

# Undergraduate Research and Innovation (URI)

**Phase-1 and Phase-2 URI Student Seed Grants**

Information Session

# Undergraduate Research and Innovation (URI)

Opportunities for students to learn necessary and important skills to research and innovate to take a leadership role in the society.

Help students develop strategic skills and vision to address research, technology and societal challenges.

Higher Accomplishments

Better Skill-set

Better Graduate/Professional School

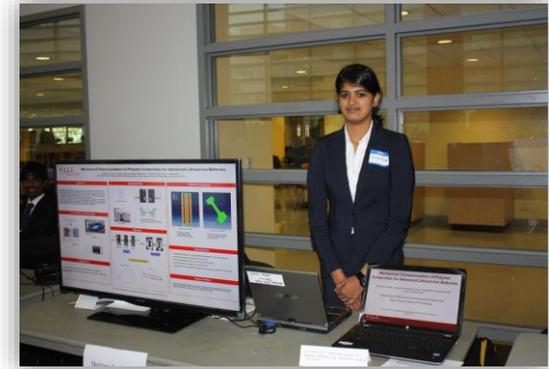
Better Future and Job

Better Life



# URI Programs

- URI Student Seed Grants
  - Phase 1: Proof of Concept and Feasibility: Up to \$500
  - Phase-2: Prototyping and Research: Up to \$3,000
- TechQuest Innovation Competition
  - Up to \$20,000 in Awards and Summer Stipends
- NIAC Innovation Challenge
  - Summer Stipends
- McNair Achievement Program
  - Scholarship Awards
- Provost Summer Research Fellowships
  - Summer Stipends
- NSF REU Programs
  - Summer Stipends
- NSF iCorps Grants
  - \$3,000 Grants



# URI Administration

- **Atam Dhawan**, Vice provost for Research
- **Angela Retino**, URI Administrative Coordinator

## URI External Advisory Board Executive Committee

- **Brian Kiernan** (Chair, EAB and Executive Committee)  
Angel Investor, Executive VP and Chief Scientist (ret), InterDigital Comm. Corp.
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- **Nish Parikh** (Executive Committee member)
  - Founder and CEO, WebTeam Corporation
- **Manish Patel** (Executive Committee member)  
Co-Founder, TrickyWater, LLC



# International Undergraduate Summer Research Symposium

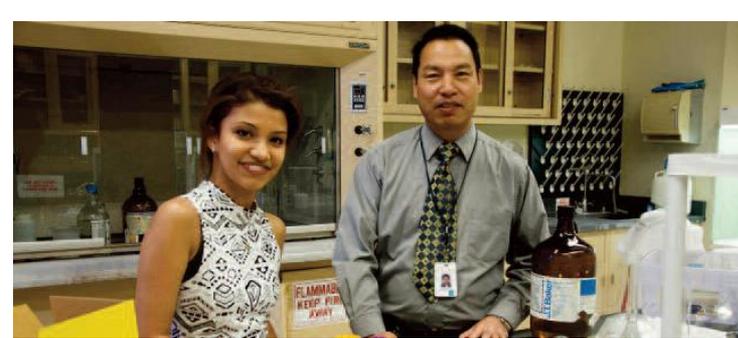
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- Over 130+ Students
- Over 340 Visitors
- Book of Abstracts



# URI Student Seed Grants

- Two Tracks for Submissions of Proposals:
  - Track 1: Innovation and Product Development (IPD) - projects focused on innovative ideas for technology/product development to address market and societal needs
  - Track 2: Application Based Research (ABR) – application based research to address market and societal needs
- Phase-1 grants provide up to \$500 for demonstration of feasibility of concept and need through market research (IPD) or complete literature review (ABR).
- Phase-2 grants provide up to \$3,000 per project to pursue research or develop proof of concept prototypes.
  - Funds can only be used to order project supplies and prototyping
  - Open to former Student Seed Grant winners who have completed Phase-1 work
  - Open to new students who have a research or product idea that has shown preliminary proof of concept, market assessment or application based research to establish need



# URI Call For Proposals

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- All proposals should be submitted by **February 25, 2019** following the URI Phase-1 or Phase-2 for both Track-1 and Track-2 Student Project Grant Proposal Format Guidelines posted on the URI website <http://centers.njit.edu/uri/programs/index.php>.
- Students working with a faculty member may upload their URI Student Seed Grant proposals after completing the online application form. The online application form can be found on the URI website.
- All proposals will be reviewed to select up to 15 finalist proposals for presentation to the External Advisory Board in the URI Workshop to be held on March 12, 2019 at the Campus Center Ballroom A from 2.00 PM to 5.30 PM.

