APPLICATION FOR REHABILITATION "VIRTUAL REHAB"

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Abstract

The article participate in the project RoboReha in which solutions are being implemented, aimed to increase the level of education of health professionals, improving care for patients and development platforms with virtual models for virtual rehabilitation. To verify the design there were applied two of the six categories of the proposed exercise in solution. For use in practice, it is also necessary to solve the question of interpretation and sharing of results between rehabilitation therapist and his patients.

Key words: Rehabilitation, Upper Limb, Virtual Reality, App Inventor, Object-Oriented Programming, Android, Virtual Rehab

INTRODUCTION

Virtual rehabilitation brings several advantages over conventional rehabilitation practice. Level can be dynamically changed according to specific needs coming from previous exercise. Interactive games and activities bring greater motivation than conventional exercises hospital. Perhaps the most important is the recording of the results in real time, resulting in a better understanding of the progress of the treatment.

VIRTUAL REALITY FOR REHABILITATION

The main reasons for the introduction of virtual reality in rehabilitation practice is more attractive rehabilitation process as well as increase capacities and capabilities rehabilitation workers.

Popularizing the rehabilitation process is psychologically significant impact on speeding up the process and improve the overall results of healing. Degradation, or minimize the impact of the hospital environment has a positive effect on the psyche of patients. In a domestic environment in a circle of family members treated defect loses its priority status within the current priorities of the patient. It also deals with other activities that enable it to "forget" their health problems.

This aspect is particularly significant in pediatric patients for whom the traditional rehabilitation exercises like something important and necessary. Transformation of classical rehabilitation exercises in various degrees of control computer applications and games can be suppressed perception of rehabilitation as medical acts. A similar effect has appropriately chosen a rehabilitation program for the elderly in which the patient suppresses the feeling of dependence on another person. Home rehabilitation allows for flexibility and easy access. Patients are able to carry out their rehabilitation programs in order to follow their individual plans. Depending on the severity of the defect, patients may participate in the intensive level of therapy several hours per week or follow a less demanding regime. Possibility home rehabilitation is usually used by individuals who are not able or willing to travel frequently, or require treatment of only one type of rehabilitation therapist. The main drawback is the lack of a home rehabilitation specialized equipment. However, the treatment received at home gives people the advantage to practice their skills and create your own strategy to reduce their disability in the space of their own environment.

The second aspect is to increase the capacity possibilities of rehabilitation workers. As mentioned in Europe there is an aging population. This increases the number of residents who to speed up the recovery process as well as the most successful cure urgently need rehabilitation support. Increasingly, as rising demand for rehabilitation capacities. These may be increased movement of individual rehabilitation exercises in the home. On the physiotherapist would thus remain burden settings appropriate exercise and control. This could be realized by remote access, data sharing and automatic transmission of results exercise. The patient is not excluded from the review process, although the quality and clarity of transferred exercises at home is not completely controllable. For this reason, should be given the choice of appropriate exercises and different categories of eligible patients increased attention.

In the implementation of concrete solutions rehabilitation exercises so far carried out two principles of control of interactive virtual environment:

- Position control and measurement components of the body / in hand users - joystick, interactive controls (Wii, PlayStation), virtual helmet, interactive jackets and gloves,
- Extracorporeal placement of components - cameras sensing movement microphones.
Outside, it was not only in the virtual rehabilitation using other sensors to collect information on the current status and condition of the patient - infrared temperature sensors, Heart Rate, Blood Pressure and under. Said sensors allow application deployment adjust the load and speed exercises adequately state the user. This feedback minimizes the risk of overloading, but adapts the load sufficiently, which helps the patient to quicker healing process.

DESIGN AND IMPLEMENTATION OF APPLICATION VIRTUAL REHAB

In order to minimize the complexity of the structure and the resulting application was at the beginning of each exercise should be classified based on how they are measured by internal sensor mobile device. This classification at a later stage helped unify the various sub-programs of exercise and thus greatly help to reduce the final size of the application.

The distribution of individual exercises is based on the choice of measuring parameters of each sensor as well as the method for measuring the specific exercises. On balance, I suggest six basic categories which, in the current version of App Inventor 2 environment and the possibilities of mobile devices designed cover my rehabilitation exercises, suitable for application solutions in program Virtual Rehab and on exercises using:

- Touch screen
- Sensor lateral inclination (roll)
- Sensor lateral tilting of the retaining phase (Roll)
- Sensor vertical inclination (Pitch)
- compass sensor (Azimuth)
- A combination of lateral and vertical sensor.

DRAFT BASIC STRUCTURE OF VIRTUAL REHAB

When designing the basic structure of Virtual Rehab I came from the design flow chart that describes the structure of the program, each stage of the selection rehabilitated area and the final rehabilitation practice. Finally, the structure reflects the proposed category 6 exercises which are schematically noted of such subprograms of the application fig. 1.

The actual exercise starts calibration phase. This phase is used to define the initial position of the mobile device before exercise and at the same time is used to determine the average dispersion of the current measured values precisely measured parameter sensor. The need for calibration is based on the uncertainty of measurements of individual sensors. According to my measurements taken, the mean variance values tilting angle of approximately 30 °. Elaboration of such variance values should absolutely avoid relevant measurement and evaluation of results. Therefore, I have the judgment and decided to test several test sample as relevant for the determination of the average take into account the 100 measurements. At the same time expressing the determination of the average current location of the mobile device it is in the calibration of determining the average dispersion values. This variance in further measurements determines the range of values. It expresses the interval in which it is possible to expect change the value of the measured parameter without changing the position of a mobile device. After this phase comes the actual calibration exercises that course and structure for each program is different, so the following subprograms are described in separate sections.
CONCLUSION

Testing of proposed applications are confirmed despite slight lack of opportunity to deploy Virtual Rehab in rehabilitation practice. A prerequisite for the realization is to implement the remaining 4 exercise categories to final solution applications. A secondary objective is to solve the question of writing the results of the exercise. As I mentioned, the sharing of data on a database project, App Inventor is easy and fast, also a way of creating new databases for rehabilitation workers and their patients is relatively simple and easily manageable even for less computer-savvy people. Processing and presentation of results is stored in this way but rather limited. The possibility of sharing data by using the tool “Fusiontables”, also in the web interface of Google. Shared data are clearly listed in the tables, but the setting is a bit more challenging. There would be in place to verify the possibility of automated creation of spreadsheets, or creating multi-purpose table that could be used as a template for all future users.

References


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