

**REPORT TO THE
LOUISIANA BOARD OF REGENTS**

**RESEARCH & DEVELOPMENT COMPONENT
OF THE BOARD OF REGENTS SUPPORT FUND**

PROOF-OF-CONCEPT/PROTOTYPING INITIATIVE

FY 2023-24 COMPETITION

March 2024



**REPORT OF THE FINAL PANEL
BOARD OF REGENTS SUPPORT FUND RESEARCH
PROOF-OF-CONCEPT/PROTOTYPING INITIATIVE**

FY 2023-24

BACKGROUND INFORMATION

Thirteen (13) proposals requesting a total of \$519,167 in first-year funds were submitted for funding consideration in fiscal year (FY) 2023-24 to the Proof-of-Concept/Prototyping (PoC/P) Initiative of the Board of Regents Support Fund (BoRSF). Proposals were submitted in five targeted industry sectors: Advanced Materials and Manufacturing, Coastal and Water Management, Clean Technology and Energy, Digital Media and Enterprise Software, and Life Sciences and Bioengineering, , as well as other disciplines as permitted in the RFP.

THE REVIEW PROCESS

The proposals submitted were each reviewed by two experts in related fields. The proposals were then ranked according to proposal score and rating, and the available funds were distributed in order of the priority ranking. All proposals recommended for funding received ratings of Good, Very Good, or Excellent by both reviewers. Overall, four (4) proposals were recommended to receive a total of \$159,985.

Table I of this report contains the rank-order list of all proposals highly recommended for funding. Table II lists the contributing consultants across all categories. These are followed by a compilation of written comments submitted by the discipline-based review panels for each of the highly recommended proposals. Appendix A contains a list of all PoC/P proposals submitted, and Appendix B contains the rating form used by all consultants to evaluate proposals.

All proposals not recommended for funding (i.e., any proposal not listed in Table I) will receive debriefing material summarizing reviewer assessments of the project in July 2024, to assist applicants in development of future submissions to PoC/P and other grant programs. These materials will be distributed via the PI LOGAN account used to submit the original proposal.

Table I
FY 2023-24 PROOF-OF-CONCEPT/PROTOTYPING INITIATIVE

Proposals Highly Recommended for Funding

Rank	Proposal #	Institution	Category	Funding Request	Funding Recommendation
1	001D-24	LSU-AG	Coastal & Water Management	\$40,000	\$40,000
2	008D-24	LA Tech	Clean Technology & Energy	\$39,999	\$39,999
3	002D-24	LSU A&M	Life Sciences & Bioengineering	\$40,000	\$40,000
4	013D-24	ULL	Coastal & Water Management	\$39,986	\$39,986
				\$159,985	\$159,985

Table II

FY 2023-24 PoC/P Consultants		
Name	School	Discipline
Ian Butts	Auburn University	Aquaculture
Yong Chen	Stonybrook University	Fisheries Science
ZhiQiang Chen	University of Missouri-Kansas City	Disaster Response
Lawrence Davis	Kansas State University	Biochemistry
Mohamed ElGawady	Missouri S&T University	Civil Engineering
Siamak Farhad	University of Akron	Mechanical Engineering
Melanie Gall	Arizona State University	Disaster Response
Maryam Hojati	University of New Mexico	Civil Engineering
Xiangbo Meng	University of Arkansas	Mechanical Engineering
Sriram Neelamegham	University of Buffalo	Bioengineering
Tam V. Nguyen	University of Dayton	Computer Science
Ram Ray	Prairie View A&M University	Soil Science/Water Engineering
Rodrigo Salgado	Purdue University	Geotechnical Engineering
Xin Sun	North Dakota State University	Precision Agriculture
Oleh Taratula	Oregon State University	Drug Delivery
Shane Walker	Texas Tech University	Civil Engineering
Dongmei Wang	North Dakota University	Geological Engineering
Murali Yallapu	University of Texas-Rio Grande Valley	Immunology
Qi Yu	Rochester Institute of Technology	Computer Science

**FY 2023-24 Proof of Concept/Prototyping Initiative
Priority Ranking of Proposals Highly Recommended for Funding**

Rank	1
Proposal #	001D-24 (Coastal & Water Management)
PI/Institution	Maria Gutierrez-Wing/Louisiana State University AgCenter
Title	Deployable Modular Crab Habitat and Coastal Protection Device
Requested	\$40,000
Recommended	\$40,000

This project aims to develop a functional structure for crabs to provide habitat and protection. The device will be built using regional byproducts including biomass and ashes from the sugar and wood industries to reduce overall weight for easy transportation and longer service time in soft bottom. This is proof-of-concept work with a high likelihood of success. This project will directly benefit crab fisheries and the construction industry. The use of organic products opens the possibility of using the habitat structures for carbon capture, adding environmental and economic benefit to their use. The technology developed through this project can contribute to coastal protection and restoration. Given the current state of land loss in the Gulf Coast and other areas, the application of the modular habitats has great potential and aligns with state efforts and investments in this area.

