

How do healthy people sleep?

Biomechanics, physiology, and environment – what matters the most?

What's the project about?

In the Westernized world a person typically spends one third of their life in bed, with more time spent sleeping in a bed than in any other single activity. Sleep amount and quality of sleep have a direct impact on mood, behaviour, motor skills and overall quality of life. Yet, despite how important restful sleep is for the body to maintain good health, there is a comparatively small amount of studies evaluating key multi-factorial and biomechanical determinants of restful sleep in non-pathological, healthy adults.

While sleep quality is dictated by a synergy of physical, psychological, and physiological aspects of the person, there is still an important part to be played by the mattress to provide an optimum biomechanical support for the musculoskeletal system in order to establish a well-adapted 'sleep system'. How to create this optimised system is new knowledge you will discover through this exciting collaborative research project, working with Sealy of Australia.

This project will use engineering principles, to develop advanced 3D simulation, and state-of-the-art sensing technology to gain new understanding of sleep biometrics. With this new knowledge, a contemporary understanding of optimised bedding design can be developed, and an evidence base for future mattress design will be established. This design knowledge will have broader impact for the development of design standards that lead to restful sleep and lying comfort for everyday Australians.

Who?

We are seeking a motivated and highly skilled applicant to undertake a **PhD** research project with industry partner Sealy of Australia.

This student will be a member of the **QUT-Sealy Centre for Biomechanics and Sleep Research**.

The ideal candidate will be either:

- Medical engineer (Honours)
- Mechanical engineer (Honours), or
- Hold a degree in human movement or biomechanics with strong computer science and programming experience.

Location

The student's project will be based at Queensland University of Technology Gardens Point campus, in the Brisbane CBD. The project will be in the School of Mechanical, Medical and Process Engineering, within the Faculty of Engineering.

In addition to this, they will have real world research experience, with co-location at Sealy of Australia's Research and Development headquarters, in Wacol, Brisbane.

The student will be supported to enhance their applied research experience through a 60 day industry internship, which they will complete part-time during the 1st or 2nd year of the PhD candidature.

Project objectives

The project outcomes will:

- Characterise factors that influence sleep quality in healthy adults. Factors including:
 - o Biomechanics of individual musculoskeletal systems
 - o Environmental influences (eg. temperature, humidity, sounds)
 - o System interaction between the human and lying surfaces of different stiffness
- Develop new methods to characterise and optimise sleep surface mechanics in order to enhance the human-surface interaction.
- Use a system approach to integrate contemporary materials engineering with modern advanced manufacturing method to propose a sustainable model for contemporary mattress design.

Candidature details

We are seeking an applicant to begin 1st July 2024. Domestic applicants are encouraged to apply.

Each student will receive an annual, tax-free PhD stipend of \$32,500, along with eligibility for a fee-waiver scholarship from QUT for their degree.

Keywords: medical engineering, biomechanics, sleep, computational modelling, materials science