting and standing position, single player as well as multiplayer.
Development and Evaluation of Low-Cost Game-Based Balance Rehabilitation Tool Using the Microsoft Kinect Sensor (Lange et al., 2011)	Not mentioned	PrimeSense produced Infrared depth sensing camera/Microsoft Kinect sensor	Unity3D engine	Upper Limb	Post study interview questions	3D	20	Clinical	challenging and fun	Customised	Not mentioned	A number of participants suggested more instruction would be helpful, including a tutorial at the beginning of the game and more time to practice and familiarize themselves with the new technology.
The Sony PlayStation II EyeToy: Low-Cost Virtual Reality for Use in Rehabilitation (Rand et al., 2008)	Kung-Foo, Wishy-Washy	Sony PlayStation 2 EyeToy	NA	Upper Limb	NA	VR	12	Acute patients at home or clinic, Subacute program at the hospital	EyeToy was found to be feasible for individuals with acute and chronic stroke, all the participants in the chronic	Commercial	180 sec for each game	Meaningful play, visual and audio feedback, look and feel,

									group enjoyed Kung-Foo more than Wishy-Washy, but the mean SFQ scores for both games was high (>26/30)			
Optimising engagement for stroke rehabilitation using serious games (Burke et al., 2009)	Rabbit Chase, Bubble Trouble, Arrow Attack	Glove or marker	C#.NET framework, DirectShow libraries, Microsoft's XNA platform for Windows	Upper limb	Visual and audible feedback	VR	3	Clinical	Games were developed by keeping in mind the games designs and studies showed positive and encouraging results.	Not mentioned	not mentioned	Meaningful play, Challenge, can be played seated or standing, calibration process should take place, game should save patients data to provide the results and measure the performance.
Augmented Reality Games for Upper-Limb Stroke Rehabilitation (Burke et al., 2010)	Brick' a 'Break, Shelf Stack	DirectShow-compatible webcam + Markers	ARToolKitPlus	Upper Limb	Visual and auditory feedback	AR	NA	NA	AR has the potential to bring about interesting outcomes for upper limb stroke rehabilitation.	Prototype		Meaningful play, handling of failure and challenge level.
Development of an Interactive Game-Based Rehabilitation Tool for Dynamic Balance Training (Lange et al., 2010)	Prototype	Nintendo Balance board	Python and C++	Lower	Sound and visual feedback / Questionnaire	3D	4	Clinical	People felt that the game was more engaging but requires strength as equals to require for occupational therapy	NA	4-10 minutes	Game play goals, Level design, Scoring, Look and feel, Audio, Device, ability to change the level and duration of the game.

Serious Games for Movement Therapy after Stroke (Ma and Bechkoum, 2008)	Catch-the-orange game, fishing game, whack-a-mouse game	Sensors and virtual hand/ Kinect Camera/w Nintendo's Balance Board/Virtual Basket	NA	Upper limb movement	Multisensory feedback	VR	8	Clinical	Serious games intervention may eventually prove to be motivational and beneficial in movement therapy.	NA	Not mentioned	Initial configuration of the game is done automatically based on the profile of the player, adaptive elements of the game which change dynamically according to how well or badly the user is performing. The player, level of game, score, and adapted speed should be available on the screen to provide real-time feedback., multiple sensory feedback
Chances for Serious Games in Rehabilitation of Stroke Patients on the Example of Utilizing the Wii Fit Balance Board (Baranyi et al., 2013)	RehaLabyrinth system GAME	conventional computer with a Bluetooth unit, a normal LCD screen, a Wii Fit Balance Board and access to the Internet on the part of the patient	Java and the Slick2D Framework	Upper Limb	Therapist's visual perception	NA	NA	NA	The game is useful in helping patients post stroke and goal to motivate patients to perform the exercise can be achieved	Prototype	NA	Rules, Goals and Feedback.

Clinical feasibility of interactive motion-controlled games for stroke rehabilitation (Bower et al., 2015)	a. Ball Maze b. Fridge Frenzy c. Tentacle Dash d. Bubble Fish	PrimeSense 'Carmine' depth camera (PS1080)	Unity3D engine	Upper Limb	Simple auditory feedback	3D	40 in phase 1, 16 were chosen for phase 2, 8 for intervention group	Clinical	There was a positive result in using motion-controlled games for post stroke rehabilitation.	prototype	40min for 4 weeks	Auto-calibration process is used, user to interact in a seated or standing posture and each had 10 levels of difficulty, monitoring and feedback on performance, Simple auditory feedback was provided in each game in response to either successful or unsuccessful movements or 'hits', all four games had scoring, and time counts
Robotic-assisted serious game for motor and cognitive post-stroke rehabilitation (Dehem et al., 2017)	ROBiGAME - THE TARGET POINTING GAME	REApian - Robotic device	Unity Technologies	Upper Limb	Sounds - positive and negative, red and green colours are used.	3D	2	Clinical	Further study with a greater number of patients and therapists is required.	Not mentioned	45 min/participant	Game difficulty, Evaluation result is shown with the help of different colours, During the exercise, real-time information is received from captors, robot collected data is transformed to performance indicators, large number of targets, the variety of challenge and distracting elements
Adaptation in serious games for upper-limb rehabilitation: An approach to improve training outcomes (Hocine et al., 2015)	Prehab	a graphics tablet	NA	upper-limb	Two different values (gold and silver) coins were used to reward patients to increase their motivation.	NA	7	Clinical	The results of the experiment show that our dynamic adaptation technique increases movement amplitude during a	NA	NA	Time constraints, difficulty of a task.

