2021

VEMI Lab 2021

Virtual Environments and Multimodal Interaction Laboratory

VEMI LAB

1865 THE UNIVERSITY OF MAINE

2021

Including collaborators from

Bowdoin College
Carnegie Mellon University
Colby College
Dartmouth College
Harvard University
Northeastern University
Smith-Kettlewell Eye Research Institute
St. Louis University
Temple University
The Iris Network
University of California, Santa Barbara
University of Minnesota
University of Pennsylvania

70
collaborators outside of UMaine


Paul Fink

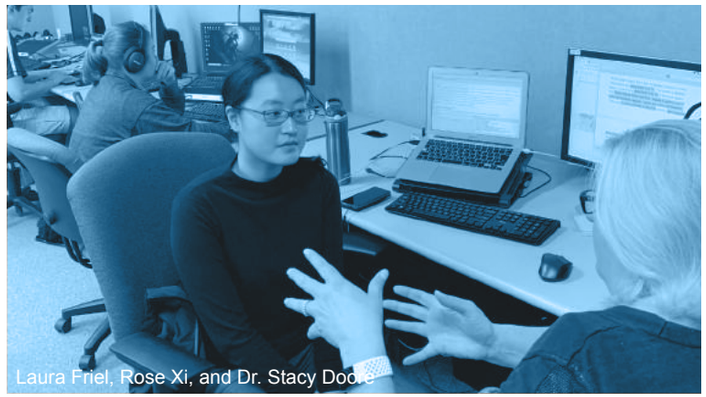
> "VEMI allows me the opportunity to work on interesting projects in a creative, hands-on, and intellectually stimulating environment. One of the best parts of VEMI is being able to learn and solve problems with people who are truly excited by the work they are doing."

Aubree Nygaard, Junior,
Computer Science and Philosophy

VEMI is

21
cross-campus collaborators from UMaine from 5 colleges

Abedi, A.	Jacobson, K.	Roscoe, J.
Beard, K.	Kelley, A.	Sandweiss, D.
Bird, K.	Maasch, K.	Scott, M.
Dimmel, J.	Mayewski, P.	Strout, K.
Egenhofer, M.	McCoy, S.	Teisl, M.
Herbert, V.	Moratz, R.	Worboys, M.
Howell, C.	Noblet, C.	Yasaei Sekeh, S.


Laura Friel, Rose Xi, and Dr. Stacy Doore

20
students working per semester

6
students learn at VEMI yearly from other institutions

12
majors/programs currently represented, with 31 total majors represented since 2008

Accounting	Kinesiology
Anthropology/Archaeology	Mathematics
Biomedical Engineering	Mechanical Engineering
Chemical Engineering	Mechanical Engineering Technology
Communication Science Disorders	New Media
Communications	Philosophy
Computer Engineering	Physics
Computer Science	Political Science
Earth Sciences	Psychology
Education	Quaternary & Climate Studies
Electrical Engineering	Social Work
Electrical Engineering Technology	Spatial Information Science and Engineering
Engineering Physics	Studio Arts
English	Theater
Finance	University Studies
Interdisciplinary PhD	

interdisciplinary

The VEMI Lab embodies an inclusive, collaborative, and multi-disciplinary approach to hands-on research and education. By bringing together students and faculty from more than a dozen majors and disciplines, VEMI is uniquely positioned to advance computing and STEM initiatives both here at the university as well as in broader communities throughout Maine and nationwide.

> "Working at the VEMI Lab was one of my fondest and most valuable experiences while attending college. VEMI gave me the opportunity to apply my skills in a collaborative environment and to solve problems with a group of passionate like-minded students."

Sylvia Allain,
Computer Science 2014,
Software Development Engineer at Google

33 student co-authors with **61%** student-led publications

122 student academic products

100% of students involved in research

29 undergraduate research awards supporting VEMI students

69 VEMI-related classes taught since 2008

Funding agencies include

NSF USDA
NIH FAA
NEH NIDILRR
MTI UMS

$100,000 in undergraduate grants and fellowships

VEMI’s culture synergizes education and research to enrich students throughout their UMaine experience. Our philosophy is that undergraduate and graduate education is inextricably linked to VEMI’s research goals. As students design, conduct, and apply the research and learning advanced by the Lab, they are able to showcase their progress while addressing the growing need for innovative solutions to solve technological challenges in our community.

