

**Illinois Scholars Undergraduate Research (ISUR) Program Research Expo**  
**Tuesday, April 25, 4:00 PM – 6:00 PM**  
**Illini Union Rooms A, B, and C**

The Grainger College of Engineering Illinois Scholars Undergraduate Research (ISUR) Program Research Expo showcases the various science and engineering projects our scholars and their mentors have been working on this year. ISUR is a two-semester, structured, mentored research experience for undergraduate students in science and engineering. Through the learning-by-apprenticeship model, students learn about the research process, develop their research and technical communication skills, and gain experience needed for graduate school acceptance or research in industry.

Under the ISUR umbrella are the following programs: Clare Boothe Luce Research Program, DaRin Butz Foundation Research Program, Semiconductor Research Corporation Undergraduate Research Program (SRC URP), Accelerated Learning and Engineering Research Training (ALERT) Program in Electronic and Cyber Security, and the IBM-Illinois Discovery Accelerator Institute Undergraduate Research Experience (IIDAI URE).

This year, we also have presentations from students in other undergraduate research programs in Grainger Engineering: Promoting Undergraduate Research in Engineering (PURE) and CS Student Ambassadors/Research Scholars (CS STARS).

**Accelerated Learning and Engineering Research Training (ALERT) Program in Electronic and Cyber Security**

*Square Patch Antenna*

**Maximilian Damewood**, Junior, Engineering Physics, ENG

*Next Generation Power Semiconductor: Diamond*

**Victoria Garcia**, Senior, Agricultural and Biological Engineering, ENG

*Machine Learning-Based Anomaly Detection in UUV Swarms*

**Emily Grob**, Senior, Electrical Engineering, ENG

**Nandika Vuyyuri**, Sophomore, Electrical Engineering, ENG

*Use of (Ultra)Wide-bandgap Materials in Power Devices*

**Aleksai Herrera**, Junior, Electrical Engineering, ENG

*Ultrasensitive Temperature-sensing Intelligent Surfaces for Smart Homes*

**Teague Mitchell**, Senior, Computer Engineering, ENG

*Anomaly Detection for Road Traffic Patterns*

**Vivek Thatte**, Junior, Computer Science, ENG

*Autoencoder Based IDS*

**Krishna Vasudev**, Junior, Physics, LAS

## **Clare Boothe Luce Research Scholars**

*Advanced Water Purification Methods: Plasma-Based Treatment Against PFAS*

**Jasmine Dinari**, Senior, Nuclear, Plasma, and Radiological Engineering, ENG

*Rethinking Household Tasks for Elders with Soft Robotics*

**Maya Grant**, Junior, Mechanical Engineering, ENG

*Multiplexed Detection of Protein Sepsis Biomarkers and nCD64 from Whole Blood Samples Utilizing Microfluidic Capture of Hydrogel Beads*

**Victoria Kindratenko**, Senior, Bioengineering, ENG

*Enhancing Bacterial Secretion of Biotherapeutics*

**Alexa Mitka**, Senior, Bioengineering, ENG

*Digital Histopathology to Diagnose Breast Cancer*

**Varshini Muruges**, Sophomore, Bioengineering, ENG

*Design of Polyurethane Actuators for Aortic and Cardiac Sleeve Applications*

**Charmaine Nieves**, Senior, Mechanical Engineering, ENG

## **DaRin Butz Foundation Research Scholars**

*Cache Reconfiguration via Dynamic Mapping Function*

**Julie Lee**, Senior, Computer Engineering, ENG

*Construction and Test of a Reaction Plane Detector to Characterize Heavy Ion Collisions at the ATLAS Experiment at CERN*

**Farah Mohammed Rafee**, Senior, Engineering Physics, ENG

*A Hybrid Plasma - Electrocatalyst Activated Process for the Synthesis of Ammonia from Air and Water*