The project objectives are efficiently constructed. The scope of work is consistent with the timeline and budget. Evidence of industry interest is provided, and commercial partners are directly involved in the project. The PI and others in the research group are world leaders in gamete cryopreservation devices and have state-of-the art facilities to fabricate different shelters and habitats for protecting genetic resources and ecosystems. This proposal is novel and the approach will likely be applicable to many other useful tools and shelters, etc. for marine animals. Full funding is recommended.

Rank	2
Proposal #	008D-24 (Clean Technology & Energy)
PI/Institution	Shengnian Wang/Louisiana Tech University
Title	Sustainable Nitrogen Fixation into Valuable Chemicals Using Lithium Cycle
Requested	\$39,999
Recommended	\$39,999

The technology proposed in this project is novel and may pave a new route for generating ammonia (NH₃) that saves energy and is cost effective. The proposed method depends on high-efficiency recovery of the lithium catalyst into a form that is usable for repeated cycles. A patent application has been filed for the proposed technology. Investigation of the feasibility of commercialization needs further development, which makes the project a strong candidate for this funding mechanism. If successful, the technology will bring multiple benefits to the market. Specifically, NH₃ is a widely used feedstock for fertilizers. The advantages of scale (small versus large) may favor the lithium cycle in some locations where demand for ammonium or nitrate fertilizer is not uniformly high. The research and development methods, procedures, and budget are well presented and feasible. The scope of work is consistent with the timeline and budget. The project milestones and anticipated outcomes are reasonable.

A company partner has been identified for this project. The size of the potential market has been discussed and the related patent has been filed. This technology is in perfect position to take the next step proposed. Full funding is recommended.

Rank	3
Proposal #	002D-24 (Life Sciences & Bioengineering)
PI/Institution	Leslie Butler/Louisiana State University and A & M College
Title	Precision In-Field Agricultural Sensor for Internal Crop Analysis
Requested	\$40,000
Recommended	\$40,000

The applicants propose the validation of X-ray CT scanning and neutron imaging to characterize some properties of sugarcane and avocados. This innovation is meaningful for the crop sensing field, especially when biomass content needs to be detected under in-field operation. The project activities are reasonable and sustainable. The project outcomes align with the proposed tasks. The research includes assessing the neutron imaging and scattering technology for sugarcane and other agricultural products, developing collaborations for follow-on funding, filing patents, and publishing research findings. Tasks also include student engagement in X-ray CT scanning, neutron imaging experiments, and machine learning development.

The proposed project seems likely to enhance the potential for commercialization. There is a need for sensors and/or technology that can be deployed at the farm to characterize the interior of plants and fruits with non-contact imaging able to detect sugar content, ripeness, or plant disease. The project team proposes calculating the field data and analyzing it in the lab; however, the long-term goal is to deploy the proposed sensors in the field and characterize the interior of plants and fruits. Two potential commercial partners have been working with the researchers for a long time to develop and deploy neutron experiments. The potential of this technology lies in its application in field settings. X-ray technology is a particularly effective means to address the limitations of normal RGB cameras in detecting crop attributes. If this work is successful, the potential market would be on a national, even global scale. The preliminary data acquired for sugarcane stalks will be used to support a provisional patent application(s). A technology disclosure has already been made to the LSU Innovation & Technology Commercialization office, and the project is ripe for PoC/P investment. Full funding is recommended.

Rank	4
Proposal #	013D-24 (Coastal & Water Management)
PI/Institution	Rui Zhang/University of Louisiana at Lafayette
Title	Monitoring Ground Water Level by Turning the Fiber Optical Network on UL Lafayette Campus into a Distributed Acoustic Sensor [DAS]
Requested	\$39,986
Recommended	\$39,986

The applicants propose to test the fiber optics on the ULL campus for distributed acoustic sensing (DAS) measurements of ambient noise. The recorded seismic data will be used to estimate the ground water level variation, which will lead to a more substantial project to use Louisiana Optical Network Initiative (LONI) as a DAS measurement tool to monitor environmental and industrial impacts statewide.

