WHAT IS THE RESEARCHERS INITIATIVE?

Established in 2007, the Researchers Initiative (RI) introduces undergraduate students residing in the four Urbana South living-learning communities to research by pairing them with faculty mentors. These communities include Global Crossroads, Health Professions, Intersections, and Women in Math, Science, and Engineering.

GUIDING PRINCIPLES

The RI provides information and access to research opportunities for a diverse group of students early in their college careers. It is also designed as a retention tool as sophomores are given priority. Finally, the RI can serve to deepen the students’ involvement in their own disciplines or expose them to research topics and practices outside of their disciplines.

Goals

When students are accepted into the RI, they work with faculty members on various projects broadly related to the theme of their specific living-learning community or to their majors. Faculty members mentor students, act as role models, prepare them for graduate school, teach them technical skills, and help them develop theoretical frameworks to create research questions and to interpret data. They also acquaint students with the process of research as a whole. The idea is for students to continue working in the faculty members’ labs beyond the one semester afforded by the RI.

LIVING-LEARNING COMMUNITIES

Living-learning communities are organized around themes and provide curricular and co-curricular programming for a designated group of students living in proximity to each other. Such communities are designed to foster students’ shared sense of purpose related to the themes of their communities, which, in turn, sustains their sense of belonging and academic persistence. The RI extends the notion of community to include a community of researchers.

TO APPLY

FACULTY MEMBERS
APPLICATION AVAILABLE AUGUST 1, 2019
GO.ILLINOIS.EDU/RI_FACULTY_AP

STUDENTS
APPLICATION AVAILABLE OCTOBER 9, 2019
GO.ILLINOIS.EDU/RI_STUDENT_AP
The 2019 Researchers Initiative (RI) saw a class of 87 students, the largest to date. The majority had not done research before, and they were excited and committed to staying on top of their work. Thirty-one faculty members participated and 18 were new to the RI.

Students presented their work at the Researchers Initiative Poster Symposium on April 28. The vast majority of them appreciated seeing the breadth of research their peers had done. Doing so widened their understanding of what research is. They also enjoyed engaging with their peers, faculty members, graduate students, and guests about their work.

Dr. Matthew Gilbert, professor of history and the director of American Indian Studies Program shared his wisdom about finding your path as a researcher through thoughtful persistence and openness to challenge. Junior Alisa Hastie, who is majoring in civil and environmental engineering, offered her insights regarding on-going research experience. As a first-year student, Alisa started in the RI with Dr. Ashlynn Stillwell, civil and environmental engineering. By the time Alisa graduates, she will have three and a half years of research experience and authorship on a published paper.

This year, the RI secured two grants to expand the initiative. The Office of Undergraduate Research’s Development Grant supported the work of the RI graduate assistant. University Housing’s Coke Funds supported students from the Florida and Pennsylvania Residence Halls who were not part of the living-learning communities.

Lastly, after 15 years with University Housing and seeing the RI grow so much, I will be stepping down from my position in University Housing. I have enjoyed working with so many talented and enthusiastic students and faculty members. In August 2019, I will return to my psychology roots, as it were, to join the Division of Counseling Psychology, Department of Educational Psychology, as associate clinical faculty.

—Lydia Khuri, Psy.D.

“I THOUGHT RESEARCHERS WOULD ALREADY KNOW WHAT THEY ARE DOING. THEY DO HAVE MORE KNOWLEDGE [THAN STUDENTS] BUT THEY ARE LEARNING ALONG THE WAY, TOO.” - MIN CHEONG KIM, PHILOSOPHY, WIMSE

2018–2019 RESEARCHERS INITIATIVE STUDENT PARTICIPANTS
Global Crossroads (2000)
Global Crossroads, located in the Pennsylvania Avenue Residence Halls (PAR), is designed to challenge and motivate students whose interests, experiences, and aspirations have a strong international component. Both academic and co-curricular programs support the students’ sustained engagement across cultural differences. The community of 120 students has about equal numbers of international and domestic students. Just over 50 percent of the students have majors in the College of Liberal Arts and Sciences, followed by 22 percent from Engineering. Another five percent each come from the Gies College of Business, Fine and Applied Arts, and Agricultural, Consumer and Environmental Sciences (ACES).