**Nitika Purohit**, Sophomore, Nuclear, Plasma, and Radiological Engineering, ENG

*Determining the Effects of Estrogen in an Osteoporotic Model Using a Sex-based Approach on Mineralized Collagen Scaffolds*

**Sofia Vargas**, Senior, Materials Science and Engineering, ENG

## **Semiconductor Research Corporation Undergraduate Research Program**

*Effects of Pneumonia Along Animal Specimen using Electron Microscopy and X-ray Scattering*

**Nathan Anderson**, Senior, Materials Science and Engineering, ENG

*Use of (Ultra)Wide-bandgap Materials in Power Devices*

**Aleksai Herrera**, Junior, Electrical Engineering, ENG

*Patterning of Structure, Properties, and Function in Polymeric Materials*  
**Anisha Sharma**, Senior, Materials Science and Engineering, ENG

*Large-Signal Modeling of GaN HEMTs Using Fermi Kinetics and Commercial Hydrodynamics Transport*  
**Ethan White**, Sophomore, Electrical Engineering, ENG

### **ISUR Scholars**

*Measuring the Hydraulic Permeability of Polyacrylamide Hydrogels*  
**AJ Aguero**, Senior, Materials Science and Engineering, ENG

*Optimization of Data Analysis Methods for Optical Transmission Relaxation Testing*  
**Katrina Arsky**, Junior, Materials Science and Engineering, ENG

*Boundary Layer over an Accelerating Wall*  
**Coggan Banerian**, Sophomore, Mechanical Engineering, ENG

*Macrophage Phenotype Modulation in RAW 264.7 Cells Using Anti-Inflammatory Drug Combinations*  
**Milica Barac**, Junior, Bioengineering, ENG

*The Development of R Based Code for the Analysis of Nanostring and Luminex Assays*  
**Jared Buabeng**, Junior, Chemical & Biomolecular Engineering, LAS

*Using Python to Expedite SEM Data Analysis*  
**Patrick Carmichael**, Junior, Materials Science and Engineering, ENG

*Surgical Masks: A Direct Source for Inhalation of Microplastics*  
**Avram Distler**, Senior, Mechanical Engineering, ENG

*Tumor Microenvironment-mediated Patterns of Therapeutic Resistance in 3D Sex-specific Glioblastoma Models*  
**Ela Eames**, Senior, Chemical & Biomolecular Engineering, LAS

*DR-BERT: A Protein Language Model to Annotate Disordered Regions*  
**Malcolm Forsyth**, Junior, Computer Science, ENG

*Developing a 3D-Printed GelMA Model for the Study of Endometriosis Invasion*  
**Sarah Hashim**, Senior, Chemical & Biomolecular Engineering, LAS

*Large-Scale Graph Analytics with In-Storage Computing*  
**Kevin Higgs**, Sophomore, Computer Science, ENG

*The Development and Evaluation of an Accessible Soft Aquatic Robot*  
**Jaylynn Kim**, Sophomore, Mechanical Engineering, ENG

*Neutral  $^{171}\text{Yb}$  Tweezer Array in a Concentric Cavity*  
**Healey Kogan**, Junior, Engineering Physics, ENG

*Intrinsic Signal Imaging*  
**Beulah Lee**, Senior, Computer Engineering, ENG

*Early Detection and Prediction of Facial Expression for Parkinsonism Powered by Few-Shot Learning*  
**Samuel Li**, Senior, Mathematics & Computer Science, LAS

*Imparting Extensibility to Colloidal Inks for Direct-Ink-Writing Printability*  
**Eliza Lovrich**, Senior, Bioengineering, ENG

*Direct-Write 3D Printing of Thermosets with Frontal Polymerization*  
**Andrew Lum**, Sophomore, Material Science and Engineering, ENG

*Characterization of  $\text{Li}^2\text{CuO}^2$  as an Energy Dense Cathode Material in All-solid-state Li-ion Batteries*  
**Dylan Mendez**, Junior, Materials Science and Engineering, ENG

