

So far, only the static – elastic compressive modulus of the foams have been evaluated. However, for a system as dynamic as entry into the Earth’s atmosphere, multiple load cases persist. It then becomes important to assess the behaviour of these foams when loaded flexural, or in shear, or using an oscillating load. These load cases serve to highlight the likelihood of failure of the foams when utilised structurally and address the limitations of the foam [2].

Finally, a detailed in-flight testing regime aboard a suitable sounding rocket would not just serve as a demonstration mission, but also provide suitable testing data under different flight conditions [2].

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#### **APPLICATION OF VIRTUAL REALITY IN THE DEVELOPMENT OF FITNESS APPLICATIONS**

The problems of not getting enough exercise, sedentary lifestyle, and dealing with excess weight have been around for a while. These issues weren't new even before the COVID-19 pandemic, but according to a publication in the "BMC Public Health" journal [1, p.3], things got worse when the pandemic hit. The number of factors contributing to these problems increased, making the situation even more challenging.

It is widely recognized that activities, be it educational processes or engaging in physical exercises, are more readily embraced when presented in a gamified format. Research findings [2, p.14] indicate that incorporating virtual reality into physical exercise regimens is not only effective but also holds promise in positively influencing both physical and psychological well-being. Consequently, the creation of fitness applications integrating virtual reality represents a notably beneficial, pertinent, and underexplored endeavor.

The objective of this thesis is to examine the utilization of virtual reality for stimulating physical activity, as well as to analyze contemporary fitness applications, and explore available tools for their development.

Within the fitness applications market, prominent products include Beat Saber, Les Mills Body Combat, FitXR, Supernatural, Headspace, VireFit, HOLOFIT, Sparc, Holopoint, Knockout League, Superhot, Echo Arena, AudioShield, Raw Data, ROM: Extraction, Holoball, and many others. Each of these applications exhibits a unique set of strengths and weaknesses.

Among the advantages, notable features include engaging workouts employing diverse mechanics, adjustable intensity levels, high-quality graphics, and the option for collaborative team training.

The prevailing drawbacks are the monotony or predictability of the gameplay, insufficient updates, inadequately designed physical exertion ranging from overly light to potentially traumatic, subpar graphics adversely impacting overall well-being, and an absence of comprehensive training elements, among other issues.

A common issue observed in many applications is the absence of sustained motivation for users to persist in their training endeavors. Addressing this concern could entail the development of a fitness application that combines the strengths of existing applications while incorporating distinct features designed to inspire repeated and consistent usage by the user.

Incorporating virtual reality into an application poses a considerable challenge owing to the diverse array of devices available from different manufacturers, including headsets, glasses, joysticks, suits, LCD screens, and specialized simulators, each characterized by unique specifications and distinctions.

Notably, the predominant tools for crafting virtual reality applications are Unity, Unreal Engine, and Godot. These game engines, in addition to their primary advantages, offer comprehensive documentation and developer guides to facilitate the integration process.

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