# Phase-1 Proposal

**A. Problem Statement** (What problem are you trying to address through research or product development?)

**B. Significance** (Why is the problem important? What is the value proposition to users or society?)

**C. Approach** (How will you solve the problem? What is your overall approach? Briefly present methods or procedures critical to your approach.)

**D. Innovation** (What is the innovation or novelty in your approach?)

**E. Expected Outcomes and Deliverables** (What do you expect as the outcome of research or deliverables towards product development?)

**F. Users/Market and Potential Impact** (What impact do you expect if the proposed work is successful?)

**G. Resources and Budget Needed** (Provide a budget and justification for supplies to pursue research or develop a prototype for proof of concept. Budget is limited to \$500)

# Phase-2 Proposal

- A. Problem Statement**
- B. Significance** (Why is the problem important? What is the value proposition to users or society?)
- C. Innovation** (What is the innovation or novelty in your approach?)
- D. Phase-1 or Preliminary Research Goals** (List each specific goals of earlier work)
- E. Phase-1 Research Literature Review or Market Research**
- F. Phase-1 Report, Accomplishments and Lessons Learned**
- G. Phase-2 Special Goals**
- H. Phase-2 Research/Innovation Plan and Methods** (Briefly present methods or procedures critical to your approach.)
- I. Expected Outcomes and Deliverables** (What do you expect as the outcome of research or deliverables towards product development?)
- J. Resources and Budget Needed** (Provide a budget and justification for supplies to pursue Phase-2 research or develop a prototype. Budget is limited to \$3,000)

# Sample Phase-2 Track-2 Proposal

## A. Problem Statement

Glioblastoma, also known as glioblastoma multiforme (GBM), is an extremely aggressive type of nervous system tumor that forms on the tissue of the brain. Nourished by a large and complex network of blood vessels, the tumor cells reproduce quickly, making GBM one of the deadliest cancers. Glioblastoma accounts for roughly half of all brain and central nervous system cancers, with a one-year survival rate of less than forty percent and a five-year survival rate of less than five percent [1]. Current standard of care for patients with newly diagnosed glioblastoma includes surgery, radiation therapy, and chemotherapy. One such treatment involves an in-situ drug delivery system. Following surgery, carmustine wafers are implanted in the tumor cavity. The wafers then slowly dissolve while releasing medication that will kill the remaining cancerous cells. These wafers, however, lack the ability to homogeneously coat and conform to the tissue voids of the resected tumor cavities, amongst other issues. To address this lack of proper fit, a space-conforming peptide modified with an anti-angiogenic mimic will be developed in the form of an injectable hydrogel that self assembles into  $\beta$ -sheet-based nanofibers. This modified peptide will be tested for its anti-angiogenic properties in several different cell cultures, eventually progressing to animal models.

# Sample Phase-2 Track-2 Proposal

## B. Significance

Glioblastoma multiforme is one of the most common forms of High-Grade Gliomas, with an estimated 12,500 diagnoses to be made in 2018 in the United States alone. Despite maximal efforts, patients with recent diagnosis of GBM who receive full treatments have a median survival of less than 17 months [2]. Additionally, with the relatively young age of diagnosis (between ages of 45 and 70), more years of productive life are lost from patients with GBM compared to other cancers [2]. Given these troubling statistics, it is clear that significant efforts must be made to develop novel treatments that will not only eradicate the remaining cancerous cells, but also prevent reoccurrence.

## C. Innovation

The originality of this project derives from its utilization of a novel peptide hydrogel modified with an anti-angiogenic mimic. The peptides are a sequence of amino acids (K-(SL)6K (SL) that are designed to self-assemble into antiparallel  $\beta$ -sheets and develop into a nanofibrous mesh [3]. This formation is biocompatible, biodegradable, and durable. Self-assembly of these sheets can be attributed to several molecular interactions that can rapidly reform, including Van der Waals forces, hydrogen bonding, and ionic interactions [3]. Due to the reversibility of these bonds, the hydrogel presents shear stress recovery and shear thinning properties, allowing for aspiration into a syringe and subsequent injection via needle [3].

# Sample Phase-2 Track-2 Proposal

## F. Phase-2 Specific Goals

The overarching purpose of this initial project will be to produce a set of preliminary data that can be evaluated to determine the potential of this drug delivery system.

Aim 1: The first specific goal will be to develop the injectable self-assembling  $\beta$ -sheet peptide modified with an anti-angiogenic mimic will be developed. The project will utilize past research to develop the peptide with the aforementioned mimic.

Aim 2: Following this advancement, the peptide will be tested for its anti-angiogenic properties in vitro. As mentioned earlier, GBM is marked by its aberrant vascular proliferation. Confirming anti-angiogenesis is critical towards developing a treatment protocol for glioblastoma.

