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## ASBGo- A multimodal smart walker for rehabilitation assistance and clinical evaluation of people with cerebella ataxia

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This talk describes the development of the ASBGo Smart Walker with the intent of helping patients with high disorders of balance, such as cerebella ataxic patients. It describes the first steps towards the proposal of a new treatment with the ASBGo with real, ataxic patients. The talk is structured in different sections: first the walker and associated sensory systems are presented. Then the four operating modes delineated (autonomous, manual, safety and remote control) in the ASBGo are described. Then it is described the application of the developed gait and posture assessment tool into the rehabilitation of patients with ataxia, including a brief description of the disease and case studies.

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## Biomechanics of lamellar-repulsive lubrication of natural joints

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The chemical and physical nature of biological surfaces is seen in an entirely different light than that of engineering surfaces immersed in water. The lubrication mechanisms in an animal body, where the surfaces are coated with phospho-lipid (PLs) bi-layers, with (PLs) lamellar phases and charged bio-macromolecules in synovial fluid, have been referred to as a "lamellar-repulsive" mechanism. Amphoteric (PLs) are the main solid-phase lubricant on the surface of an articular cartilage (AC). The lubricant is chemically attached to the surface, and is responsible for the biological lamellar-repulsive lubrication mechanism. It has been well established that the PLs bi-layers mechanism, which essentially consists of a surface amorphous layer (SAL) surrounded by a 0.155 M electrolyte synovial fluid (SF) of pH ~7.4 with high-molecular-weight charged bio-macromolecules, supports low friction. Both the friction and wettability show very similar behavior as the SAL thickness is varied. The SAL, phospholipidic lamellar phases and bio-macromolecules in SF, are expected to cover cartilage surfaces and support hydrophilic lubrication. Hydration repulsion dominates the interaction between charged cartilage surfaces at nanometer separations and ultimately prevents sticking together of cartilage surfaces, even at as high pressures as 100 MPa. In this presentation, we demonstrate experimentally that the pH sensitivity of cartilage to friction provides a novel concept in joint lubrication on charged surfaces

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**Notes:**