“RESEARCH TAKES A LOT OF INITIATIVE. YOU DON’T KNOW THE ANSWER AHEAD OF TIME. THERE ARE NO NOTES TO HELP GUIDE YOU TOWARD WHAT THE ANSWER IS.” -Keith Briones, Civil & Environmental Engineering, Pennsylvania Avenue Residence Halls

Health Professions (2007)
Health Professions brings together undergraduate students who are preparing for careers in the health fields. It provides relevant academic courses and support, career development opportunities, and skill-building programs for students to consider working with underserved populations. Health Professions houses approximately 110 students and is located on two floors of Oglesby Hall in the Florida Avenue Residence Halls (FAR). 67 percent come from the College of Liberal Arts and Sciences, with biology and chemistry most heavily represented. 10 percent of the students come from Applied Health Sciences. There are also students with majors in the College of Agricultural, Consumer and Environmental Sciences (ACES), as well as Engineering and other colleges.

Intersections (2004)
Intersections introduces undergraduate students to diversity issues in the United States through the experience of living in a multicultural community and opportunities for academic engagement. Its purpose is to foster interpersonal and intellectual skills and knowledge to live and work in a multicultural society. Intersections houses approximately 110 students and is located in the Pennsylvania Avenue Residence Halls (PAR). Since its inception, over half of the students have come from the College of Liberal Arts and Sciences, while about 20 percent come from Engineering. Another seven percent come from the Gies College of Business and five percent from the College of Agricultural, Consumer and Environmental Sciences (ACES).

Women in Math, Science, and Engineering (1996)
Women in Math, Science, and Engineering (WIMSE) is designed to foster community among women who major in traditionally male-dominated fields of study. Research shows that women benefit from a supportive network of fellow students who share similar academic interests. Academic courses and support, along with social programs, provide 135 women majoring in mathematics, science, and engineering with the resources to build a positive foundation for a future career. Nearly 50 percent of the women are enrolled in the College of Liberal Arts and Sciences, while about 40 percent are from Engineering. WIMSE occupies three floors of Trelease Hall, located in the Florida Avenue Residence Halls (FAR).
The Researchers Initiative is administered by the program director for the Urbana South living-learning communities.

Who can apply?
Students residing in the Urbana South living-learning communities are eligible to apply. Any faculty member of the University who can supervise undergraduate students in research endeavors may participate.

How to apply?
The student application form is available in the fall. Students rank and provide explanations as to why they wish to work with particular faculty members. The faculty information form is available in the summer.

How are students and faculty matched?
In mid-fall, the program director reviews applications and matches students with faculty members based on these factors:

- Clarity and cogency of students’ responses
- Students’ ability to meet faculty requirements regarding meeting times, etc.
- Giving as many students as possible their top choices
- Priority to sophomores
- Relative balance of number of students from each of the four communities
- Faculty preferences for particular students

After students and faculty members are notified of their matches, students are required to meet in person with the faculty member. Faculty members have the final say in whether or not they will accept a particular student in their labs.

How many hours can students work?
Students can work up to 75 hours for the semester, which averages about five hours a week, but must work a minimum of 35 hours. How the hours are broken down depends on the faculty member’s needs and the student’s schedule.

How are students compensated?
Students can work for pay or for independent study credit. They cannot do both. In either case, they must be enrolled in courses for the spring semester. The processing to get on the Housing Payroll is done with the program director and the Payroll Office. Students wishing to get credit must work that out with the faculty member.

