Below are the MURI summer projects to which IUPUI undergraduate students can apply. Before you contact one or more project mentors to express your interest in a research position make sure that you meet all the eligibility criteria, which include a cumulative GPA of 3.0 or higher and being a fulltime student pursuing your first undergraduate degree at IUPUI.

When emailing the project mentors use the following subject line “Summer MURI project application”. In the text box list your GPA, your major and your year of study (first year, sophomore etc). You may consider attaching your resume to the message.

Note: You can apply for a position on more than one project. However, you will be eligible to work on only one project.

Deadline for application is April 1. However, project mentors may decide to close applications for their respective project prior to that deadline once they have assembled their project team.

1. Angiomotin protein binding and lipid membrane deformation

Angiomotins are a family of adaptor proteins that control cell proliferation and differentiation. The focus of the project is to determine protein features that confer binding specificity leading to morphological changes in lipid structures.

For students majoring in: Chemistry, Biology, Biomedical Engineering, Biotechnology, Bioinformatics

Required skill set: Basic chemistry, molecular biology, physics or engineering laboratory experience. Cell culture experience preferred from biology/chemistry majors.

Contact: Dr. Kimble-Hill (ankimble@iu.edu), Dr. Petrache (hpetrach@iupui.edu)
2. **Tobacco Effect on Mucosal Pathogens**
The objective of this project is to investigate the effects that several tobacco components have on biofilm formation by two bacterial species, *Streptococcus mutans* and *Pseudomonas aeruginosa*.
For students majoring in: biology, chemistry, pre-dent, pre-med
**Required skill set:** Good analytical skills, basic understanding of chemistry and/or biology, persistence and strong attention to detail
**Contact:** Dr. Gregory (rgregory@iu.edu), Dr. Anderson (ga2@iupui.edu)

3. **Effects of loading-interaction on bone failure properties**
The purpose of this project is to study loading interactions in bone with the long-term goal to better understand components of bone fragility and to help design composite materials with enhanced biomimetic properties.
For students majoring in: Biomedical Engineering, Biology
**Required skill set:** None specified
**Contact:** Dr. Wallace (jmwalla@iupui.edu), Dr. Allen (matallen@iupui.edu)

4. **ITrac: Open-Access Learning Center Management System**
The IUPUI Mathematics Assistance Center has developed a web-based, database driven tracking system for student attendance and learning center usage. The objective is to develop a well designed analytics suite that is designed to make quantitative analysis user friendly, easy to operate, and easy to communicate with key stakeholders.
For students majoring in: Media Arts and Sciences, Computer Science, Visual Communications Design, Business Management
**Required skill set:** Front End/Back end programming skills; Front End UI/UX Design Experience; Business/Marketing experience
Applications are closed for this project.

5. **Historical geography of African American placemaking and collective memory in Indianapolis**
This project will use historical research methods and geographic information science to fill gaps in the knowledge base associated with Indianapolis and its cultural landscape of collective memory.
For students majoring in: Disciplines across the Social Sciences and Humanities
**Required skill set:** Interest in history and geography, attention to detail, willingness to learn methodologies of quantitative and qualitative interdisciplinary research used in humanities and social sciences (including archival research and digital cartography)
**Contact:** Dr. Dwyer (odwyer@iupui.edu), Dr. Labode (mlabode@iupui.edu)
6. The Solder to Music Project
The objective is to build, calibrate, test, and apply audio hardware devices in a collaborative learning environment for use in the CLEAR laboratory.

For students majoring in: Electrical Engineering Technology, Electrical Engineering, Music and Arts Technology, Physics

Required skill set: Students must have a background or aptitude for 2 of the following: Music and/or performance, Circuit Theory, Circuit building or hardware design, Recording and music production techniques

Contact: Dr. Bielmeier (dougbiel@iupui.edu), Dr. Cooney (eccooney@iupui.edu)

7. Impact of Augmented Reality in Biomedical Equipment Training
Augmented Reality is the visual composite of a virtual man-made construct superimposed onto the real world. Students will explore two current methodologies to determine the optimal training delivery method.

For students majoring in: Mechanical Engineering Technology, Mechanical Engineering, Biomedical Engineering Technology, Electrical Engineering Technology

Required skill set: Good CAD skill; Ability to understand program structure and methodology; Ability to research the role of medical equipment in patient care; Desire to explore Augmented Reality

Contact: Dr. Yearling (pyearlin@iupui.edu), Dr. Christe (bchrist2@iupui.edu)

8. Interstellar Electrical Propulsion Study by means of Pure Ionic Emission
The project focuses on propulsive systems that allow the operation of a spacecraft once it leaves the earth’s atmosphere. The main research objective is to characterize a propulsive system that has the highest possible specific impulse using the smallest possible flow rate.

For students majoring in: Mechanical Engineering, Electrical and Computer Engineering, Engineering Technology, Chemistry

Required skill set: Basic Fluid Dynamics Knowledge; Basic Circuit Knowledge; Basic Chemistry Knowledge

Contact: Dr. Larriba-Andaluz (clarriba@iupui.edu), Dr. Izadian (aizadian@iupui.edu)

9. Optimal filament fused fabrication of 3D printed components made of recycled mixed shredded plastic
Filament fused fabrication is the most common additive manufacturing technology in desktop 3D printers. The goal of the project is to determine the optimal material and processing parameters that produce reliable and optimal filament and part quality.


Required skill set: Prototyping or machine fabrication experience; Exposure to programming of micro-controllers (Arduino); Basic knowledge in inorganic chemistry; Technical report writing

Contact: Dr. Tovar (tovara@iupui.edu), Dr. Siegel (apsiegel@iupui.edu)
10. **Low-Cost, High-Efficient, Scalable Manufacturing of High Quality Graphene for Energy Applications**

Graphene-based materials show unique properties on electric conductivity and chemical stability and have attracted tremendous attention in energy storage devices. The goal is to develop a novel technology for large-scale manufacture of high quality graphene including the design of a spray drying system.

*For students majoring in:* Mechanical Engineering, Chemistry, Material Science, Physics  
*Required skill set:* Mechanical design and fabrication; basic knowledge of chemistry, physics and/or material science  
*Contact:* Dr. Xie (jianxie@iupui.edu), Dr. Li (lilei@iupui.edu)

11. **Smart City Surveillance Leveraging Vehicle-mounted Sensing Capabilities**

The objective of this proposal is to develop a novel paradigm for smart city surveillance running on vehicles by leveraging the diverse vehicle-mounted sensing capabilities.

*For students majoring in:* Computer information technology, Electrical and Computer Engineering, Computer Science  
*Required skill set:* Computer programming skill, wireless communication and mobile computing knowledge, some ideas on image processing technology would be a plus.  
*Contact:* Dr. Liu (hl45@iupui.edu), Dr. Zou (xkzou@cs.iupui.edu)