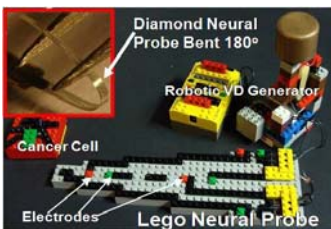


Micro- and Nano-system Integration: Education, Research and Commercialization

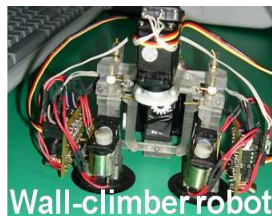
“Your cell phone tells the quality of air around you, monitors your blood pressure & glucose level, has a built-in projection display and replaces your desktop computer.” Yes, this is expected to become reality in the next 5 years through micro- and nano-system integration (MANSI). Education, research and commercialization of MANSI are crucial for smart (a) consumer products, (b) biomedical, healthcare, environmental and communication systems, and (c) zero-energy buildings and public security systems. This talk will focus on MANSI education and research starting with extremely simple ideas and leading to ‘difficult to understand’ concepts¹. Using everyday items and experiences such as Lego™ and static charges as learning vehicles, the basic science, operation and building of (a) computer switches, (b) micro and nano sensors, (c) programmable robots, (d) neural probes and (e) environmental systems will be explained and linked to examples of cutting edge research. MEMS simulation tools (such as CoventoreWare) are used to stretch the simple hands-on learning modules to Ph.D. level.

Some interesting ideas will also be presented on how MANSI could be implemented in (a) Pakistan’s universities and schools including elementary schools, (b) technical/vocational workforce development for domestic and international needs, and (c) organization of educational courses for illiterate children and adults. Hands-on demos of learning modules depicted in figures below will be shown during the lecture.

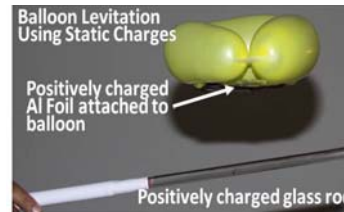
Prof. Dean Aslam is Associate VP Americas of MANCEF (www.mancef.org/AboutMANCEF), Assoc. Director of NSF WIMS ERC (www.wimserc.org), and founding Editor-in-Chief of Journal of Nanosystems and Technology (<http://jnst.ajboggs.com/>). For more information, check his website: www.egr.msu.edu/~aslam



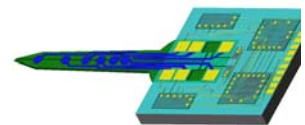
A Lego-based neural probe explains how cancer cells can be destroyed.



Palm-size robot built by a 12th grader in Dr. Aslam’s MSU Lab.

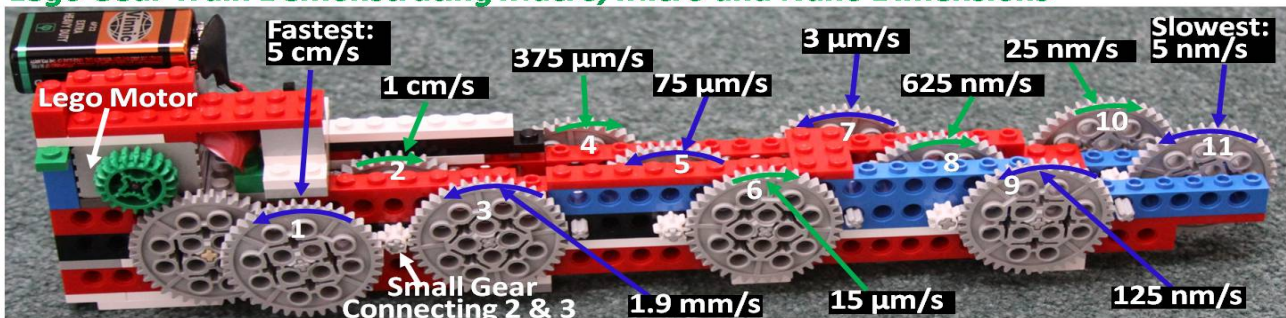


Simple explanation of electrostatic actuation process used in airbag sensors in a car.



Concept of a MANSI microprobe for study of (a) electrical and chemical brain signals and (b) pathogens in the environment.

Lego Gear Train Demonstrating Macro, Micro and Nano Dimensions



Simple explanation of a number of micro and nano dimensions and concepts.

¹ We mix dry learning topics with Legos, drive them around with robots, levitate them in air by static charges and shock them with high voltage from Lego Van de Graaff generators. Suddenly they become fun and everyone wants to learn them.