# Kinetics of Floatation® Technology

## The Mechanism Behind the Weightless Experience

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# Executive Summary

Floatation® technology represents a paradigm shift in the understanding of human kinetics for seating design. Grounded in advanced biomechanical analysis, it explores how removing the effects of gravity, friction, and mechanical dampening can profoundly influence human motion, balance, and perception. By enabling movement in a perfectly balanced, weightless state, Floatation® technology engages the body's intrinsic sensory systems to create one of the most advanced forms of dynamic seating where an individual can experience the inertia of their entire body without any external force. This plays a central role in how Floatation® technology reduces external sensory input (exteroception) and increases internal sensory awareness (interoception).

# 1. Introduction

Human kinetics, a branch of biomechanics, examines the relationships between forces acting on the body and the resulting motion. Conventional relaxation seating relies heavily on gravity to generate movement or support, either by transitioning between fixed positions or through limited dynamic ranges.

In most seating systems, gravity defines the motion experience. Acceleration, deceleration, and resistance from friction are ever-present. Floatation® technology is unique in that it removes these accelerations and forces entirely from human perception. With no acceleration, no deceleration, and no perceptible friction, the body remains in continuous equilibrium, regardless of orientation. This allows the user to experience motion, free from external influence, a pure expression of balance. It may be the only place on earth's surface where a person can feel the inertia of their entire body in a weightless environment.

# 2. Centre of Gravity (COG)

The centre of gravity (COG) or centre of mass (COM) is the theoretical point at which an object's entire mass is concentrated. When seated upright, the COG lies in the midline of the body, just forward of the torso. In movement, the COG path defines how the body interacts with the external environment and with gravity itself.

In the traditional rocking chair, for example, the COG follows a convex parabolic path, coming to rest as the rocker's centre contacts the ground. Movement is then reinitiated through muscular effort. The geometry of this path, and its relationship with gravity, determines how motion feels and behaves.

# 3. Floatation® Technology COG Motion Path

Floatation® technology introduces a form of rotationally coordinated movement in which the seat tilts back, the leg rest rises, and the backrest lowers, maintaining important fixed joint angles at the hips and knees. Though this movement appears rotational, the COG follows a linear, horizontal path.

Since gravity acts vertically, it exerts no influence on motion when the COG travels horizontally. The result is motion without acceleration or deceleration, complete mechanical neutrality. The body remains balanced at all times, regardless of position or movement. The user can alter orientation, such as by raising an arm, without disturbing equilibrium.

# 4. Friction and Dampening

In the latest generation of Floatation® technology, all perceptible friction and dampening are eliminated. The result is a system that is so sensitive that the simple act of breathing can move the entire chair. This places the human at the centre of control, with motion guided entirely by the body's internal sensory mechanisms and the precision of the central nervous system.

When external sensory feedback is reduced, the brain receives less spatial information about orientation and motion. As a result, many users report sensations of continued movement even when still—an indication of reduced external sensory input and heightened internal perception. This perceptual shift can induce a profound state of relaxation and embodied stillness.

# 5. Adjustable Floatation Curve

Human variation means that some individuals' anthropometry lies on the outer edges of the population distribution. To accommodate these differences, the latest generation of Floatation® technology introduces an adjustable floatation curve.

This mechanism allows the shape of the path of the COG to be fine-tuned to suit individual body geometries. By altering this curve, the precise motion trajectory can be optimised for balance and comfort, ensuring the Floatation® experience remains consistent across diverse body types.

# 6. Planar Motion Mechanics

Floatation® technology is based on pure Planar Motion mechanics. The geometry of the mechanism was derived from a biomechanical model developed and validated with experimental data. Located beneath the armrests, the mechanism consists of ultra-low friction rectilinear translations and general plane motions.

The contact between these translations, mediated by precision bearings, forms the interface between the user and the chair base. This configuration produces an exceptionally pure COG motion path, allowing smooth, balanced, and weightless movement, without need of primitive electric motors, spring-loaded mechanisms or locking devices.

# 7. Conclusion

Floatation® technology transforms the way humans experience motion and balance. By eliminating gravity, friction, and dampening, it allows users to experience the inertia of their entire body in a weightless, mechanically neutral environment. Motion that is entirely self-guided and effortless. This unique state reduces external sensory input, heightens internal sensory awareness, and creates profound relaxation.
This technology provides a platform for further research into human kinetics and neurophysiology, opening new possibilities for optimising health and performance.


## ABOUT US

DavidHugh represents a new category of wellness innovation. Founded in Cambridge by husband-and-wife duo Dr. Melody Chen and Dr. David Wickett, the company integrates design, biomechanics, and neuroscience to develop and manufacture technologies that advance human potential.

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