*The Role of the Prefrontal Cortex and Hippocampus on Working Memory*  
**Eric Modesitt**, Sophomore, Computer Science, ENG

*Measuring the Hydraulic Permeability of Physically Crosslinked Hydrogels*  
**Maritza Murillo**, Senior, Materials Science and Engineering, ENG

*Modeling of Radical-Scavenger Reaction and Diffusion within the Plasma-Liquid Interface*  
**Sean Peyres**, Senior, Nuclear, Plasma, and Radiological Engineering, ENG

*Investigating the Influence of Initial MSC Inflammatory State and Macrophage Polarization in a 3D Co-culture Platform*  
**Maxwell Polanek**, Senior, Chemical & Biomolecular Engineering, LAS

*Impact of Task Diversity on the Performance of Meta-Learning and Supervised Learning*  
**Patrick Yu**, Junior, Computer Science, ENG

### **IBM-Illinois Discovery Accelerator Institute URE Scholars**

*Optimization Methods in Quantum Information Systems*  
**Hani Al Majed**, Senior, Electrical Engineering, ENG  
**Palak Kotwani**, Sophomore, Computer Science, ENG

*Does ChatGPT Warrant the Truth?*  
**Nishant Balepur**, Senior, Computer Science, ENG

*Multilevel Coherence and Manipulation of Transmon Qubits*  
**César Díaz Blanco**, Senior, Computer Engineering, ENG  
**Sean Ramirez**, Junior, Computer Engineering, ENG

*An AI-based Framework for Accelerated Discovery of Climate Impacts on Different Societal Sectors*  
**Brandon Dinh**, Junior, Computer Science, ENG  
**Jiayin Meng**, Junior, Computer Science, ENG

*Serverless Application Paradigm Classification*  
**Jieshu Huang**, Senior, Computer Science, ENG

*Using Distributed Learning to Scale Deep Neural Networks with Ray and HAL*  
**Arnav Mehta**, Sophomore, Computer Engineering, ENG

*CodeFlare Enabling Scientific Multicloud Workflows*  
**Minh Phan**, Junior, Computer Science, ENG

*Quantum Simulation and Error Mitigation of the XXX Heisenberg Hamiltonian*  
**Pedro Prado**, Junior, Engineering Physics, ENG  
**Sara Alabbadi**, Junior, Electrical Engineering, ENG

*Using Distributed Learning to Scale Deep Neural Networks with Ray and HAL*  
**William Tegge**, Junior, Computer Engineering, ENG

### **CS Student Ambassadors/Research Scholars (CS STARS)**

*Advising People on Future Career Options Based on a Soft Skills Survey*  
**Anushka Kansal**, Sophomore, Computer Science, ENG

*Security & Privacy in Teen Dramas*  
**Efthalia Karas**, Junior, Mathematics & Computer Science, LAS

*Dynamic NeRF (Neural Radiance Field)*  
**Rachael Wei**, Junior, Computer Science, ENG

### **Promoting Undergraduate Research in Engineering (PURE)**

*Plastic-consuming Bacteria*  
**Taige Chen**, Freshman, Physics, ENG  
**Fay Lin**, Sophomore, Computer Science and Chemistry, LAS  
**Neha Musunuri**, Freshman, Bioengineering, ENG  
**Keenan Peris**, Freshman, Physics, ENG

*Distribution of Air Voids Influence on Asphalt Specimens' Cracking Properties*  
**Rohit Choudhary**, Freshman, Engineering Mechanics, ENG

*Healthy Indulgence: The Presence of Antioxidants, Polyphenols, and Acidity in Chocolate*  
**Ahmar Khan**, Sophomore, Molecular and Cellular Biology, LAS

*Performance Coefficient Analysis of Aerodynamic Automobiles*  
**Meera Patel**, Freshman, Mechanical Engineering, ENG

*Cacao Beans Data Analysis*  
**Weiqi Zhang**, Junior, Mathematics and Computer Science, LAS  
**Runlin Zheng**, Junior, Statistics, LAS