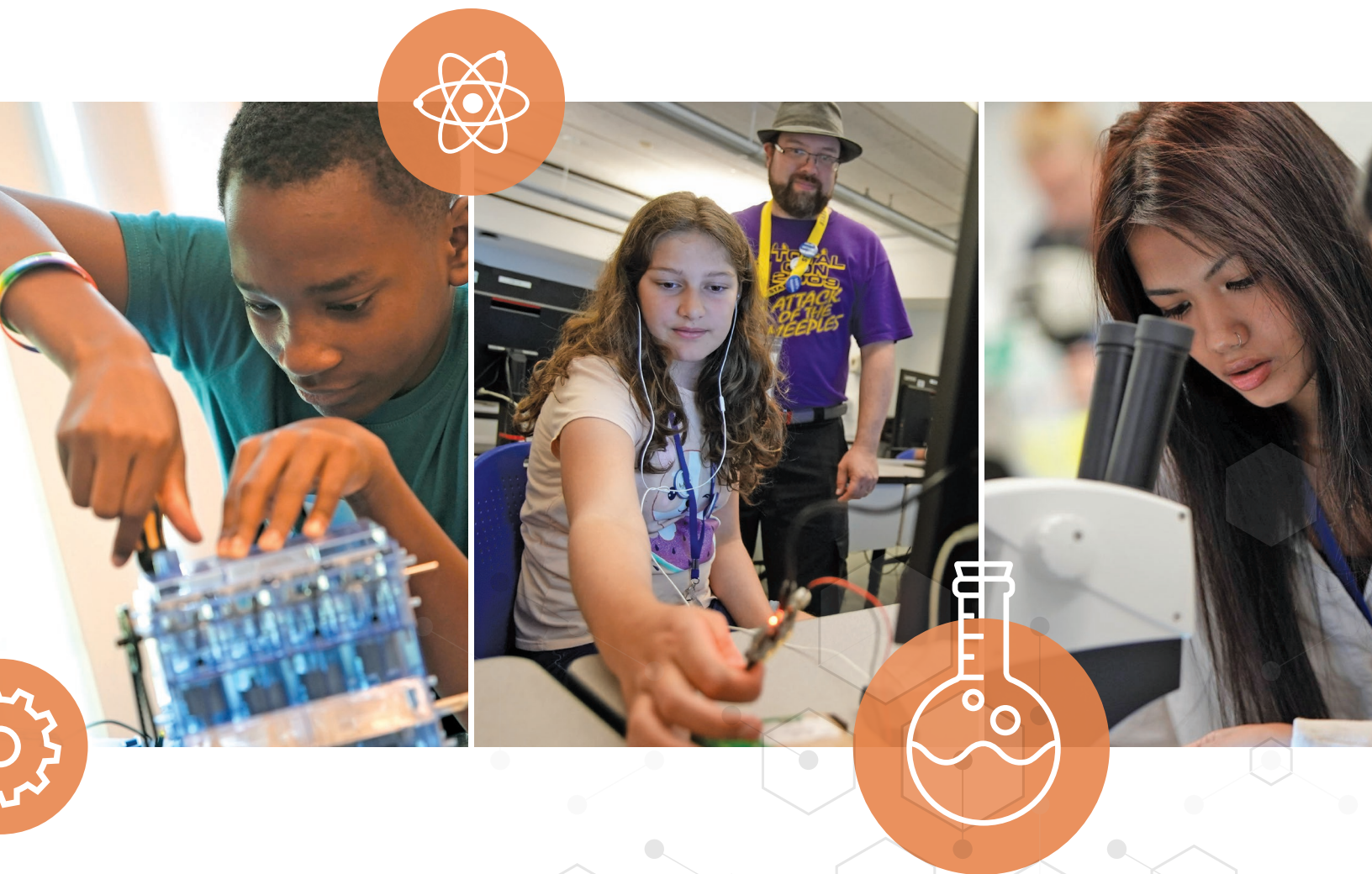


## 2022 Annual Report



INSPIRING **CREATIVITY** AND INNOVATION  
EXPANDING ACCESS AND **DIVERSITY**  
BUILDING **NEW PATHWAYS** TO SUCCESS



UNH Tech Camp was founded in 2007 to inspire middle and high school students through collaborative, hands-on activities that bring science, technology, engineering and mathematics to life.