									therapeutic session.			
Vision Based Games for Upper-Limb Stroke Rehabilitation (Burke et al., 2008)	Rabbit Chase, Arrow Attack	Coloured glove or hold a small ball	Imaging	Upper Limb	Buzzing sound and score counter	2D	NA	NA	This low-cost system is feasible to be used at home and can assist in movements in patients' arm.	Prototype	NA	Right level of difficulty, time limits, direct feedback, consistent results
Serious Games for Stroke Rehabilitation Employing Immersive User Interfaces in 3D Virtual Environment (Vogiatzaki and Krukowski, 2014)	cube stacking	Kinect sensor	Unity 3D	Upper Limb+ Lower Limb	3D physical and visual feedback	3D	NA	NA	Not much attention was paid to Kinect calibration,	Prototype	NA	Scores are collected in order to motivate patients and allow the therapists to measure the progress.
Task-specific interactive game-based virtual reality rehabilitation system for stroke patients: A usability test and two clinical experiments (Shin et al., 2014)	RehabMaster™	OpneNI™-compliant depth sensor	NA	Upper Limb	Sound consistent with the performance is used	VR	7 patients for the first trial. 16 patients for second trial	2 clinical trials	The results of this case study included the improved attention and immersive flow experience for the patients, hence, making RehabMaster one of the feasible and safe rehabilitation tool to improve the motor	Not mentioned	30 min/INS for 2 weeks for first study, 20 min/INS for second trial.	There should be accuracy of the recognition ability by the controller, games should be goal oriented, interactive and entertainment, there should be tutorials for the users on how to play those games, difficulty level should be matched with the patient's profile, competitive scoring

									function post stroke.			system, sounds for the feedback and simple graphics plus fun elements should be used.
A low-cost game framework for a home-based stroke rehabilitation system (Saini et al., 2012)	Two games are used - hill climbing and running.	Commercial device Microsoft's Kinect	NA	Upper Limb+ Lower Limb	Biofeedback system	NA	NA	NA	As it is a low-cost game framework for stroke rehabilitation purposes, it is suitable to be used for home-based rehabilitation.	Not mentioned	NA	Level of difficulty must not exceed the ability of the patients, the game should focus on the affected limbs, feedback from the system such as scores which would keep the patient motivated, time limitation to encourage patients to achieve higher score during the exercising time.
Computational intelligence and game design for effective at-home stroke rehabilitation (Borghese et al., 2013).	“Animal Feeder” & “Fruit Catcher”	Sensors and virtual hand/ Kinect Camera/w Nintendo's Balance Board/Virtual Basket	NA	To train patients' balance	Increase and decrease of scores.	Kinect	NA	Home	In this study, virtual therapist was used instead of real one during home rehabilitation and whole platform is termed as IGER . Though the system cannot fully function like a rea	NA	NA	Adaption, monitoring and real time evaluation of the movements should be provided to the patient in real time. Level of difficulty parameters should be set up as per patient's performance. Icons such as smiley face and sounds are great way to have an

									therapist but using IGER platform for home rehabilitation is supposed to be a good option.			immediate effect on performance.
A kinematic game for stroke upper arm motor rehabilitation- a person-centred approach (Broeren et al., 2014).	NA	Microsoft's Kinect gesture control device	NA	Upper Limb	Feedback in the form of hits and voice (audio).	Generic	4	Clinical	The study mentioned that if the patients are given more advanced knowledge about self-care, it will assist stroke survivors to take care of themselves and games can be taken as a tool to encourage patient's engagement.	Prototype	NA	According to the study, game should have the properties that the therapists can measure to evaluate the performance of the patient. Game should be available for standing or sitting positions.
Stroke patient rehabilitation a pilot study of an android-based game (Carabeo et al., 2014).	Android-based tablet game, FINDEX	Android-based tablet	Not mentioned	Upper Limb	Therapists was involved in the study, so feedback was provided by the therapist on the regular basis.	Generic	3	Clinical	After interviewing patients, it can be concluded that they found use of games in the therapies very effective and they mentioned that this type of therapy is more engaging than the standard one.	Commercial	There were three tasks per game and all patients played all tasks in the game for a maximum of 30 minutes.	Assessment tools were used in order to get accurate test result data for the patients. Patients performance information should be accurate and consistent, that means, if the person is doing same action with same physical inputs, the final output should be same every time in order to show

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