Aim 3: The developed peptide will be evaluated for its cytotoxicity against GBM cells to determine if the injection of the peptide itself (regardless of its anti-angiogenic properties) can contribute to the killing of cancerous tissue.

Aim 4: In the future, a thorough protocol will be devised for the usage of a self-assembling peptide against the proliferation and resurgence of GBM. Developing such a protocol will allow for future research using the peptide, expanding its abilities beyond anti-angiogenesis to targeted cytostasis to achieve even more effective results against the GBM.

# TechQuest Innovation Competition

## Cash Prizes Totaling \$8,000

## \$12,000 in Summer Stipends



TechQuest for 2019 helps you advance your project to the first steps of commercialization. Skills developed in this effort will serve you well throughout your professional career.

For more information, search "<http://centers.njit.edu/uri/programs/index.php>" right side column, first link

Application Questions Deadline 3-4-19  
Oral Presentations by Finalists 3-25-19  
Winners Announced Innovation Day 4-8-19



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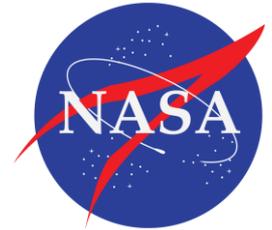
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NJIT

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# Project Format Slides

Back-Up Slides

# Proposal Writing

Process Steps	Track-1 Technology/Product Development	Track-2: Application-Based Research
<b>General Outline</b>	<p>The core idea and innovation can be correlated with the potential user group:</p> <p>Need: What is the need? Why users need it?</p> <p>Significance: Will the innovation really help them and address a critical need? How many would use it?</p> <p>Potential Impact: If the innovation is successful, what is potential impact in the society or addressing unmet market needs?</p>	<p>The core idea and research can be correlated with the potential knowledge advancement and discovery towards addressing needs for an application.</p> <p>Need: What is the problem in research that is not well understood? Does it correlate to an application?</p> <p>Significance: Will the research in the area solving complex problems towards the application? Are potential applications important?</p> <p>Potential Impact: If the research is successful, will it open pathways to innovation or further research in addressing specific application problems?</p>

# Proposal Writing..

Process Steps	Track-1 Technology/Product Development	Track-2: Application-Based Research
Preliminary Research	<p>Web and published data research and analysis to establish, need, significance and potential impact.</p> <p>Find general data and statistics about unmet needs, their importance and the volume of potential users.</p>	<p>Web and published data research and analysis to establish, need, significance and potential impact.</p> <p>Find general need and significance about research problem from published research journal and conference papers and web publications.</p> <p>Investigator why the research is important in improving knowledge-base for future research and applications.</p>
Market Survey or Literature Review	<p>Identify user group within your reach.</p> <p>Develop an effect market survey questionnaire.</p> <p>Reach out to user group through effective communication channels or personal distributions to obtain their response.</p> <p>Summarize market survey responses to establish a knowledge-base for your innovation and preliminary specification of the potential product.</p>	<p>Complete study of published papers with respect to approaches, methodologies and results to establish the and understanding of current state-of-the-art knowledge base.</p> <p>Summarize the research findings and how they can build a foundation to your future research.</p>

# Proposal Writing...

Process Steps	Track-1 Technology/Product Development	Track-2: Application-Based Research
Interact with the Real World Experts	<p>Meet with experts in the market or leaders in the user groups to discuss your product idea, innovation and preliminary specifications</p> <p>Summarize their feedback to guide future developments.</p> <p>Obtain any endorsement or comments on enthusiasm for the project if possible.</p>	<p>Meet with leading researchers in the field and your advisor to discuss your research idea and approach.</p> <p>Summarize their feedback to guide future developments.</p> <p>Obtain any endorsement or comments on enthusiasm for the research project if possible.</p>

# (Template for Phase-2 Proposal Presentation)

Title of the Project

Names of Students

Advisor Name

# Title of project

- Problem Statement:
  - What problem are you trying to address through research or product development?
- Significance:
  - Why is the problem important? What is the value proposition to users or society?
- Innovation:
  - What is the innovation or novelty in your approach?

# Phase 1 Report

- Goals
  - List specific goals of Phase 1 proposal and work
- Research Literature Review or Market Research for Potential Impact
  - Discuss results of survey with potential users, or market research
- Accomplishments and Lessons Learned
  - Discuss accomplishments/failures and lessons learned

# Phase 2 Plan

- Specific Goals
  - Describe how Phase 1 experience & lessons learned have changed your Phase 2 goals for further research or development
- Revised Research Plan and Methods
  - Describe the work, research plan and revised specifications of next level prototype
  - Methods and procedures
- Expected Outcomes and Deliverables
  - Deliverables with timeline

# Phase 2 Resources and Budget Needed

- Provide a budget and justification for supplies for Phase 2 research and prototype. (limited to \$3,000)