How is the initiative funded?
Funds come from the Urbana South living-learning communities programming fees and a non-discretionary fund from the Provost’s Office to support co-curricular learning.
Students and Faculty Involvement

**Student Participation**

*Students must:*

- Apply and be accepted to participate in the Research Initiative.
- Rank their preferences for the faculty members with whom they wish to work.
- Confirm with the program director that they have met with their preferred faculty member.
- Provide proper documentation for the I-9 form if desiring to work for pay.
- Attend the orientation to RI research, attend workshops on interpersonal safety in a research setting and how to make a research poster, and meet with the Writer’s Workshop when working on research poster.
- Attend two check-in meetings with LLC program staff.
- Participate in the Researcher Initiative Poster Symposium on Sunday, April 26, 2020, at 4 p.m., to present poster of their work.
- Participate in an exit interview with the program director at the end of the semester.
- Meet faculty members’ expectations for attendance at meetings/events, work hours, and quality of work.
- Work at least 35 but no more than 75 hours.

**Faculty Participation**

*Faculty members are asked to commit to the following:*

- Fill out one-page faculty interest form.
- Review student applications.
- Confirm in fall semester that you and the student have met in person and agreed to work together.
- Engage in consistent in-person contact with the student such as one-on-one or research team meetings.
- Explain to student if a graduate student is primary mentor.
- Give clear expectations regarding type and quality of work.
- Provide verbal feedback to student on quality of student’s work.
- If comfortable, share more personal stories related to own academic and career path.
- Suggest events on campus that would augment the student’s learning.
- Review and approve student research poster before program director prints.
- Attend RI Poster Symposium on Sunday, April 26, 2020 at 4 p.m.

**Assessment**

Students meet one-on-one with the program staff throughout the spring to discuss their progress, create and present a research poster to demonstrate what they have learned, and participate in an exit interview at the end of the semester. Faculty provide end of year feedback via online form or individual interview.

“[THE RI] DEFINITELY GOT ME THE JOB; THEY SAID, ‘TELL ME ABOUT YOUR RESEARCH!’” - Carolyn Simon, Mechanical Engineering, WIMSE
Student Outcomes

To date, a diverse group of 336 students have completed the Researchers Initiative.

In 2019, 87 students completed the Researchers Initiative.

In 2019, 87 students completed the Researchers Initiative.
Dr. Robin Jarrett, *Professor Emeritus*

**Human Development and Family Studies, African American Studies**

Dr. Jarrett, who retired this spring, was a steadfast mentor to nearly 30 RI students over the last 10 years. She introduced them to the “nuts and bolts” of research as they helped with the immense amount of data related to her ongoing studies on nutrition and school readiness of African American and Latino students from low-income families. She was also invested in teaching them “soft skills,” which are the interpersonal and professional aspects of being researchers and beyond.

Dr. Jarrett was devoted to her research, to the communities who were the focus of her research, and to mentoring students. She ran her research group with great efficiency and interpersonal care. Every RI student who worked with her commented that they felt that they and their work mattered.

Stafania Alcantar, a freshman majoring in human development and family studies who worked in Dr. Jarrett’s lab this past spring said, “I always looked forward to being in the lab. I most enjoyed working with the group. Working in Dr. Jarrett’s Lab was definitely a very positive experience, and I have learned a lot from working with her.”

Vinisha Doshi, who worked with Dr. Jarrett in 2017, and went on to nursing school, had this to say: “I was honored to be placed in Dr. Jarrett’s lab my sophomore year of college. She is so inspiring and motivated me to be a better person. Dr. Jarrett always held so much knowledge and had the best advice about the future. My experience in her lab was incredible and a completely different experience from my other research labs. She made each and every research assistant feel so special.”

Kaitlyn Pugh spent three semesters with Dr. Jarrett starting in 2016. “When I met Dr. Jarrett as a freshman, I didn’t expect that in just one short semester, I would be appointed as lab manager for the next three semesters. Not only did I gain wonderful research experience with her, but I gained a valuable resource, in both academia and life. She trusted me with some big projects and tasks during my time in her lab; all of which taught me skills I’m still implementing. Dr. Jarrett has become my favorite mentor and I will dearly miss our Friday morning meetings over coffee and tea.”

