

Centre for Biosystems Science and Engineering

SEMINAR

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Seminar Hall, Materials Engineering

Physiological Systems Modelling

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Numerical models of physiological systems have been around for more than fifty years. In contrast to physical analogues and models, numerical models are more versatile and easier to implement. Among the most fruitful areas of such modelling in physiology is the neuromuscular system. The neuromuscular system comprises the electrical signalling between excitable cells and motor action of skeletal muscles.

Beginning with basic models of electrical signals in nerves and mechanical contraction of muscle, we can understand macroscopic phenomena like electromyography and limb movement.

While numerical models are easily demonstrated using computer graphics it is more interesting to extend them in combination with physical devices like sensors and actuators. Such a system can form the basis of a physical neuro-musculo-skeletal model in which normal and pathological behaviour can be simulated. This can be a useful tool to teach neuromuscular physiology and pathology. Such models also formalize discussions in interdisciplinary areas like Bioengineering and Physical Medicine, where descriptive knowledge and quantitative knowledge must be integrated.

Such models allow us to conduct virtual experiments that cannot be performed in real biological systems due to constraints of cost and ethics.

About the speaker:

Suresh Devasahayam is a Professor of Bioengineering at Christian Medical College, Vellore. His interests are in medical instrumentation, signal processing, nerve-muscle physiology, rehabilitation engineering and systems modelling in physiology. His lab works on medical instrumentation for physiological measurement, and has been involved in technology development and commercialization. Before moving to CMC-Vellore, he was on the faculty of IIT-Bombay for a dozen years. He obtained his MS and PhD in Bioengineering from the University of Illinois at Chicago and before that his BE in Electronics and Communications from the College of Engineering, Guindy, University of Madras.