Looking for a Research Opportunity?  
*Check out Vertically Integrated Projects (VIP) at Rice!*

**VIP @Rice**

The **Vertically Integrated Projects (VIP) Program** at Rice unites undergraduate education and faculty research in a team-based context. Undergraduate Rice VIP students earn academic credits, while faculty and graduate students benefit from the design/discovery efforts of their teams.

VIP at Rice extends the academic design experience beyond a single semester. It provides the time and context to **learn and practice professional skills**, to **make substantial contributions**, and experience different roles on large multidisciplinary design/discovery teams.

The long-term nature of VIP creates an **environment of mentorship**, with faculty and graduate students mentoring teams, experienced students mentoring new members, and students moving into **leadership roles** as others graduate. Rice VIP teams are comprised of students from freshman to seniors, with a **variety of majors and backgrounds**.

Rice's VIP program in its Engineering School seeks to involve undergraduates in **ongoing research**. The implementing faculty members are all in the Department of Electrical and Computer Engineering (ECE).

Rice is a member of the VIP Consortium, based at the Georgia Institute of Technology. Through support from the Helmsley Charitable Trust, seventeen colleges and universities came together for a Consortium Planning Workshop in April, 2014. Through the proposed Consortium, partner institutions will establish VIP programs at their institutions, define effective practices for a variety of program formats, and support new partners in the establishment of new VIP programs. With its innovative model and proposed Consortium, VIP is poised to truly transform higher education.

[ vip.rice.edu ]
Research Summary: Communication theory, information theory, and their applications to wireless communication with a focus on the interplay of communication systems and networks; including network coding, user cooperation, spectrum sharing, and opportunistic access. Signal processing, information processing, and their applications to neuro-engineering with foci on (i) modeling neuronal circuits connectivity and the impact of learning on connectivity (ii) real-time closed-loop stabilization of neuronal systems to mitigate disorders such as epilepsy, Parkinson, depression, and obesity.  

REU opportunities available.

Research Summary: Large Scale dynamical systems, approximation, computation, linear algebra.

Research Summary: Analysis, design, and testing of integrated sensors and systems with applications in high-speed wireless links, radar, medical imaging, biosensing, and oil/gas monitoring.  

REU opportunities available.

Research Summary: Multiscale, computational signal and image processing; Open access, collaborative scholarly publication.

*Denotes VIP Faculty
Joseph R. Cavallaro*
Professor, Electrical and Computer Engineering & Computer Science
cavallar@rice.edu
ece.rice.edu/cavallaro.aspx


John W. Clark, Jr.
Professor, Electrical and Computer Engineering & Bioengineering
jwc@rice.edu
ece.rice.edu/clark.aspx

Research Summary: Electrophysiology (neural, cardiac); mathematical modeling of biological systems; signal processing methods applied to biological systems; nonlinear system dynamics; electromagnetic field theory.

Gene Frantz
Professor in the Practice, Electrical & Computer Engineering
(Signal Processing)
genef@rice.edu
ece.rice.edu/genefrantz.aspx

Research Summary: Entrepreneurship, Intrepreneurship.

Naomi J. Halas
Stanley C. Moore Professor, Electrical & Computer Engineering
Professor of Biomedical Engineering, Chemistry, Physics and Astronomy
halas@rice.edu
ece.rice.edu/halas.aspx

Research Summary: Design and fabrication of optically responsive nano structures, nanophonotics, plasmonics.
Kevin Kelly
Associate Professor, Electrical and Computer Engineering
kkelly@rice.edu
ece.rice.edu/kelly.aspx


Caleb Kemere
Assistant Professor, Electrical and Computer Engineering
caleb.kemere@rice.edu
ece.rice.edu/kemere.aspx

Research Summary: Building interfaces with memory and cognitive processes; model-based signal processing; low-power embedded systems.