Oisin Biswas, Graduate Student, Biomedical Engineering

> “When you’re a student at the VEMI Lab, you’re part of a team. The collaborative, multidisciplinary environment teaches you to solve problems from a diverse perspective. This experience has grown my love for research, and inspired me to pursue a graduate degree here.”

VEMI connects students with faculty research through experiential learning

Typical Undergraduate Research Position Responsibilities	VS	VEMI Undergraduate Research Position Responsibilities
• Performs rudimentary tasks		• Runs participants in experiments
• Prepares samples		• Collects and analyzes data
• Performs routine testing		• Interfaces with cutting-edge technology
• Cleans, stores and sorts materials and research equipment		• Assists in presentation of research
• Cleans and maintains research facilities		• Learns statistics and related software
• Operates basic research equipment		• Conceptualizes, designs, and implements research projects
• Maintains records and files		• Publishes and presents at conferences
• Assists staff with research testing		• Uses creative problem solving

Where do alumni go after VEMI?

Acadia Hospital
Amazon
Avalon English Academy
Bowdoin
Building 36
Cashstar
Dartmouth
Disney
Electric Power Systems
Esri
Fairchild Semiconductor
Forest International School
Fort Foster
GE
Google
Helios Interactive
Hope House Boston
Instrumentation Laboratory
Jackson Laboratory
James Madison University
Kepware
KinoTek
Maine Eye
Mass Eye and Ear
Massachusetts General Hospital
Middlebury College
Northeast Precast
Rightpoint
Salesforce
Sappi Paper
Three Rivers
Tyler Technologies
UNAR Labs
University of Maine
UMaine Farmington
University of North Carolina
US Army
VEMI Lab
...

VEMI creates economic impact

VEMI alumni were asked: How well did VEMI and UMaine prepare you for your current job or graduate work?

> “Working at the VEMI Lab has opened doors for me that I never knew were options before working at the Lab. I wouldn’t have the opportunities I do today if it wasn’t for VEMI nor would I have been able to create the relationships I have that will last a lifetime!”

Justin Hafner, Kinesiology 2018, CEO of KinoTek

VEMI’s economic impact relates both to our research and our student-centric development model. While our students’ research is remarkably successful in addressing accessibility needs in our state, this success continues far beyond graduation from UMaine. 98% of VEMI alumni are fully employed, with nearly 50% living and working in Maine. These graduates help address the need for a skilled workforce in the growing tech industry in the state, with notable positions including Jackson Laboratory in Bar Harbor, GE in Bangor, and Esri in Portland. In an annual survey, over 94% of alumni responded that VEMI prepared them very well or higher for their current job or graduate studies.

$11.6M
in grants since VEMI’s inception

$1.2M
in grants in the past year

Median salaries of recent graduates

(Reflects last 10 years)

Name	$	#
MBS	39,425	497
EHD	31,046	434
ENGR	55,405	817
LAS	32,702	796
NSFA	37,725	884
VEMI	*76,000	40

Percentage employed full-time

(Reflects last 6 years)

Name	%	#
MBS	86.8	326
EHD	71.2	336
ENGR	87.2	629
LAS	67.2	711
NSFA	66.0	911
VEMI	98.0	42

Median salaries and percentage employed full-time by college from Life After UMaine survey by Office of Institutional Research.
*Does not include sign on bonuses, benefits, stock options, automotive and housing allowance or bonus in-company resources.

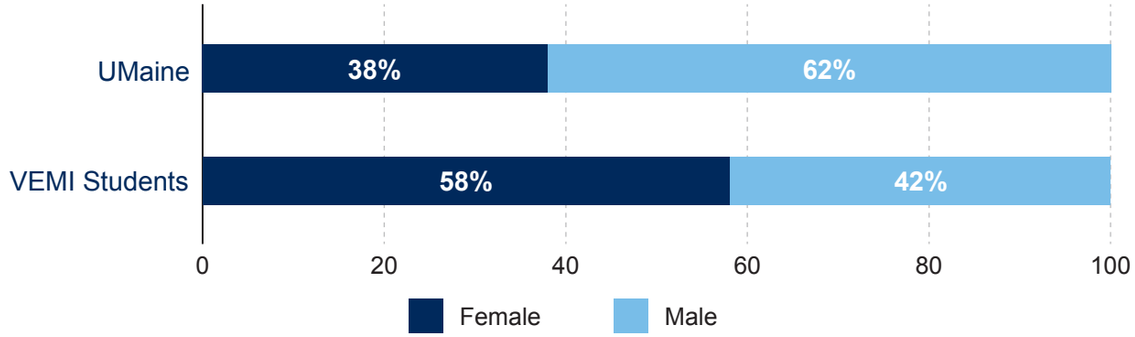
> I quickly realized that VEMI is very much a learning environment for students as much as it is a research lab. A work environment where you feel comfortable enough to let your guard down (especially as a woman) and show vulnerability is difficult to come by, and without the VEMI Lab, I would not be on the same path as I am today.

