NSF
Civil, Mechanical and Manufacturing Innovation

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NSF Mission

“To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense....”
CMMI Overview
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• civil, mechanical, industrial and manufacturing engineering, and materials design

• reduction of risks and damage from earthquakes and other natural and technological hazards
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• civil, mechanical, industrial and manufacturing engineering, and materials design

• reduction of risks and damage from earthquakes and other natural and technological hazards

• cross-cutting technologies including adaptive systems, nanotechnology, and simulation

• encourage cross-disciplinary research partnerships
Advanced Manufacturing

- 3 programs: MME, MEP, NM
- For next generation production and optimization
- For application-driven development of materials systems
- For fabrication of novel devices and systems
Advanced Manufacturing

- 3D printed device removes toxins in blood

- Integrating lasers into machining to soften hard materials
Mechanics & Engineering Materials

- 3 programs: BMMB, DEMS, MOMS

- For integrating design and materials systems

- For optimizing response of novel materials

- For investigating mechanics of biological systems
Mechanics & Engineering Materials

- Personalized treatment of heart disease
- Printing liquid metal
Resilient & Sustainable Infrastructures

- 6 programs: CIS, GEM, IMEE, SAE, ENH, NHERI

- For civil infrastructure: from day-to-day to extreme hazards conditions

- For infrastructure resilience & sustainability across lifecycle

- For systems-level design to withstand multi-hazards

- For economic and societal resilience in the face of disaster
Resilient & Sustainable Infrastructure

• Evaluating progress in reducing damage from extreme hazards

Credit: Reuter Pictures

Christchurch, NZ earthquake, 2011

Moore, OK tornado, 2013 – Credit: NSF
Experimental Testing Facilities (NHERI)

- Tsunami wave tank
- Earthquake testing of five story building
Operations, Dynamics, & Design of Systems

- 4 programs: SMOR, SYS, ESD, DCSD
- For decision-making models: from fundamental operations to complex applications
- For theoretical foundations for design & systems engineering
- For enhancing performance of dynamic systems through data integration and modeling
Operations, Dynamics, & Design of Systems

- Genetic algorithms drive better solar cells

- Models better service delivery
CMMI Award Profile

Majority of Awards:
- $150k to $400k
- 36 months duration
Cross-Directorate Initiatives

- Cyber Physical Systems (CPS)
- Computational and Data-Enabled Science and Engineering (CDS&E)
- Designing Materials to Revolutionize and Engineer our Future (DMREF)
- Scalable Nanomanufacturing (SNM)
- Critical Resilient Interdependent Infrastructure Systems and Processes (CRISP)
- Smart and Connected Health (SCH)
Broader Impacts

• Advance society
• Innovate for future
• Integrate research and education
• Build diverse STEM talent
• Engage wider audience