



The mission of the National Institute of Biomedical Imaging and Bioengineering (NIBIB) is to improve human health by leading the development and accelerating the application of biomedical technologies. The Institute is committed to integrating the physical and engineering sciences with the life sciences to advance basic research and medical care.

The Division of Discovery Science and Technology is one of three divisions within the NIBIB's Office of Extramural Science Programs. Through grant, cooperative agreement, and contract mechanisms, the division promotes, fosters, and manages bioengineering research programs in the funding areas listed below.

## Research Programs

### Program Area: Prototype Design Cluster

#### Mathematical Modeling, Simulation and Analysis

Grace C.Y. Peng, Ph.D.

**Mathematical Modeling:** Emphasis is on engineering solutions for theory-driven, physics-based, physiologically realistic, virtual representations of biomedical systems, with a particular weight on multiscale modeling.

**Simulation:** Emphasis is on engineering, mathematical, statistical and computational approaches for emulating system dynamics and processes implicated in biomedical applications, with a particular weight on medical simulator design and development to reduce medical errors and increase patient safety.

**Analysis:** Emphasis is on theoretical, mathematical, statistical and engineering approaches to interpret the behavioral of complex biomedical data and its dynamics, with a particular weight on paradigm-shifting methodologies and software interfaces.

### Program Areas: Prototype Demonstration Cluster

#### Biomaterial Interfaces

Luisa Russell, Ph.D.

This program focuses on engineering new prototype biomaterial interfaces to mediate human biology for clinical purposes. These technologies are biochemical, biomechanical, bioelectric, biomagnetic, bioacoustic, and biophotonic transducers designed to interconvert energy and biological action. Projects

should be directed toward overcoming a technological challenge that limits biomedical adoption. This program encourages projects that use a design-build-test approach.

#### Biorobotic Systems

Moria Fisher Bittmann, Ph.D.

This program focuses on engineering new prototype biorobotic systems to sense and actuate in response to human biology for clinical purposes. These technologies are robots and bionic devices designed to be closed-loop systems to regulate organ- and human-scale functions. Additionally, this program focuses on engineering new prototype parts and modules, such as the sensors and actuators that comprise biorobotic systems. Projects should be directed toward overcoming a technological challenge that limits biomedical adoption. This program encourages projects that use a design-build-test approach.

#### Synthetic Biological Systems

David Rampulla, Ph.D.

This program focuses on engineering new prototype synthetic biological systems to sense and actuate in response to human biology for clinical purposes. These technologies are biological chassis and biomimetic machines designed to be closed-loop systems to regulate cellular and tissue functions. Additionally, this program focuses on engineering new prototype parts and modules, such as the sensors and actuators that comprise synthetic biological systems. Projects should be directed toward overcoming a technological challenge that limits biomedical adoption. This program encourages projects that use a design-build-test approach.

## Collaborations

An important aspect of the Institute's mission is encouraging collaborations among the institutes and centers at NIH, other federal agencies, and the private sector.:

### Interagency Modeling and Analysis Group (IMAG)

IMAG brings together program officers across multiple federal agencies to communicate, disseminate, and plan collaborative activities and joint initiatives related to computational modeling and analysis of biomedical, biological, and behavioral systems. IMAG coordinates the Multi-scale Modeling (MSM) Consortium. For more information, see IMAG wiki: <https://www.imagwiki.nibib.nih.gov/>

### Synthetic Biology Consortium (SBC)

The SBC is a trans-NIH effort to foster collaborations among researchers and share synthetic biology technologies to address unmet needs in biology and medicine. See: <https://www.syntheticbiology.nibib.nih.gov/>



## Funding Opportunities

See <https://www.nibib.nih.gov/research-funding> for complete information about our funding opportunities.

## Contact

Contact NIBIB program staff with your questions about funding opportunities or the application process. We welcome the opportunity to speak with potential applicants about the Institute's programs.

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