Students & Researchers

- Illinois students and their faculty mentors bring AI/machine learning and other engineering expertise; deployed flexibly to provide solutions to clinical and IT needs at Mayo Clinic.

- Workforce development through pipeline of engineering-trained students who see their future in healthcare at Mayo Clinic.
Computing/Digital Solutions

- Illinois hosts, protects, and supports Mayo Clinic’s data at NCSA with a secure high-performance computing (HPC) platform exclusive to Mayo Clinic

- Illinois provides advanced computing capabilities to Mayo Clinic’s data analysis pipelines and integrated data platforms

- Illinois provides powerful health data analytics to use on multiple forms of Mayo Clinic imaging and clinical data
Research & Discovery

- Clinical discovery in Mayo Clinic patient populations via application of machine learning/deep learning algorithms
- Development of advanced technology to better detect disease, predict clinical outcomes, avoid potential complications, improve monitoring of patients, and provide better delivery for treatment
Patient-Centered Translation

- Visualization tools to aid physicians in interpreting patient data for diagnosis and treatment plans
- AI-powered decision-making support for physicians via point-of-care access to clinical data and knowledge sources
- Apps and visual tools to enable better physician-patient communication and collaboration in real time
Clinical Needs & Developments

Assemble Interdisciplinary Teams

Translation

Innovation

Augmented Human Intelligence for Decision Support

Visualization & Image Analysis

Cyberinfrastructure

IT Needs & Developments

Computational Genomics

Multi-’Omics Pipelines

Collaboration Challenges

Machine Learning-Based Clinical Discovery

Sensors/Devices for Patient Monitoring/POC

Integration & Translation

Technology-Based Clinical Solutions

Incorporate Academic R&D

Assemble Interdisciplinary Teams
# Collaborative Research & Education Programs

<table>
<thead>
<tr>
<th>Summer Undergraduate Research Fellowships (SURF)</th>
<th>Two-Year Graduate Fellowships</th>
<th>IT &amp; Bioinformatics Summer Internships</th>
<th>Other Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 70 Illinois students</td>
<td>• 6 Illinois students</td>
<td>• 15 Illinois students</td>
<td>• Students in hybrid academic/corporate model</td>
</tr>
<tr>
<td>• Alliance supports 5 students each summer</td>
<td>• Minimum 1 year at Mayo Clinic</td>
<td>• Bioinformatics Systems Unit at Mayo Clinic</td>
<td>• M Eng degrees</td>
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<tr>
<td></td>
<td></td>
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<td>• Joint PhD training</td>
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<td></td>
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<td>• Medical Student Exchanges</td>
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</tbody>
</table>
NCSA–Mayo Clinic Collaboration

R&D Programs (Active and Outcomes)
1. Mayo Grand Challenge Project – compression/workflows
2. Mayo Grand Challenge Project – Structural Variant analysis
3. Mayo Grand Challenge Project – coverage visualization
4. Multi-photonic Image Biomarker - deep learning
5. HPC Genomic Research Computing Platform (Phase 1+2)
6. Mayo Labs Workbench Evaluation/Design
7. Risk Context Tool – student project
8. OmiX Microbiome Visual Analytics Software
9. KnowEng Platform for Cloud-based Analysis
10. Structural Variant Reporting
11. Clinical Report for HCC Panel
12. Alzheimer’s Analysis
13. Breast cancer Analysis
14. Mitral Valve Analysis
15. Immunology Analysis
16. Latent TB Analysis

Compute Platform and Cyberinfrastructure

- mForge (HPC environment at Illinois) supports genomics, health sciences, engineering and other non-clinical research activities for Mayo Clinic Physician Scientists

- Research and development programs and projects

- Security, ePHI support plus BAA
Nearly $20M in joint externally-funded grants

<table>
<thead>
<tr>
<th>Project</th>
<th>Award</th>
<th>Type</th>
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<tbody>
<tr>
<td>The Human Vaginal Microbiome and Bacterial Vaginosis</td>
<td>$659,510</td>
<td>NIH</td>
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<tr>
<td>Classification of Breast Masses Based on Visco-Elastic Properties</td>
<td>$2,200,000</td>
<td>NIH-NCI R01</td>
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<tr>
<td>KnowEng. A Scalable Knowledge Engine for Large-Scale Genomic Data</td>
<td>$9,300,000</td>
<td>NIH U54</td>
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<tr>
<td>Droplet Microfluidic Platform for Ultralow Input Epigenetics</td>
<td>$430,255</td>
<td>NIH-NCI R21</td>
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<tr>
<td>Collaborative Research: Planning Grant: I/UCRC for CISE: Computing and Genomics – An Essential Partnership for Biology Breakthroughs</td>
<td>$16,258</td>
<td>NSF Planning Grant</td>
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<tr>
<td>Microbial Metabolic Toxicity Drives Colon Cancer (Role of the Microflora in the Etiology of Gastro-Intestinal Cancer)</td>
<td>$2,240,500</td>
<td>NIH-NCI R01</td>
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<tr>
<td>Biomimetic Hydrogel Niches to Study the Malignant Phenotype of Glioblastoma Multiforme</td>
<td>$1,700,000</td>
<td>NIH-NCI R01</td>
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<tr>
<td>Translational Molecular and Cellular Imaging Technologies for Quantitative Prostate Tumor Pathology</td>
<td>$1,100,000</td>
<td>NIH-NCI R33</td>
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<tr>
<td>Fisk University/UIUC-Mayo KnowENG BD2K Center R25 Partnership</td>
<td>$1,021,235</td>
<td>NIH R25</td>
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<td>Administrative Supplement to BD2K</td>
<td>$411,128</td>
<td>NIGMS U54</td>
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<tr>
<td>I/UCRC Computing and Genomics - An Essential Partnership for Biology Breakthroughs</td>
<td>$150,000</td>
<td>NSF</td>
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<td>Extracellular Matrix Regulation of Lung Adenocarcinoma Signaling and Drug Responsiveness</td>
<td>$376,070</td>
<td>NIH-NCI R21</td>
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<tr>
<td>Remote Patient Monitoring Technologies in Spinal Cord Injury Rehabilitation</td>
<td>$30,839</td>
<td>NIH R21</td>
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<td>$19,635,795</td>
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