Snail-Inspired Digital Twin for Soft Robotic Drug Delivery

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Project Background

This project investigates how snail locomotion can inspire miniature soft robots able to deliver cancer drugs to hard-to-reach tumour sites. Snails move using controlled muscular waves along their foot and glide on a thin mucus layer, enabling precise motion across complex surfaces. Re-creating this behaviour in a soft robot requires understanding how soft materials deform, adhere, and move within biological environments.

To support this, the team is developing a digital twin – a detailed computer model of the robot and the environments it must navigate. This allows rapid, safe exploration of ideas before building physical prototypes.

Intern Contribution

Across eight weeks, you will work with a Research Software Engineer to develop early simulation components for the digital twin. You will help model soft-material deformation, wave-like motion along the robot surface, and interaction with gel or tissue-like substrates. These modules will feed into a shared modelling framework used across biomechanics, materials science, and robotics.

Why High-Performance Computing Matters

Soft-robot motion is computationally demanding due to large deformations, nonlinear materials, and continuous surface contact. High-performance computing enables parallel testing of multiple material or movement scenarios, fast turnaround for simulation-to-lab workflows, and robust parameter sweeps needed to guide design decisions.

Why This Internship Is Exciting

You will gain hands-on experience in scientific computing and simulation while contributing to a major research programme with real medical impact. Your work will help shape the virtual foundation for a new class of soft robotic drug-delivery systems.