POSTER ABSTRACT

DEVELOPMENT OF FORCE/DISPLACEMENT CONTROL FOR A BIOREACTOR

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Complications concerning musculoskeletal diseases ranging from acute to severe state and across all age groups include delayed healing processes of the human body and long-term side effects incurred from surgical treatment, drugs, and pharmaceuticals. Bioreactor technology is a branch of tissue engineering that is capable of creating an *in vitro* microenvironment to uphold cellular metabolism, differentiation, and proliferation. This project transformed an out-of-service, costly bioreactor with a complex processing unit, scarce technical support, and a difficult-to-use interface by developing a cost-effective, dynamic, versatile, compact, and user-friendly supporting design toolbox from first principles. Recent developments indicate that this ideology would facilitate the use of force-displacement-strain control systems, offering real-time feedback and enabling end-users to select parameters relevant to their interests or research. Successful accomplishments include testing and verifying the rig functionality prior to developing a user-controlled interface, which consists of analogue input signal generation to the bioreactor using LabVIEW®, and thus, replacing hardware. This would eventually provide the groundwork for controlling the push-pull action of the bioreactor using software. The implementation improved usability and potentially enabled the inception of an on-site bioreactor production laboratory at The Guy Hilton Research Centre (GHRC), an institute of excellence. This innovation promotes sustainable development, and its ultimatum includes testing its response against various stimuli and bone tissue scaffolds.

Keywords: force, displacement, feedback, control, bioreactor, labview