Offered through the College of Engineering and Physical Sciences, Tech Camp covers a wide range of subject areas—from robotics and regenerative medicine to virtual reality and forensic science—that are explored through a dynamic, project-based curriculum. The emphasis is on problem solving, creative thinking and having fun.

Since its beginning, Tech Camp has fostered a diverse and inclusive community with a goal to make STEM education available to all curious learners regardless of skill level or experience.

# UNH TECH CAMP

## Dear Friends,



This summer marked the first session of Tech Camp held in-person on the UNH Durham campus since the pandemic started and it felt great to be back home! The collective energy and enthusiasm of our students, faculty and staff made for a lively learning environment that was a joy to behold.

In total, we ran 16 projects over the course of three weeks with 180 student participants. Most of our campers were from New England, but we also had a number from farther afield, including students from Spain and South Africa. The vast majority of our campers stayed on campus in Fairchild Hall during their program, building new friendships outside the classroom.

Being back on campus also gave us the opportunity to expand two programs that we launched last summer. The first, NH CREATES, is part of a broader workforce development initiative at UNH focused on regenerative medicine and biotechnology that is funded by a grant from the National Institutes of Health. This summer, we held six projects focused on such innovative topics as 3D bioprinting, molecular visualization and cryopreservation.

The second program we expanded was the Dinah Whipple STEAM Academy, which explores pre-engineering principles and the Black experience with a goal to create new career pathways for students of color who are traditionally underrepresented in STEM-related fields. Building on the success of last year's program, a second session of Dinah Whipple was added this summer.

Our two-week Tech for Teachers Institute was also a big success. Nine teachers participated in this professional development program, which was focused on designing curriculum around biotechnology. These teachers will all receive ongoing support from our team as they roll out their ideas in the classroom.

This year's summer session ended on several high notes. On July 29, New Hampshire senator Jeanne Shaheen stopped by to learn more about our NH CREATES initiative and engage with students and teachers. We also had two senior executives from the Advanced Regenerative Manufacturing Institute visit our BioTrek program and several school superintendents and principals drop by the Tech for Teachers Institute. Tech Camp and NH CREATES were also the subject of a lengthy cover story in NH Business Review.

Finally, I want to extend a special thank you to our sponsors and donors who made it possible for us to offer many programs at no cost this year and helped offset the expense of all others. We are grateful for their ongoing dedication to making STEM education available to all who are interested!

Sincerely,

*Carmela Amato-Wierda*

Carmela Amato-Wierda, Ph.D.  
Associate Professor of Materials Science  
Director of UNH Tech Camp



On July 29, Senator Jeanne Shaheen stopped by Tech Camp to learn more about the NH CREATES workforce development initiative, tour the labs and engage with students and faculty.

# A Dynamic, High-energy Learning Environment for Grades 5-12



As is always the case at Tech Camp, all programs were taught in a project-based learning format with students engaging in a variety hands-on activities, interactive demonstrations and lab experiments. Studies have shown that active learning of this kind leads to enhanced critical thinking and problem-solving skills. At the end of each session, a showcase was held, giving students the opportunity to share their individual projects with parents, family and friends.

Support for Tech Camp was provided in part by the Federal Highway Administration and the New Hampshire Department of Transportation. For the past eight years, Tech Camp has served as a host for the National Summer Transportation Institute (NSTI), a program focused on raising awareness around civil engineering and transportation-related career opportunities. A grant from the Essex County Community Foundation through its Greater Lawrence Summer Fund also provided financial support for students attending from the Lawrence Family Development Charter School.



This summer, all Tech Camp programs were held in person on the Durham campus for the first time in two years giving students the opportunity to connect and collaborate in ways that weren't possible online during the pandemic. Being on the UNH campus also meant that campers could take full advantage of the labs, classrooms and outdoor spaces in and around Kingsbury Hall, making for a dynamic, high-energy learning environment.

Over the course of three weeklong sessions held in July, 180 middle and high school students participated in one of Tech Camp's 16 programs, 62 percent choosing the residential option and staying on campus. Thanks to the generosity of our sponsors and donors, 72 percent of our campers attended at no cost, tuition and housing included.



