Computer Simulation of Human Gait for Rehabilitation Applications

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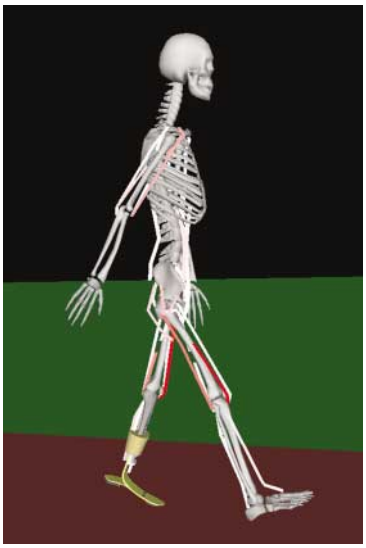
We developed a human gait simulation system for rehabilitation applications. As an example, a human model with an artificial limb was constructed. In this simulation, both the walking pattern and optimal design of the artificial foot were determined through this research. The simulation results suggested that an artificial foot having a small and soft heel might produce a more efficient walking pattern, and the results matched with the actual prescription by prosthetists. We believe that such a simulation technique will provide novel research tools of rehabilitation consultation for physically handicapped people.



Gait simulation model with an artificial foot

Information and Communication Technology

Long-Distance Quantum Cryptography

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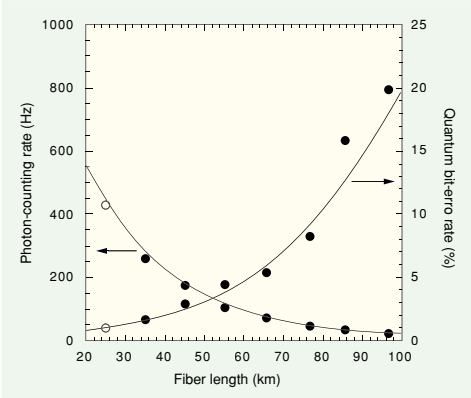
We report a fiber-optic quantum cryptosystem based on Bennett's two-coherent-state protocol operating at 1550 nm for long-distance quantum key distribution. Two thermoelectrically cooled (-35 degrees Celsius) gated-mode single-photon detectors are employed for establishing a secret key exchange between two remote parties who are separated by a 25.2 km single-mode optical fiber. The quantum efficiency is 22.4% with a dark count probability per gate of 4.3×10^{-5}, which yields a quantum bit-error rate of 1% for a fiber length of 25.2 km.



Measured photon-counting rate and quantum bit-error rate. Fiber (open circles). Attenuators (solid circles)