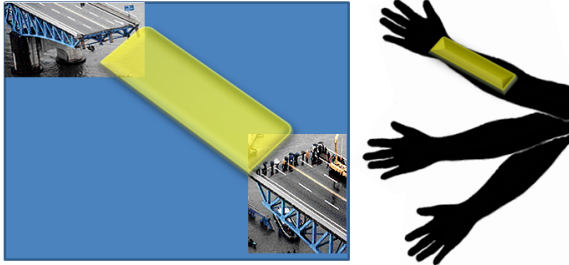**Title: Development of a VR game application to train arm and hand function in stroke rehabilitation**

Abstract: The objective of this project is to develop and evaluate a motivating game interface combined with a tactile display to provide various arm and hand exercises and assessment for stroke patients.

Picture:

Description:

In recent years, virtual reality applications have been used in stroke rehabilitation to increase motivation and intensity of therapy. A number of research projects suggest that rehabilitation using virtual reality (VR) environments has several advantages. Since it is easy to manipulate the parameters of a virtual environment, intensity and difficulty of therapy could easily be adjusted to each patient to match his/her level of impairment. In addition, it could provide self-awareness in a loop; examining the results of a task, perceiving the errors, and providing effective learning. Moreover, the rehabilitation process might engage and challenge patients and thus increase patients' motivation.

In order to support exercises of arm and hand function with increasing intensity of rehabilitation, providing an effective low-cost rehabilitation system can be a solution. Therefore, a tactile interface comprised of a vibrotactile display and sensing elements will be developed in parallel. A game-like interface supporting patients' movement such as closing/opening fingers independently, turning the wrist, and lifting the arm, can be also developed to enhance rehabilitation with the developed low-cost tactile interface.

The goal of this project is to provide a VR game application supporting arm and hand function with the tactile interface to synergize rehabilitation. The envisaged game-like VR interface is required to receive sensing data from the tactile interface and control the task in the VR application by visualizing the measured data. Furthermore, experiments can be conducted to examine the performance of the system and of subjects training with it.

Tasks:

  75% programming - C++/ openGL or DirectX programming
  25% user studies - Performance and usability of the arm and hand rehabilitation interface will be examined (e.g. measuring task completion times, error rates, etc.).

Remarks: co-supervised by Yeongmi Kim, and ETHZ-REL (http://www.relab.ethz.ch)