The Gear Research Laboratory is a research group within the Department of Mechanical Engineering dedicated to research and teaching in several areas including the study of gear and transmission design and manufacturing.

The Gear Research Laboratory is part of the Department of Mechanical Engineering at the University of Texas at Austin. Its research focuses on the design and analysis of gears and transmissions, with an emphasis on gear kinematics and dynamics, as well as computer-aided design and manufacturing.

The department also conducts research in other areas such as wind energy, automotive and aerospace applications, and powertrain systems. The department has a strong focus on interdisciplinary research and collaboration with other departments and industries.

The department continues to be a valuable asset in the conduct of research highlighted here as well as other departmental activities. The recent establishment of a site for the center at Texas A&M University in College Station will greatly enhance our ability to characterize the cellular mechanics at single-cell levels and provide new insights into the mechanisms of metastatic cancer progression.

Materials and methods

Our research is centered on the role of mechanical forces in the regulation of cellular behavior. We use advanced imaging techniques to visualize the mechanical forces acting on cells in real time.

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Detecting Cancerous Tissue During Surgery

C.H. Yang, B.S. as an Assistant Fellow of ERAC and ARRA

Recent Faculty Recognitions

New Faculty Join the Department

Uncertainty Quantification and Reduction in Nuclear Reactor Modeling

An Update from the Nuclear Engineering Program

As a result of successful full-scale testing, despite advances in human technology and surgical methods, medical professionals at the forefront of medical technology and surgery are trying to improve diagnostic and treatment capabilities. In the last five years, Professor Youn Subramaniam at the University of Illinois has been developing an electromagnetic (EM) probe that can successfully distinguish between healthy and diseased tissue. Along with Joe West, Electronics Laboratory Supervisor in Mechanical Engineering, they have developed a method to detect cancerous tissue during surgery by using EM technology. Subramaniam’s team has demonstrated the ability to detect cancerous tissue in real-time surgery through the use of an EM probe. By inserting this probe into the area of interest, they can detect the tissue when it is different in EM properties from healthy tissue, allowing for precise cancer detection. CT and PET scans are also used to detect the location of the diseased tissue or to measure their size and shape. However, the EM probe has advantages over these imaging methods, as it does not involve the use of ionizing radiation, making it safer for both the patient and medical personnel. The EM probe has been tested on surgically excised tissue from a liver cancer case, and preliminary results show that the EM probe can detect the diseased tissue more accurately than other methods. These scans must be done before surgery, because putting the CT scanner in the operating room would be too risky. The ability of the EM probe to detect cancerous tissue directly into the operating room, making cancer surgery more precise, is a major breakthrough in the field of medical technology.

Dr. Xiaodong Sun

Professor Xiaodong Sun submitted a successful proposal to the U.S. Nuclear Regulatory Commission for a research project on nuclear engineering, health physics, and radiochemistry. As a result of this grant, including the implementation of an interfacial area characterization for advanced nuclear reactor characterization for advanced nuclear reactor. Two research activities will be carried out under the support of this grant.

Professor Sun’s research focuses on the physical understanding and control of complex multiphase flows, with a specific emphasis on the interfacial area between two phases. His research team is developing new methods to improve the safety and efficiency of nuclear reactors, which are crucial for the future of energy production. This project will support his research investigating spatio-temporal characteristics of this grant, including the implementation of an interfacial area characterization for advanced nuclear reactor characterization for advanced nuclear reactor.