BIOMECHANICAL MOVEMENTS OF A HUMANOID ROBOT AND FORCE ANALYSIS

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The body works as a machine. Biomechanics help to understand exactly how this machine works. Picking up a ball or pushing an object is not just a movement, but is a system of levers, pulleys, and myriad other machines of mechanical efficiency that the body utilizes. To understand, for example, how a human stands, how a human hand works, how a human balances or walks, how a human is a functioning creature is an important knowledge of biomechanics. The human body uses numerous means of mechanically efficient movements in order to move, and these can be developed. These functions of movement are all products of biomechanics and workings of the "human machine."

Efficiency is the ultimate goal in any type of work. It allows one to exert the least amount of energy to achieve the maximum amount of work. The same applies to combat. In understanding the machines of mechanical efficiency, and other concepts and principles of mechanics, one can combine this knowledge with that of physiology, biomechanics, and physics in order to work efficiently within any extreme condition. The use of mechanical principles and laws allows one to work efficiently in any situation in one is under pressure, and still have energy to use in the achieving of any goal.

The ability to simulate human motion also has significant scientific applications in ergonomics, gait analysis of athletes and physical rehabilitation. Deformation of 3D characters and especially human bodies during the animation process is an important but difficult problem. When the body is deformed, the model must be composed from two layers: bones and skin. In this study I have implemented some of the actions of a soccer player's lower extremity using OpenGL, which is a very sophisticated language for graphical implementations. Also I analyze the forces, which affects the movement of the lower extremity of the human body. The simulation of the lower extremity of a human adult was done using the polygonal representation provided by Delp, S.L., Loan, J.P., Hoy, M.G., Zajac, F.E., Topp E.L., Rosen, J.M (1990). Also this simulation can be further developed using Artificial Neural Networks so that the motion of the robot will become more intelligent.