## TECH CAMP PROGRAMS

### TechSplorers



TechSplorers is a one-week, co-ed program for students entering grades 5-8. This past summer, two sessions were held, each focusing on a similar set of topics and activities. The goal of the program is to introduce middle school students to a wide variety of STEM subject areas and associated career opportunities. Each session includes professional scientists and engineers serving as projects leaders. Among the topics covered this summer were civil engineering, with an emphasis on bridge design and construction; computer coding in Minecraft and Earsketch; and environmental science.

### TechVenturers



TechVenturers is a one-week, co-ed program for students entering grades 8-10. This past summer, two sessions were held covering several different subject areas.

The goal of the program is to provide more experienced students with the opportunity to explore STEM topics of their choice in an in-depth, project-based learning environment. The programs offered this summer focused on structural engineering, rocketry, forensic science and remote-controlled cars. As part of the NH CREATES initiative, projects focused on molecular visualization, planaria and 3D bioprinting were also offered.

### TechLeaders



TechLeaders is a one-week, co-ed program for students entering grades 10-12. All projects this year were focused on regenerative medicine and biotechnology as part of the NH CREATES workforce development initiative and included some crossover with the TechVenturers program. Projects included bioinformatics, BioTrek (technology and entrepreneurship), cryopreservation, molecular visualization and 3D bioprinting.



All Tech Camp programs are taught in a project-based learning format with students engaged in a variety of hands-on activities, interactive demonstrations and lab experiments.

# Cultivating Interest and Expertise in Regenerative Medicine and Biotechnology



**S**tudents attending Tech Camp this past July had the unique opportunity to learn about regrowing lost body parts, freezing and storing cells, 3D bioprinting, molecular visualization and other cutting-edge topics that aren't typically covered in summer STEM programs.

These weeklong programs were each part of a broader workforce development initiative called NH CREATES the Future: the NH Collaborative for Regenerative Medicine Education and Training for Engineers and Scientists of the Future, and intended to cultivate interest and expertise in regenerative medicine and biotechnology among middle and high school students and teachers.

Funded by a five-year, \$1.2 million grant from the National Institutes of Health through its Science Education Partnership Award program the goal of this initiative is to build a skilled workforce for New Hampshire's rapidly growing regenerative medicine and biotechnology industries.

This summer, Tech Camp offered six NH CREATES programs, up from three last summer. All programs followed a project-based learning format and were offered at no cost to participants.

## NH CREATES PROGRAMS

### Bioinformatics Project

Participants learned how to use computer technology and biological databases to collect, process and analyze large amounts of information related to proteins, DNA, RNA and entire genomes. Bioinformatics is a relatively new and growing discipline used to answer complex biological and biomedical questions.

### BioTrek Project

Participants worked in small teams to conceptualize a product intended to address a significant real-world problem. A business plan was then created and pitched to teachers and industry experts. The overall focus was on the intersection of entrepreneurship, technology and advanced manufacturing. Facilitated by the Advanced Regenerative Manufacturing Institute.

### Cryopreservation Project

Participants learned how researchers are exploring innovative new ways to preserve cells and tissues through cryopreservation, a means of deep-freezing biological materials for long periods of time. Through lectures and hands-on experiments, current cryopreservation methods were demonstrated and explained as were their limitations.