Alex Horton reflected on his time in Dr. Jarrett’s lab, starting in 2012, as “life changing.” “My experience in her ethnographic research lab then, and later as a McNair scholar, was foundational to the development as an African American scholar. Her work with African American families communicated clearly to me the importance of academia to our community as identifying issues our people face and creating empirically sound solutions for them, which is often most easily done by asking those on the ground doing the hardworking every day. Although my academic interests have shifted from the ethnographic aspects of sociology to social history, my desire to make easily replicable programs about African American history stems from my work in her lab around creating programs for healthy family habits and fitness. Some languish away crafting abstract theories and concepts that have no utility outside of the Ivory Tower. Dr. Jarrett works to find real ways everyday people can lead a fuller life for themselves, their families, and their communities. In doing so, she has cemented her legacy as one in a long line of great African American scholars. The chasm left by her retirement will not be easily filled.”

“[THE BEST THING ABOUT THE RI] WAS BEING CONNECTED TO A PROFESSOR ON A PERSONAL LEVEL.” - Fernando Licea, Architectural Studies, Intersections
Many faculty mentors provided feedback on the Researchers Initiative.

• Working with undergraduate students is the right thing to do in terms of the university’s mission as a Research 1 institution.

• All faculty were motivated to participate based on the central principle that it is important to support students from underrepresented groups.

• Faculty believe that students learn important skills by participating in research that they would not otherwise learn.

Some faculty noted that they appreciated different aspects of the RI process such as,

• being able to review and choose student applicants within and beyond their own disciplines,

• having some of the administrative burden lifted off of them,

• having a system of accountability in place by way of the required student poster and check-in meetings with RI staff,

• and receiving weekly program director emails communicating tasks and events and synopses of ongoing assessment.

Faculty mentors also made suggestions to improve the RI. Improvements for next year include the following:

• Prompting faculty mentors to have background material prepared for students to review and summarize the first week, such as three to five papers and/or technical tutorials.

• Breaking down the poster into steps for review before proceeding onto next portion. Students also suggested this change.

• Having students write their poster introduction and working with the Writer’s Workshop to address writing concerns.

“RESEARCH ISN’T JUST STRAIGHT-UP BENCH WORK. IT CAN TAKE ON LOTS OF DIFFERENT FORMS. AT TIMES, IT WILL BE MESSY AND FRUSTRATING. AT OTHER TIMES, IT WILL BE GREAT.” - Brittney Naolhu, Biology, WIMSE

“I LEARNED A LOT FROM BEING IN THE RI, STUFF NOT COVERED IN HIGH SCHOOL BIOLOGY OR EVEN MCB 150!” - James Lopez, Biology, Florida Avenue Residence Halls

“This was my first time in a research setting. [The graduate student] gave me insightful advice about going on in research.” - Shelby Grant, undeclared, Global Crossroads
Faculty Mentors, Projects, and Students

**PROFESSOR AARON BENJAMIN, PSYCHOLOGY, BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY**
Oscar Garcia, Accounting » Cognitive Offloading and its Effects on Creativity

**PROFESSOR KATHERINE CLANCY, ANTHROPOLOGY**
Saumya Agrawali, Statistics and Computer Science » Correlation of Identity Scales on Polish/Polish-American Women
Ifeoluwa Atunmise, Biology » The Relationships Between Racial Microaggressions and Workplace Incivilities
Reilly Durham, Anthropology » Effects of Smoking on Cortisol Levels
Fatimata Soumare, Molecular and Cellular Biology » Social Support and Perceived Stress in Women of Color Scientists

**PROFESSOR ALISON DUNN, MECHANICAL SCIENCE AND ENGINEERING**
Helen Jo, Mechanical Engineering; Sukrit Patwardhan, Engineering Physics; David Xu, Music Technology » Do Hydrogels Dehydrate at the Same Rate as Water?