Edward W. Knightly
Chair, Electrical and Computer Engineering
Professor, Electrical and Computer Engineering & Computer Science
knightly@rice.edu
ece.rice.edu/knightly.aspx

Research Summary: Wireless networks, urban-scale testbeds, clean-slate design, diverse spectrum access, multi-antenna systems, hardware platforms, high-performance protocol design, security, and performance evaluation.

Junichiro Kono
Professor, Electrical and Computer Engineering, Physics & Astronomy
kono@rice.edu
ece.rice.edu/kono.aspx

Research Summary: Condensed matter physics, optics and photonics, nanoscience and nanotechnology.
Farinaz Koushanfar  
Associate Professor, Electrical and Computer Engineering  
farinaz@rice.edu  
ece.rice.edu/koushanfar.aspx  

*Research Summary:* Sensor networks, low power embedded systems, optimization and statistics.

Michael T. Orchard  
Professor, Electrical & Computer Engineering  
orchard@rice.edu  
ece.rice.edu/orchard.aspx  

*Research Summary:* Image and video modeling and compression.

Xaq Pitkow  
Associate Professor, Electrical and Computer Engineering  
Associate Professor, Computational Neuroscience, Baylor College of Medicine  
xaq.pitkow@rice.edu  
ece.rice.edu/pitkow.aspx  

*Research Summary:* Theories of neural computation in animal brains. Topics include: probabilistic inference, control theory, nonlinear dynamics, population codes. Current projects include analyzing behaviors of animals playing video games; designing animal virtual reality environments; stimulating and analyzing computation in neural networks.  
※ **REU opportunities available.**

Jacob T. Robinson  
Assistant Professor, Electrical and Computer Engineering & Bioengineering  
jacob.t.robinson@rice.edu  
ece.rice.edu/robinson.aspx  

*Research Summary:* Nanotechnology to measure and manipulate neural activity.
Ashutosh Sabharwal*
Professor, Electrical and Computer Engineering
ashu@rice.edu
ece.rice.edu/sabharwal.aspx

Research Summary: Wireless networks, information theory, multiple antenna systems, coding and computation.

Ray Simar*
Professor in the Practice, Electrical and Computer Engineering & Computer Science
(Digital Signal Processing Architecture)
ray.simar@rice.edu
ece.rice.edu/simar.aspx

Research Summary: Digital signal processors, design methodology and programming tools.

Isabell Thomann
Assistant Professor, Electrical and Computer Engineering
it6@rice.edu
ece.rice.edu/thomann.aspx

Research Summary: Energy, photocatalysis, ultrafast spectroscopy and nanophotonics.

Frank K. Tittel
J.S. Abercrombie Professor, Electrical and Computer Engineering
Professor, Bioengineering
fkt@rice.edu
ece.rice.edu/tittel.aspx

Research Summary: Quantum electronic devices, laser spectroscopy with applications in environmental monitoring, atmospheric chemistry, industrial process analysis and control, medical diagnostics based on breath analysis, the life sciences, defense applications and homeland security.
Peter J. Varman
Professor, Electrical and Computer Engineering & Computer Science
pjv@rice.edu
ece.rice.edu/varman.aspx

Research Summary: Computer systems, storage and memory systems, virtualization and resource management, cloud computing.

*REU opportunities available.

Ashok Veeraraghavan
Assistant Professor, Electrical and Computer Engineering
vashok@rice.edu
ece.rice.edu/veeraraghavan.aspx

Research Summary: Computational imaging, compressive sensing for imaging, signal processing and computer vision.

Gary Woods*
Professor in the Practice, Electrical and Computer Engineering & Computer Science (Computer Technology)
gary.woods@rice.edu
ece.rice.edu/garywoods.aspx

Research Summary: Optical probing and debugging of advanced integrated circuits.

Lin Zhong
Associate Professor, Electrical and Computer Engineering
lzhong@rice.edu
ece.rice.edu/lzhong.aspx

Research Summary: Mobile and embedded systems, human-computer interaction, and nanoelectronics.

*REU opportunities available.