### Molecular Visualization Project

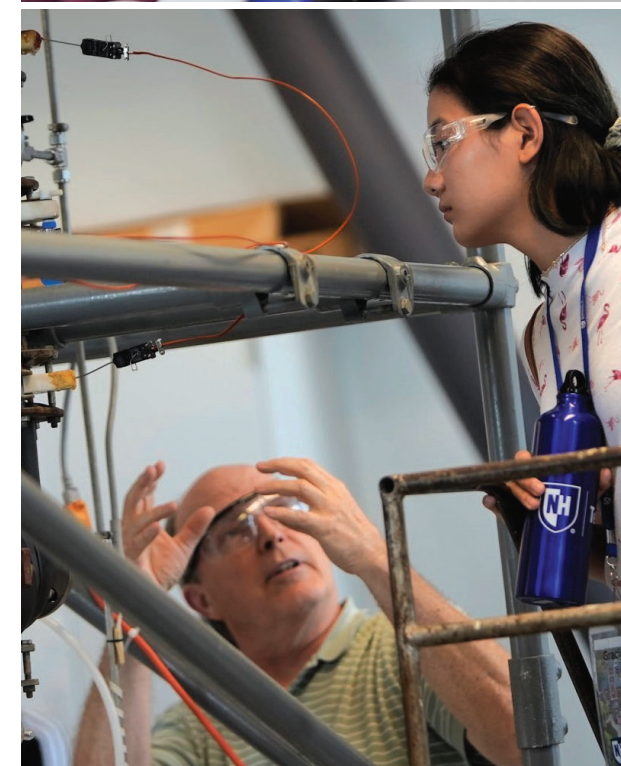
Participants gained an enhanced understanding of biomolecular structures using advanced molecular visualization software tools. Through a variety of computer-based activities, molecular geometry, bonding, structure and dynamics were explored, helping students to develop visuospatial thinking.

### Planaria Project

Participants studied planaria, a type of flatworm that can regrow lost body parts. Through a variety of hands-on activities, students learned about regenerative medicine and planaria. They also designed and performed individual experiments focused on the environmental factors that influence the ability of planaria to regrow missing body parts.

### 3D Bioprinting Project

Participants explored 3D bioprinting, a revolutionary technology that enables researchers to fabricate geometrically well-defined 3D living cell structures. Using patient-specific Magnetic Resonance Imaging (MRI) or Computerized Tomography (CT) scan data, students learned how to create a digital model without compromising the geometric information.



## Expanding Education and Career Pathways for Underrepresented Students

The Dinah Whipple STEAM Academy was launched in 2021 by UNH alumna Dzijeme Ntumi '17, '18G, to stimulate interest in STEM-related subject areas among students of color. The program explores a wide variety of engineering principles through hands-on activities and demonstrations as well as Black history.

"In both my personal life and career, I have experienced the inequities that exist in the world of STEM and engineering," says Ntumi, a design engineer for the New Hampshire Department of Transportation. "I don't look like the typical engineer to most people. I'm usually the only Black woman—often the only Black person—at the table." The Dinah Whipple STEAM Academy was started as a way to change this reality.

A scaled down version of the Dinah Whipple program was introduced in 2021 during the pandemic with nine students. Held mostly online, the weeklong program was still a success and participants stayed connected over the ensuing year through a series of field trips intended to showcase different engineering professions in action. Building on the momentum of year one, the Dinah Whipple program was expanded this past summer with a second session being added to accommodate younger students. Ntumi returned to lead a session comprised of

students returning from last summer and UNH alumna Aboubacar Konate '17, a structural designer at an engineering firm in Boston, led a second. A total of 21 middle and high school students participated in the two sessions.

**Building on the momentum of year one, the Dinah Whipple program was expanded this past summer with a second session being added to accommodate younger students.**

The namesake of the Dinah Whipple STEAM Academy was a significant figure in New Hampshire history best known for founding the state's first school for Black children in Portsmouth circa 1806. The former enslaved New Hampshire native went on to become a revered teacher and community leader.

The Dinah Whipple STEAM Academy is offered at no cost to participants thanks to the generosity of Appledore Marine Engineering in Portsmouth.

 **Appledore Marine Engineering, LLC**

## CREATING A STEM IDENTITY

As part of the Dinah Whipple STEAM Academy program this past summer, students spent a few hours each afternoon exploring concepts related to color, texture, tone, line, shape and other elements essential to composing a painting. Using this knowledge, they were then asked to create a self-portrait representing their own personal STEM identity.

Throughout this process, instructors engaged the students in discussions about their interests, aspirations and possible education and career goals related to science and engineering. How might these factors be used to inform or enhance their self-portraits?

More than just an exercise in reflection and self-expression, this project was part of a research study being conducted at Tech Camp that explores the role of STEM learning in informal settings and how it shapes identity, interest and perceptions of ability among students of color who are underrepresented in STEM-related fields.

"Research indicates that informal learning opportunities outside school can support interests in science and engineering, enhance confidence and positively influence academic achievement for these students," says Carmela Amato-Wierda, director of Tech Camp and member of the research team.