Emily Blackwood,
Graduate Student,
Interdisciplinary PhD
(Virtual Archaeology)

VEMI supports women in tech

We pride ourselves at the lab in encouraging students of all backgrounds. Part of our inclusive model involves deliberately supporting students currently underrepresented in technology majors and labs on campus—namely women. In an academic discipline where only 16% of majors identify as women, VEMI's current student body is comprised of nearly 60% women. These young women are actively involved in changing the narrative of women in tech and are at the forefront of organizations like the ACM Council on Women in Computing and initiatives intended to increase representation in the field.

UMaine STEM Majors vs VEMI Students by Gender



Note Students with majors in the following academic units/programs are included in UMaine STEM Majors: All units in the College of Engineering, Chemistry, Mathematics & Statistics, Physics & Astronomy, School of Computing & Information Science, School of Food & Agriculture, Molecular & Biomedical Sciences, School of Earth & Climate Sciences, School of Forest Resources, School of Biology & Ecology, School of Marine Sciences, Wildlife, Fisheries, and Conservation Biology, and Ecology & Environmental Sciences.
(UMaine Office of Institutional Research and Assessment, 6.14.19)

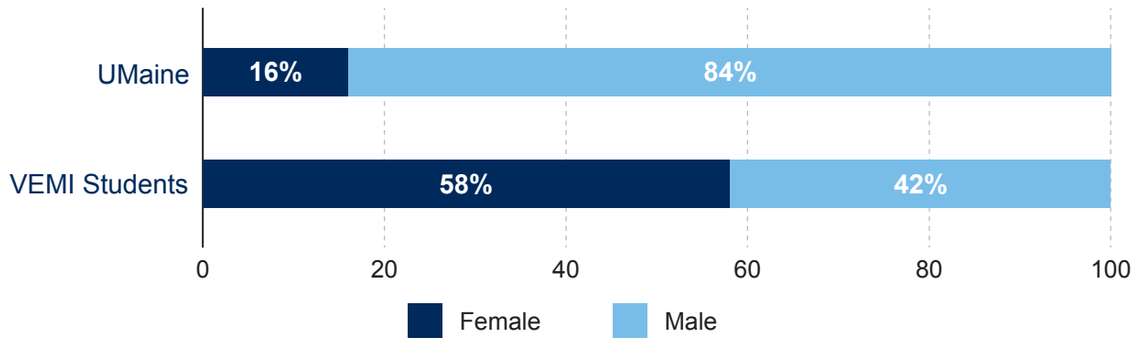
ACM-W
chapter at UMaine started by a VEMI employee

100%
of female employees interface with new, innovative technology

> The best part about the VEMI Lab was being supported, encouraged and accompanied by people who truly wanted to see me succeed.

Anna Webber, Biomedical Engineering 2019,
Imagineer at Disney

UMaine Tech Majors vs VEMI Students by Gender



Note Students with majors in the following academic units/programs are included in UMaine Tech Majors: (Bachelor's Majors) Computer Engineering, Computer Science, Mathematics, New Media (Master's Majors) Computer Engineering, Computer Science, Information Systems, Mathematics, Spatial Information Science & Engineering (Doctoral Majors) Computer Science, Spatial Information Science & Engineering.
(UMaine Office of Institutional Research and Assessment, 6.14.19)


Colleen DeMaris

Interactive medical technology

VEMI has developed medical technology that meets immediate needs in both local and nationwide communities. We have created: (1) Open source instructions for the public to produce IR thermometers in response to COVID-19, (2) A Maine mobile app that gives step-by-step instructions on how to administer naloxone in case of an overdose, (3) A remote simulation-based nursing education app to increase student engagement and learning performance.

