Higher Education Research Council

Report on activities from July 1, 2019 - June 30, 2020 (Fiscal Year 2020)

> Dr. Christopher Nomura June 16, 2021







University of Idaho

Lewis-Clark S T A T E C O L L E G E

Attachments

- FY20 Research Performance Measure Report
- FY20 Research Activity Report
- FY20 Infrastructure Summary Report
- FY20 Undergraduate Research Report
- FY20 Idaho Conference on Undergraduate Research Report
- FY20 HERC Budget Allocation
- FY20 IGEM Grant Reports
- FY20 Incubation Fund Grant Reports
- 2020 CAES Annual Report

HERC Mission

Strengthen the research capabilities at Idaho's public, four-year institutions and contribute to the economic development of the state of Idaho.

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HERC Membership

Higher Education Representatives

Dr. Christopher Nomura, University of Idaho

Dr. Donna Lybecker, Idaho State University

Dr. Harold Blackman (Chair), Boise State University

Dr. Lori Stinson, *Lewis-Clark State College*

Industry Representatives

Robin Woods, *Alturas Analytics*

Marianne Walck, Idaho National Laboratory

Eileen Barber, Keynetics

Heather Messenger, Life Sciences and Biotech Industry

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FY20 HERC Budget Allocation

Total
Administrative Costs
Incubation Fund
IGEM Grants
Undergraduate Research
Matching Grants (EPSCoR)
Research Infrastructure Funds

\$850,000 \$800,000 \$217,000 \$2,066,500 \$244,670 \$2,700 **\$4,160,870**

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Research Infrastructure

Funding to support science, engineering, and other research infrastructure

FY20 Infrastructure Budget - \$850,000

Major line items:

- **BSU** High performance computing equipment/software
- **ISU** Equipment to support the IGEM 20-001 grant
- UI Post-doctoral fellows and lab equipment
- LC State Library support and lab equipment

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Undergraduate Research

Funding to support STEM undergraduates in research projects and travel to conferences

FY20 UR Budget - \$185,000

Student research projects supported in FY20:

BSU – 17 **ISU** – 10 **UI** – 11

LC State – 11

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Idaho Conference on Undergraduate Research (ICUR)

Funding for two day undergraduate conference held each July

FY20 ICUR Budget - \$32,000

FY20 ICUR Outcomes: 291 attendees from 26 different institutions/organizations 189 students 150 poster presentations 102 faculty, industry and governmental representatives

IDAHO CONFERENCE ON UNDERGRADUATE RESEARCH

July 21-22, 2021 Virtual Conference

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Idaho Global Entrepreneurial Mission Fund (IGEM)

Competitive grant program used as seed funding for strengthening Idaho's future by strategically investing in the development of expertise, products, and services which result in state economic growth.

1- to 3-year grants up to \$700,000 per year

FY20 IGEM Grant Budget – \$2,065,500

Active Grants in FY20: 4

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FY20 Active IGEM Grants

Sustaining the Competitiveness of the Food Industry in Southern Idaho: Integrated Water, Energy and Waste Management

University of Idaho – \$700,000 – Year 3

Nucleic Acid Memory

Boise State University – \$665K – Year 3

A Disaster Response Complex for Emergency Responders in Idaho Idaho State University – \$525K – Year 2

Cellulosic 3D Printing of Modular Building Assemblies University of Idaho – \$175K – Year 2

Sustaining the Competitiveness of the Food Industry in Southern Idaho: Integrated Water, Energy and Waste Management (U of I)

- Build capacity and partnerships among UI, BSU, ISU and CAES to assist Idaho food producers and processors in reducing water, energy, and waste footprints
- Demonstrate/transfer technologies for reducing water/nutrient use
- Pilot at field-scale and transfer technology for recovering valuable nutrients/byproducts from waste streams
- Provide decision support tools for community and business stakeholders to better understand the interconnections and tradeoffs between energy, water, nutrients, and land use
- Include workforce development in the use of new technologies

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Nucleic Acid Memory (BSU)

- 16 trillion GB of data were produced in 2016; 163 trillion GB of data will be produced in 2025
- Archival storage of this huge amount of data using electronic memory is reaching physical and economic finish lines
- Project will develop an optical technology using DNA to write, store and read digital information
- DNA as a digital storage/memory medium:
 - Retention time of thousands to millions of years
 - 1 kg of DNA can store the entire projected digital universe in 2040
 - DNA storage energy is 100 million times less than current electronic memory
- Creation of Nucleic Acid Memory Institute to meet critical innovation, economic, and workforce development needs in Idaho

A Disaster Response Complex for Emergency Responders in Idaho (ISU)

- FEMA has recognized the need to establish emergency management as both an academic field and as an applied practice
- Coupling academia to traditional emergency response structures will make the complex emergency management more effective
- Goal of this project is to develop and construct an outdoor campus called "Disaster Response Complex" at ISU
- DRC will become a premier regional/national response center for research, curriculum development, and training/exercises for military and law enforcement personnel in Idaho and beyond
- The DRC ideas is strongly supported by INL and CAES who wish to use the complex to develop workforce talent

Cellulosic 3D Printing of Modular Building Assemblies (UI)

- Identify a methodology, process, and materials necessary to 3-D cold print building assemblies using wood fibers
- Primary objective is the development of a cost-effective and reliable process for printing wall, roof, and floor assemblies on a horizontal plane.
- Target market is light commercial, residential and multi-family buildings.

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Incubation Fund Grant Program

1-year grants up to \$75,000

FY20 Budget - \$224,670

FY20 Projects: 3

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FY20 Incubation Fund Grants

Optical Sensors for Harsh Environment

Boise State University – \$75,000

Ink Production Scale Up

Boise State University – \$74,970

Darwin's Demons Mobile: Expanding the Market for Evolutionary Procedural Content Generation

University of Idaho – \$74,700

Optical Sensors for Harsh Environment (BSU)

- Market need for optical sensors that can withstand extreme environments and that are immune to electromagnetic interference
- Such sensors can be used in places like jet engines, nuclear power plants, deep sea drilling rigs, etc., leading to more accurate information and increased efficiencies
- Idaho does not currently have capability to create these kinds of sensors locally
- Fiberguide Industries in Caldwell has partnered with BSU and has become the industry leader in the US for this technology
- This grant allowed BSU to purchase an ultrafast laser system that is used by researchers and Fiberguide staff to create sensors on specialty fibers and test them under harsh environments (extreme temperature and radiation)

Ink Production Scale Up (BSU)

- Scale up the synthesis of nanoparticle inks
- Several inks are not available commercially, including platinum, niobium, cobalt, tungsten, molybdenum, iron
- Great interest in these inks from industry, national labs, and governments
- Further fostering partnerships with industry, leading to commercialization of new inks and associated technologies

Darwin's Demons Mobile: Expanding the Market for Evolutionary Procedural Content Generation (UI)

- US video game market generates over \$90B per year
- Content development for games is expensive
- In a previous IGEM grant, UI researchers created a game using evolutionary procedural content generation (IPCG)
- This approach uses evolutionary models to evolve game content rather than relying on pre-programmed content
- IPCG creates a competitive advantage by significantly reducing game development costs
- This grant allowed UI to develop a mobile version of the game that was previously developed using IGEM funds.
- The mobile market is very large potential source of income

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Thank You



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