

Through a generous \$25,000 grant from the PNC Foundation, Jump Simulation has piloted an interactive game combining robotics and rehabilitation to engage children recovering from traumatic brain injuries. Developers plan to scale the project into a portable system patients can check out and use throughout the rehabilitation process.

The Pediatric Neurology Project Team is led by Brent Cross and Harris Nisar, Simulation Engineers at Jump, in collaboration with Shrey Pareek, a Systems Engineering Ph.D. student at the University of Illinois at Urbana-Champaign. The team has installed and tested an interactive system giving feedback and assistance using integrated robotic arms purchased through the grant. Using a robotic arm to play interactive games, children are given haptic responses and guidance helping them relearn critical motor skills.

“[Young patients will] actually be playing a game, but when they play the game they’ll be having some therapy exercise be delivered to them. So they’ll be concentrating on playing the game, but at the same time they’ll be regaining some of their motor skills back,” said Shrey Pareek.

Making the rehabilitation process engaging can have a profound effect on the outcome for children recovering from any number of significant motor impairments. Customizable levels within the platform make the game accessible and scalable as patients grow in ability.

“Once we got the grant we got an opportunity to get a few more robotic devices and a computer which would actually run all of these games and we were also able to conduct a few user studies with about 11 kids and so we got a real world feel with how our system.”

Pareek has built a system that not only engages and assists the patient, but also records data about the movement and limitations of the patient. Pareek hopes to develop the system to provide therapists with data that can be used to develop and adapt rehabilitation programs to the patient’s needs.

“Through this grant we got a platform to actually test and develop our system... But now we can actually move on to patients and then test the efficacy, as well as the safety... A system being usable and interesting is not enough; to actually work with children who have suffered some injuries it needs to be safe as well as effective.”

Through grants like this one, Pareek has a vision for programming beyond the gaming experience, helping patients to use the technology to regain fine motor skills including writing and detail oriented tasks. The team at Jump has plans to package the system so it can be used by patients in the home to augment their clinical rehabilitation routines.

“It’s also going to help a lot of children regain their motor control which is going to help them in their day to day activities – [that is] going to be the greatest accomplishment of this grant. So even if we can have one kid who is able to do something they weren’t able to do before, like maybe just button their shirt, that’s a really great improvement. Because of this grant we might be one step closer to achieving that.”

Harris plans to expand the project to include more games and incorporate it into the Jump Bedside STEM Enrichment Program for students who are being cared for at OSF HealthCare Children’s Hospital of Illinois. By innovating the rehabilitation process through haptic technology, the team at Jump hopes to motivate patients to achieve a better quality of life. This project is one of many taking place at Jump that

are demonstrating the value of engineers and clinicians working together to create new technologies that will help overcome disabilities, facilitate recovery from injury and illness and more fully address patient needs.