A Lumbar-Spine Motion Capture Suit for Physiotherapeutic Use in Sports

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This project focused on creating a motion capture suit for lumbar spine and a software for displaying the recorded movements. The device is meant for athletes, such as swimmers and hockey players. In the sports mentioned, it is difficult or even impossible to see clearly the movements of lumbar spine with naked eye or a camera. Lumbar spine is a common area for back injuries and they are often caused by wrong movements during training (RSI). Those incorrect motions are often caused by weak core strength/control or by a bad technique. The data gathered will be used by a physiotherapist, who can determine “wrong” movements and give instructions for correcting them. The device was constructed around ATMega2560 microcontroller devboard using MPU6050-IMU’s. The data is stored into an SD-card. The software used for displaying the movements on to a 3D-model is made with Unity. The data display app is under development, same as the device software. The device consists of 10 sensors, which are placed to lumbar spine, T10-T12 vertebrae and to the ends of hip bone. The device is an early prototype meant for testing and proofing the concept. The device will be going through a lot of changes to improve its accuracy, usability, size and data transfer. The device will be developed eventually to a product. Though motion capture suits for posture monitoring and overall fatigue measuring in sports are an old invention, this project brings in a new innovation as it is meant for monitoring lumbar spine during training in order to prevent repetitive stress injuries.