Project name: Neuromend

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The purpose of the project is to create a virtual environment complete with three levels that will fully immerse users both mentally and physically. Virtual reality hardware such as a combination of the Oculus Rift in coherence with other devices such as the Leap Motion, Kinect (Windows), Razer Hydra and keyboard & mouse will be used in the virtual simulation to achieve the virtual reality goal.

The ultimate aim is to design the levels in such a way that in the future it can be used with the rehabilitation of stroke patients who have lost some form of motor control. When someone has a stroke, the brain is starved of oxygen for an amount of time and some parts of the brain may die. Research has found that if those areas of the brain are forcefully used again, the brain may eventually begin to rewire itself resulting in possible repairing of the damaged areas. The aim of this project is to develop a simulation that fully immerses the user and has 3 simple tasks that the user should be able to complete. The system will have the potential if adapted for future expansion, to try and rehabilitate stroke patients by getting them to use their affected areas of their brains to hopefully to regain functionality of limbs and other motor control functions. For the scope of this project, our goal is to find the best tools in the hardware and software aspects to solve that problem.

The task is to design and develop a system that supports various natural user interface devices that immerses the user. Each level will have a different simple task associated with it, including object manipulation, object avoidance, and way finding. The goal of this project is to design the system with different combinations of devices; so that it can be determined which set will be the most beneficial either as a whole or only in specific tasks in future adaptions of the project. Sensitivity can be adjusted to compensate for loss of motor control. User profiles are stored in a database which includes progress scores from the system at each use. User confidentiality is kept by each patient having an ID number and their names not being stored. The database is accessible remotely and not restricted to the system.

The goal of the project is to create a virtual environment system that can be used to monitor ability and conduct tests to see how users respond to the different environments using the different combination of devices. The long term goal is to further expand the project by putting it into practice. This will be done by monitoring patients exercising the affected areas of the brain with the ambition that the simulation will aid in the recovery of some motor control ability. In summary, there is room for further expansion of this project, for example speech therapy or other motion sensing devices may be able to be incorporated upon expansion as well as the addition of new levels to improve upon the diversity of tasks and scenarios to help stimulate more parts of the stroke patient’s brain.