Orthopedic Diagnostic Software

With the help of this software, it is possible to make automatical, or half-automatical diagnostics of deformations and disorders (for example scoliosis). It is unmissable for the production of equipment perfectly fitting the body. It helps also in the creation of supporting objects and special clothing. It benefits the healing process without the disturbance of the patients, by using the images. To use this method there's no need of special preparations, and it can be repeated as many times as needed. The software has been developed to be suitable for a mobile device, to act as such an opportunity to make the screening, or checkup carried out in schools and kindergartens. The hardware demand of the software is low, it needs only a proffetional videocard, the output of the processor is not relevant. Software and Hardware

The image processing software is made in a large part in C# language with Microsoft .Net Frameworks, and some parts are made in C++ and C++/CLI. The process itself works fully on the GPU,and was made in HLSL with the help of DirectX API, so that's why the CPU loading can stay relatively low. The Graphical Card is used trought .Net, in the framework of XNA, which is handled by the DirectX API classes. The basic of this software was made through the use of OpenKinect project and the Freenect driver and with the usage of Microsoft Visual Studio. For the calibration we've used MALTAB's Camera Calibration Toolbox module. We're using the rotating scanner of Microsoft Kinect, with development of Laszlo Basch. The most important hardware is the graphic card, wich needs to be preperd with the technology of DirectX Shader Model 3 (or a newer edition). It needs usually thee free memory of 70-200 MB depending of the settings. So because all of these parameters this software is usable with any avarage computer of these days, tuned with a high quality video card.

Controlling The Image Processing

Because the hardware itself was created for the Game Industry, Microsoft has no drivers for any further usage of Kinect. But many developers seeing other possibilities in this innovation. So there were no official drivers for „non-gaming" applications. That's why the users themselves created the drivers, and because of this, there are normally three different drivers on the devices, with different interfaces. Anyhow our software was tested with all of these drivers.

OpenNI driver:

is a consortium and was made by PrimeSense, who made the sensor for Kinect. This driver is part of Middleware, and this is perfecting the gesture detection for devices with the ability to treat Kinect as an innovating step. The handicap of this driver is, that it is not that flexible and it may cause problems with the framework by initializing the hardwares. The advantage of it is, that it can run more softwares at the same time, and the settings are very well made.

Microsoft Driver:
At the end, Microsoft recognized the possibilites in Kinect, so they made a their own driver. Now unfortunately this official driver is nearly unable to handle more softwares at the same time, as it should. However it is more stabile, but it needs a very high system requirements.

OpenKinect driver:

This one was made by the inspiration and

mensuration of the user community of Microsoft's Xbox. It is a multiplatform driver, so it is made for many operation systems. This driver has low system requirements. And it can use many different hardwares like infrared camera, accelerometer sensor, Status LED,etc. This was the very first driver which made it possible for 640x480 resolution of Kinect.

So that's why our choice is OpenKinect driver.

Further possibilities

- Thanks to the OpenKinect Driver it is possible to make a conditioning infrared video stream. Also it is possible to make Kinect's infrared camera's settings spread out for more feasible,clear.
- Turnable Scanner is still in production, but the 3D modelling possibilities are already stabile. But still it needs more development

- Automate Kinect calibration, so it can interchange the MATLAB script, and include it into a specific software

- The all-round image processing of the Turnable Scanner, which is our own developement, and through the settings it will be much more userfriendly, and versatile.

- To make the software more independent from the hardware requirements, to make it easier to use this software with older systems. And to add much more

simpler methods for videocards. And a to make the whole Vertex texture and DirectX Shader Model 3 reading possible, even with older or integrated graphics cards.

- Some of the stereotypical parts of the software are not compatible with many hardware so it would be possible to create a module-package for more outputs, that the software could work with more hardwares and softwares as well. Right now we are working on the integration into the TriDef Ignition software.

- Further development of the Kinect model, such as location-based quasi-static effect of reducing image problems, or the reducing of the features for the depth and the examination of the place-dependence.

So by the further development we will exclude the probable errors in the software. general and spinal diagnostics aiming parts were tested in details, and they are working fine, and already in use. We're close to the final stage to calibrate the software and to analyze all possibilities with the hardware in further points, but the software needs more developement and testing, especially in the case of the turning scanner. After the stabilizing of this aspect, other parts will getting integrated, and we'll finalize the interface. This is used int he Hungarian Heim Pal Hospital and the Orthopedic Clinic. So it is always tested.

These are only a few basic words about the developement. We're getting very close to the final stage, but the Software works already.

The Goal of this project is: To create a full a functional, highly detailed software for the turning scanner, which is specialized on the first place in the medical care, to make it possible to create special objects for patients with ortopedic disorders. To make easy for the examination of children. To include almost all possibilities for further usage, and developement, and to create a really innovating methor in the healtcare.