Wayfinding and navigational technologies

VEMI and Dr. Nicholas Giudice (an international leader in Blind and Low-Vision Wayfinding) has been using augmented-reality and haptic technology to assist individuals with learning and navigating in complex spaces. Our research includes simulated edge detection, beacon overlays, and haptic mapping--all of which improve independence for blind people and help an aging population live independently in their own homes for longer.

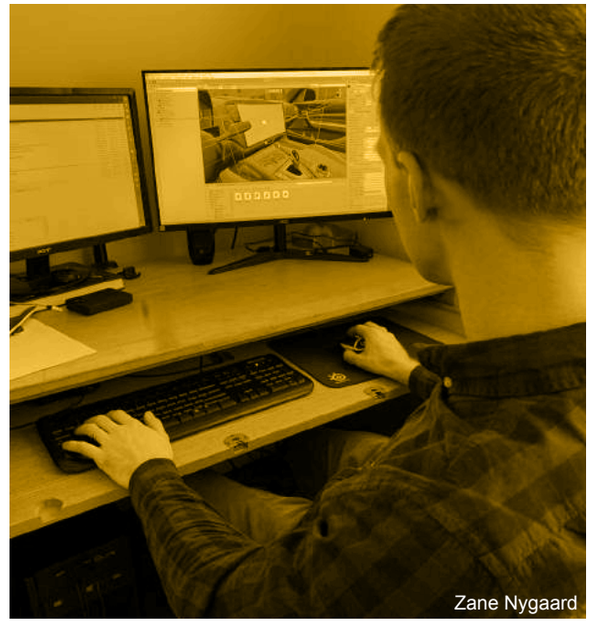
Bioinspired technology

VEMI and Dr. Caitlin Howell are using nanotextured surfaces inspired by nature and using real-time machine learning to create a system for remote, rapid detection of surface contamination. Their work both improves the health of the community, as well as provides new AI explorations.


Dr. Richard Corey, Alia Parsons, Kaitlyn Haase, and Oisin Biswas

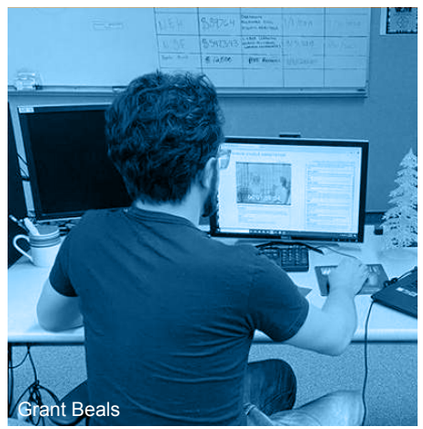
Human-vehicle collaboration

VEMI is a world leader in researching Human-Vehicle Collaboration and how we will communicate with fully Autonomous Vehicles. We are developing an autonomous vehicle simulator to study the interaction between people and vehicle based AI to create a safer, more inclusive and more seamless transition from manually driven to Autonomous Vehicles.


Zane Nygaard

VEMI is innovative research

Information access technology


Grant Beals

VEMI has been researching the best ways to use multisensory technology to provide information access to both the BVI and aging communities. We have researched: (1) Audio/haptic data exploration to support educational and vocational success in collaboration with UNAR Labs, (2) The creation of new accessible tools and annotation standards in collaboration with Dartmouth College that will open new pathways for BVI users to experience, learn from, and interact with archival films, and (3) A visual assistant using machine learning to help identify objects and navigation using augmented reality.

VEMI responds to COVID


R.J. Perry

We were designated as an essential research lab for the State of Maine and University's Covid Response unit. VEMI's staff, faculty, and students worked to create:

- IR thermometers
- Hospital resource databases
- Projection models
- Accessibility solutions
- Science advisory
- Lab reopening plan
- Online human subject research
- Information on masks/face shields

"A final note about education at VEMI itself: I believe the educational approach that the VEMI Lab embodies is the future of education. The team-focused, collaborative approach to problem solving that makes up the essence of the VEMI Lab is clearly the direction that education has to go."

- Dr. Nicholas Giudice,
Executive Director of VEMI Lab &
Professor, Spatial Informatics

Dr. Caitlin Howell, Dr. Nicholas Giudice, and Dr. Richard Corey

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