Still, she adds, more research is needed to determine which program designs work best for different learning needs and styles and how each contributes to a child's interest in STEM subjects. "The study we are conducting can provide insight to help fill these gaps."

Piloted during the summer of 2021, the research study relies on three data sources: student self-portraits, semi-structured interviews with students and student surveys. In addition to Amato-Wierda, investigators also include Kelly Clark/Keefe, associate professor at the University of Vermont, and Aubrey Scheopner Torres, associate professor at Saint Anselm College.





# Regenerative Medicine and Project-based Learning

Tech for Teachers Institute is a dynamic, paid professional development program open to middle and high school teachers from across all STEM subject areas. The focus of the program is two-fold: building knowledge of an emerging technology—this year’s topic was regenerative medicine—and the transformation of instructional practice through project-based learning.

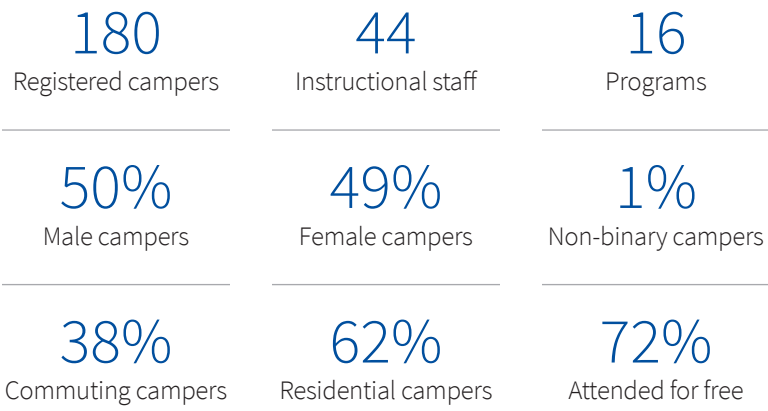
Working in collaboration with fellow teachers, UNH faculty and graduate student mentors, industry professionals and educational experts, participants in the Tech for Teachers Institute designed projects to implement during the upcoming school year. This program is part of NH CREATES, a broader workforce development initiative at UNH and funded by a Science Education Partnership Award (SEPA) grant from the National Institutes of Health.

Tech for Teachers is open to both school-based teams and individuals. Upon completion, participants receive a \$1,500 award, CEUs, classroom supplies and ongoing support from UNH faculty and graduate students. The two-week 2022 Tech for Teachers Institute was held on the UNH Durham campus.

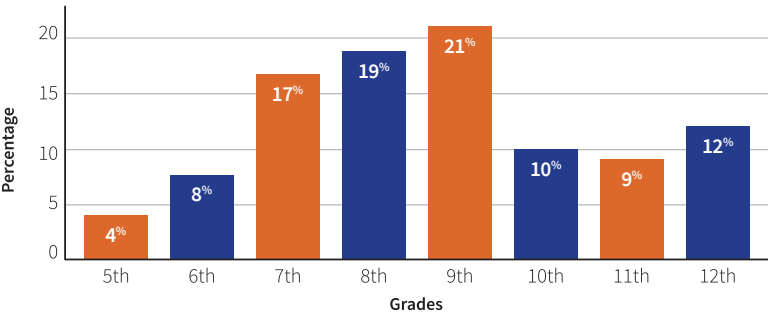
## PARTICIPANTS

- Jasmine Beltran**  
Timberlane Regional High School
- JoNan Bilodeau**  
Surry Village Charter School
- Mindy Blanner**  
Somersworth High School
- Patty Davidson**  
Elm Street Middle School
- Frank Harrison**  
Concord High School
- Daniel Heath**  
Keene Middle School
- Caroline Kepka**  
Rye Junior High School
- Kate Lewis**  
Oliverian School
- Anika Vittands**  
Cooperative Middle School