The proposed approach could improve commercial solutions for predicting groundwater using fiber optics. This is an interesting proposal with potentially high impact. The presented scope of work, budget and feasibility are well aligned and reasonable. A compelling justification is presented for the need to explore commercial viability. The project team has explained clearly how this technology has been widely used in other states and its potential to spin off future projects. Additionally, although the need for water table monitoring is compelling enough, the broader applications of the technology discussed in the proposal are even more exciting. Full funding is recommended.

Appendix A

Proposals Submitted to the Research and Development Program - Proof-of-Concept/Prototyping (PoC/P)
Initiative for the FY 2023-24 Review Cycle

Proposal #	PI Name	Category	Institution	Project Title	Amount Requested
001D-24	Dr. Maria Gutierrez-Wing	Coastal and Water Management	Louisiana State University Agricultural Center	Deployable Modular Crab habitat and coastal protection device	\$40,000
002D-24	Prof. Leslie Butler	Life Sciences and Bioengineering	Louisiana State University and A & M College	Precision in-field agricultural sensor for internal crop analysis	\$40,000
003D-24	Dr. Yong-ha Kim	Coastal and Water Management	Louisiana State University and A & M College	Capacitive Deionization Device to Clean up Radioactive Spills	\$40,000
004D-24	Prof. Roger Laine	Other - Antiviral Therapeutic Compounds, Pharmaceutical Development	Louisiana State University and A & M College	Ocular Herpes Model for Thioglycosides and Selenoglycosides as Antiviral Coat Glycoprotein Decoys	\$40,000
005D-24	Dr. Yong-Cheol Lee	Other - Disaster risk and resilience	Louisiana State University and A & M College	A Disaster Risk and Resilience Measurement System for Disaster-Prone Buildings	\$40,000
006D-24	Dr. Xiangyu Meng	Digital Media and Enterprise Software	Louisiana State University and A & M College	Developing Digital Autonomous Twin Technology for Advanced Battery Management Systems of Electric Vehicles	\$40,000
007D-24	Dr. Yen-Fang Su	Advanced Materials and Manufacturing	Louisiana State University and A & M College	Real-time rheological properties monitoring of 3D printable cementitious materials	\$39,504
008D-24	Prof. Shengnian Wang	Clean Technology and Energy	Louisiana Tech University	Sustainable nitrogen fixation into valuable chemicals using lithium cycle	\$39,999
009D-24	Dr. Vahid Atashbari	Clean Technology and Energy	Southern University at Shreveport	New Integrated Environmental System between Geothermal Energy and Hot CO2 injection	\$40,000
010D-24	Prof. Vijay John	Life Sciences and Bioengineering	Tulane University	A Drug Delivery Platform for Advanced Prostate Cancer based on Molecular Self-Assembly	\$40,000
011D-24	Dr. Beenish Chaudhry	Digital Media and Enterprise Software	University of Louisiana at Lafayette	A Mobile Application for People with Early Stage Dementia and their Caregivers	\$39,990
012D-24	Dr. Beenish Chaudhry	Digital Media and Enterprise Software	University of Louisiana at Lafayette	Interactive Augmented Reality Tour of the Cultural Heritage of the Attakapas Region	\$39,688
013D-24	Prof. Rui Zhang	Coastal and Water Management	University of Louisiana at Lafayette	Monitoring ground water level by turning the fiber optical network on UL Lafayette campus into a Distributed Acoustic Sensor [DAS]	\$39,986
Total Number of Proposals Submitted			13		
Total Funds Requested			\$519,167		

Appendix B

**BOARD OF REGENTS SUPPORT FUND
PROOF-OF-CONCEPT/PROTOTYPING (PoC/P) INITIATIVE**

Proposal Number	
Proposal Title	
Submitting PI/Institution	
Amount Requested	

A. TECHNICAL MERIT (40 Points) _____

- Is innovation reduced to practice and not subject to near-term obsolescence?
- Are the R&D methods, procedures and budget sustainable?
- Is the scope of work consistent with timeline and budget?
- Are the project milestones and projected project outcomes reasonable?

COMMENTS:

B. COMMERCIAL OPPORTUNITY (40 Points) _____

- Does the proposal present a disruptive product or significant improvement over existing commercial solutions?
- Is the potential scope of intellectual property protection adequately described?
- Is a compelling justification presented for the need to explore commercial viability?
- Is evidence presented for commercial viability and the need for further R&D documented?

COMMENTS:

C. POTENTIAL FOR SUCCESS (20 Points) _____

- Has interest been demonstrated by potential users/commercial partners?
- What are the size and scope of the potential target market or patent application filed?
- Is the prior art search completed, with meaningful scope of claims?

COMMENTS:

TOTAL SCORE (Out of 100) _____

OVERALL RATING OF PROPOSAL

Poor Fair Good Very Good Excellent