**PROFESSOR MARY EDWARDS, URBAN AND REGIONAL PLANNING**
Fernando Licea, Architectural Studies » Analyzing Cities Readiness for Aging in Place

**PROFESSOR AHMED ELBANNA, CIVIL AND ENVIRONMENTAL ENGINEERING**
Keith Briones, Civil and Environmental Engineering » Network Models for Trabecular Bone Characterization
Yankai Li, Mathematics and Computer Science » Earthquake Prediction with Hybrid Deep Neural Network

**PROFESSOR RANDY EWOLDT, MECHANICAL SCIENCE AND ENGINEERING**
Haley Middendorf, Mechanical Engineering; Yaashnaa Singhal, Physics » Fluid Impact on Hydrophobic and Heated Surfaces

**PROFESSOR MARY FLAHERTY, SPEECH AND HEARING SCIENCE**
Kelsey Libert, Speech and Hearing Science; Kelin Mendoza, Speech and Hearing Science » Children’s ability to benefit from a mismatch in voice intonation patterns

**PROFESSOR MATTHEW GILBERT, HISTORY, AMERICAN INDIAN STUDIES**
Lana Fitzgerald, Anthropology; Adriana Nava-Villanueva, English » Is the Existence of Chief Illiniwek Racist?

**PROFESSOR MANUEL HERNANDEZ, KINESIOLOGY & COMMUNITY HEALTH**
Apurva Sanagavarapu, Computer Engineering; Carolyn Simon, Mechanical Engineering » Coding and Calibration with Kinesiology
Sanjana Sastry, Electrical Engineering » Oscillating Ankle Model for Parkinson’s Disease

**PROFESSOR CARLA HUNTER, PSYCHOLOGY**
Johnnysha Shannon, Psychology » Religious Involvement Among African Americans and Caribbean Blacks

**PROFESSOR FATIMA HUSAIN, BECKMAN INSTITUTE FOR ADVANCED SCIENCE AND TECHNOLOGY, SPEECH AND HEARING SCIENCE**
Rosa Lin, Statistics; Jade Roberts, Computer Science and Linguistics » Tinnitus: Can You Hear That?

**PROFESSOR ROBIN JARRETT, HUMAN DEVELOPMENT & FAMILY STUDIES, AFRICAN AMERICAN STUDIES**
Stefania Alcantar, Human Development & Family Studies; Stephanie Garcia, Human Development & Family Studies; Lizette Mendoza-Hernandez, Political Science & Global Studies; Armando Miranda, Global Studies & Latino/a Studies » Defining School Readiness in Latinx and Black Families: From Pre-K to Kindergarten

**PROFESSOR MARIANA KERSH, MECHANICAL SCIENCE AND ENGINEERING**
Shreyas Chandrashekaran, Computer Science » Quantifying the Effects of Rotator Cuff Tears on Glenohumeral Capsule Strain
Clara Duarte, Biology » Strain Due to Structure and Density: Is Bigger Better?
Aisha Kamran, Bioengineering » Changes in structure and loading conditions of the equine third metacarpal bone during growth
2019

Projects, Students, & Faculty Mentors

PROFESSOR FRANKLIN LOMBARDO, CIVIL AND ENVIRONMENTAL ENGINEERING
Nafiz Rahman, Civil and Environmental Engineering » The Use of Social Media on Assessing Tornado Damage

PROFESSOR RACHEL MAGEE, SCHOOL OF INFORMATION SCIENCES
Nataly Meza, Social Work; Jose Ramo, Undeclared » Young Researchers Project

PROFESSOR JAMES MILLER, NATURAL RESOURCES AND ENVIRONMENTAL SCIENCES
Soumithri Karra, Industrial Engineering; Tejas Polakam, Statistics and Computer Science; Amodh Vyas, Mathematics & Computer Science » Modelling and Studying the Spread of Lyme Disease using Python

Brenna Kelly, Systems of Engineering and Design; Kai Oliver, Urban and Regional Planning » Pollinator Gardens from the County to Chicago: Just a trend or a Valuable Conservation Effort?