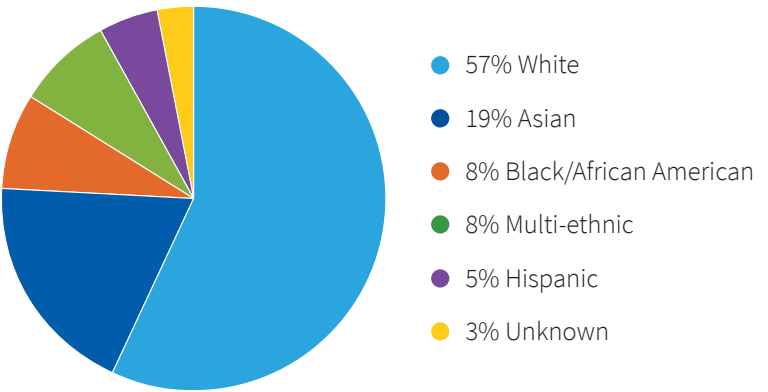
## Tech Camp by the Numbers



## Tech Camp Total Enrollment by School Grade



## Tech Camp Racial-Ethnic Demographics



## Tech Camp Staff and Faculty

### Leadership Team

- Carmela Amato-Wierda, Ph.D.  
*Director*
- Amy Booth  
*Assistant Director and NH CREATES Project Director*
- Shawn Gyga  
*Camp Manager*
- Joey Cote  
*Residential Program Director*

### Faculty Project Leaders

- Jason Pellettieri, Ph.D.  
*Keene State College*

### Faculty Project Advisors

- Erin Bell, Ph.D.  
*University of New Hampshire*

- Diliang Chen, Ph.D.  
*University of New Hampshire*

- Eshan Dave, Ph.D.  
*University of New Hampshire*

- Nivedita Gupta, Ph.D.  
*University of New Hampshire*

- MD Ahasan Habib, Ph.D.  
*Keene State College*

- Edward Song, Ph.D.  
*University of New Hampshire*

- Kelley Thomas, Ph.D.  
*University of New Hampshire*

- Krisztina Varga, Ph.D.  
*University of New Hampshire*

- Harish Vashisth, Ph.D.  
*University of New Hampshire*

### Project Leaders

- Logan Brown
- Emma Burkett
- Catherine Goodwin
- Christy Johnson
- Matthew Johnson
- Katarina Jovic
- Stephanos Khalil
- Aboubacar Konate
- Shannon McCracken-Barber
- Hannah Miller
- Wayne Moulton
- Gabrielle Mourousas
- Dzijeme Ntumi
- Connor Quigley
- Brunno Rocha
- Joseph Sevigny
- Stephen Simpson
- Tiffany Thompson

### Project Assistants

- Matthew Allen
- Andrea de Assis
- Owen Bell
- John Finocchiaro
- Niaya Huyghue-Fancy
- Lisa Nash
- Oneil Smith-Elias
- Jayden Taylor
- Matthew Thompson

### Counselors

- Clara Delgado
- Maeve Healy
- Shahrukh Khan
- Nicholas McPherson
- Adase Ntumi
- Andrew Peloquin
- Jason Perra
- Gloria Tawalujan
- Elizabeth Tremblay

# Making STEM Education Available to All Who are Interested!

Thanks to the generosity of our donors and sponsors, 72 percent of our campers attended at no cost this year! Grants and financial support received from the organizations listed below covered tuition and housing for 129 students and helped offset expenses for all who attended.

Appledore Marine Engineering, LLC  
ATech Designs, Inc.  
Center for Assessment  
Essex County Community Foundation  
Federal Highway/New Hampshire Department of Transportation  
Liberty Mutual Insurance  
National Institutes of Health  
Newburyport Bank  
Oak Point Associates  
QA Café  
Relyco  
SMRT Inc.  
Society of American Military Engineers  
William J. Cusack Scholarship Fund

We would also like to thank our partner organizations and STEM colleagues for sharing their expertise with students over the summer and providing added resources to enhance the learning experience.

Advanced Regenerative Manufacturing Institute  
Lakes Region Community College  
Liberty Engages Girls in Technology (LEGIT)  
NH Good Roads Association  
Pike Industries  
UNH College of Life Sciences and Agriculture  
UNH Technology Transfer Center



**University of  
New Hampshire**  
Tech Camp

For more information on Tech Camp, please visit [ceps.unh.edu/outreach/tech-camp](https://ceps.unh.edu/outreach/tech-camp) or contact Carmela Amato-Wierda at [ccaw@unh.edu](mailto:ccaw@unh.edu).