PROFESSOR JOHN POLK, ANTHROPOLOGY, KINESIOLOGY AND COMMUNITY HEALTH
Stephanie Mireles, Bioengineering » Influences of Body Size on Horse Kinematics and Bone Strength

PROFESSOR LAURA RICE, KINESIOLOGY & COMMUNITY HEALTH
Tiffany Payne, Undeclared » Fall Prevention Among Wheelchair Users Living with Multiple Sclerosis: A Pilot Study

PROFESSOR WENDY ROGERS, KINESIOLOGY AND COMMUNITY HEALTH
Leonardo Galoso, Mechanical Science and Engineering » Informing Older Adults About Smart Technology: Designing a Usable Consumer Guide & Website

Luqi Zhao, Community Health » Social Engagement Through Video Chat for Old Individuals With and Without Cognitive Impairment

PROFESSOR JODI SCHNEIDER, SCHOOL OF INFORMATION SCIENCE
Yi Shian Ho, Economics; Min Cheong Km, Philosophy and Psychology; Nitish Natarajan, Statistics and Computer Science » Analyzing Data Visualization Tools for Effectiveness of Network Analysis

PROFESSOR SHARDÉ SMITH, HUMAN DEVELOPMENT & FAMILY STUDIES, AFRICAN AMERICAN STUDIES
Tamia Miller, English; Jessica Osemwengie, Political Science » African American Families Combating Race-Related Stress

PROFESSOR ASHLYNN STILLWELL, CIVIL AND ENVIRONMENTAL ENGINEERING
Helen Sun, Civil and Environmental Engineering » Determining the State of China’s Energy-for-Water Research

PROFESSOR JONATHAN SWEEDLER, CHEMISTRY
Andrew Feng, Undeclared; Meemie Hwang, Biochemistry » Visualizing Microbial Signaling with Mass Spectrometry Imaging

Larry Lau, Biochemistry » Single Neuron Stable Isotope Labeling with Amino Acids in Culture

Madeline Melzer, Biochemistry » Investigating Neuropeptide Diffusion from Aplysia Californica neurons Using MALDI-MS

Carolyn Oh, Biochemistry » Single Cell Analysis of Aplysia Neurons Using Capillary Electrophoresis-Mass Spectrometry

PROFESSOR RACHEL SWITZKY, SIEBEL CENTER FOR DESIGN
Kenna Ducoff, Psychology; Julian Herrera, Mechanical Engineering; Athena Lai, Industrial Design » Research Initiative

PROFESSOR RAFAEL TINOCO, CIVIL AND ENVIRONMENTAL ENGINEERING
Ashley Dominick, Physics; Anna States, Civil and Environmental Engineering; » The Effect of Aquatic Vegetation on Temperature Variant River Flows

PROFESSOR SEVER TIPEI, MUSIC
Vivek Bhatt, Pre-Engineering; Xavier Higgins, Computer Science & Economics » DISSCO - Combining Music and CS to
2019 Projects, Students, & Faculty Mentors

Create Magic

**PROFESSOR HUY TRAN, AEROSPACE ENGINEERING**

Aryaman Jain, Computer Science; Jonathan Xue, Computer Science » Social Sensing

Daman Mulye, Computer Science; Atharva Sehgal, Computer Science » Predicting Weather Related Flight Delays using Data-Driven ML Algorithms

Daniel Yang, Aerospace Engineering » Reinforcement Learning Based Multi-Agent Exploration

**PROFESSOR RACHEL WHITAKER, MICROBIOLOGY**

Desiree Devero, Biology » Antibiotic Resistance in Bacteria

**PROFESSOR BRENDA WILSON, MICROBIOLOGY**

Logan Callaci, Biology » Amplification and Cloning of eptA to Test its Virulence Properties

Jiahao Cen, Biochemistry; Katherine Kim, Biology; James Lopez, Biology; Britney Naolhu, Biology; Jessica Tiggelaar, Biology » Analysis of O-antigens and H-antigens on Escherichia coli Sequence Types

**PROFESSOR LILIANE WINDSOR, SOCIAL WORK**

Amalia Loiseau, Psychology; Mau Mwachande, Global Studies; Rina Ravisundar, Political Science and German » Community-Based Participatory Research: Valuable and Versatile

Rashmi Ghonasgi, Psychology; Joyce Park, Social Work; Madisyn Welsh, Social Work » Community Wise: Evaluating Treatment Fidelity

**PROFESSOR YANG ZHANG, NUCLEAR, PLASMA, RADIOLOGICAL ENGINEERING**

Breanna Chan, Mechanical Engineering; Davin Clark, Electrical Engineering; Sophia Jonas, Mechanical Engineering; Alexander Littlefield, Electrical Engineering; Megan Shapland, Electrical Engineering; Frederick Zhang, Computer Engineering » Investigating Soft Robots: Production and Application

“I LIKED THE MENTORING ASPECT OF [THE RI], GETTING TO KNOW A PROFESSOR AND HELPING THEM ACCOMPLISH THEIR RESEARCH. BEING IN THE LAB WAS AMAZING.” - Kelsey Libert, Speech and Hearing Science, WIMSE

“I LIKED [THE RI] A LOT. ONE, THIS PROJECT HAD AN END GOAL. TWO, I GOT TO WORK ON APPLIED RESEARCH. AND, THREE, IT WAS A VERY GOOD FIRST STEP.” - Soumithri Karra, Industrial Engineering, Florida Avenue Residence Halls
The Researchers Initiative Poster Symposium is part of Illinois’ Undergraduate Research Week. At the end of April, students present posters of their work that address the nature and goals of their project, the specific tasks completed, and results and conclusions that they were able to draw. Students are also asked to reflect upon what they learned and what value their research may have for the wider society. The Symposium includes a faculty speaker and a brief presentation by a student who previously completed the Researchers Initiative and continued with research.

Faculty members and graduate students are invited to attend the Symposium; their presence is deeply encouraging and meaningful to the students as they introduce their work in a public forum, perhaps for the first time. It also helps students develop a sense of a “researchers’ community.” The Symposium celebrates the students’ accomplishments and they receive a certificate of completion for the Researchers Initiative.

INTRODUCTION
Earthquakes are the shaking of the surface of earth. They are the sudden release of energy in the Earth resulting from internal geologic processes which cause the ground to vibrate. Earthquakes are the result of movements along pre-existing fault systems. Earthquakes are also a result of sudden compression of rock by external loads or external forces. This compression may cause the rock to fracture and release energy. The sudden release of energy results in movement of rock mass and creates seismic waves which travel outward from the point of fracture.

METHOD
The one-dimensional spring-block-slider system is developed from the principles of dynamics, which describes the laws of motion. The system is shown in Figure 1. The system is composed of n blocks, each with a mass mi and a spring with a spring constant ki. The system is subject to a constant force F applied to the first block. The blocks are connected by springs, representing the stiffness of the rock mass. The ground motion is modeled as a time-varying force, which represents the ground acceleration. The system is modeled as a discrete-time system, where the state vector x(t) at time t consists of the positions and velocities of all the blocks in the system. The state vector is defined as:

\[ x(t) = [x_1(t), x_2(t), ..., x_n(t), v_1(t), v_2(t), ..., v_n(t)] \]

where xi(t) and vi(t) are the position and velocity of the ith block, respectively. The model is defined by the following set of differential equations:

\[ \frac{d^2x_i}{dt^2} = \frac{F - k_i(x_{i+1} - x_i) - k_i(x_i - x_{i-1})}{m_i} \]

RESULTS
The hybrid deep neural network is a successful approach to model the earthquake data. The network is able to accurately predict the magnitude of the next earthquake. The results show that the network is able to predict the magnitude with an accuracy of 95%. The network is also able to predict the location of the earthquake with an accuracy of 80%.

CONCLUSION
The hybrid deep neural network is a powerful tool for predicting earthquakes. The network is able to accurately predict the magnitude and location of the next earthquake. The results show that the network is able to predict the magnitude with an accuracy of 95% and the location with an accuracy of 80%. The network is also able to predict the earthquake with a lead time of 1 hour.

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EARTHQUAKE PREDICTION WITH HYBRID DEEP NEURAL NETWORK
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DISSCO - Combining Music and CS to Create Magic
Vivek Bhatt, Xavier Higgins
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