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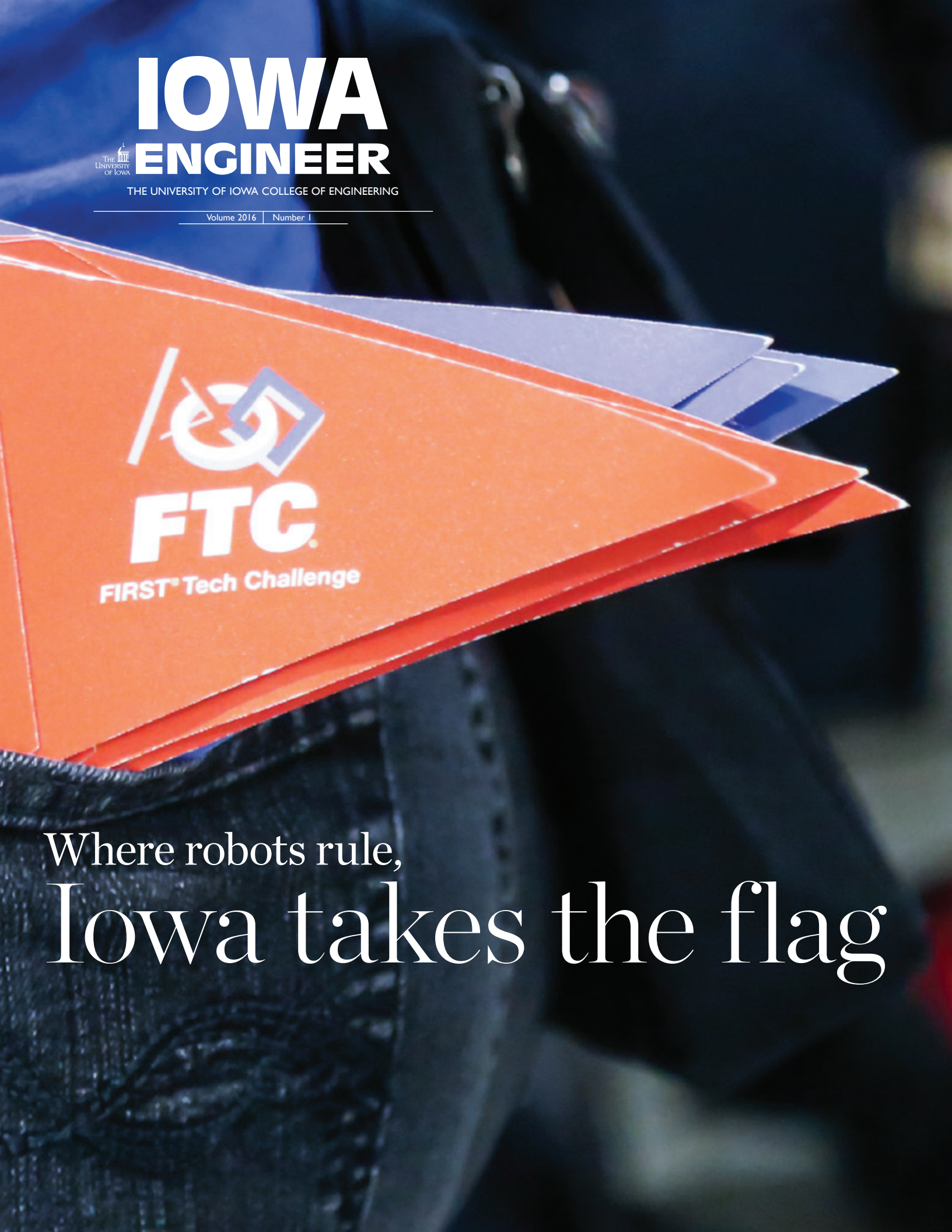
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Where robots rule, Iowa takes the flag

Enhancing the Future: K-12 Outreach and Creative Engineers

At the University of Iowa College of Engineering we are continuously striving to find ways to better serve Iowa, the nation, and the world. In this issue of *Iowa Engineer* we highlight two developments that have arisen from this focus on enhancing the future: K-12 outreach, and collaborations with the arts. The goal of our K-12 outreach program is to inspire our youth to consider their possible future as engineers by showing them that the creative design process is fun, engaging, and rewarding. The FIRST Tech Challenge program described in this issue is one great example of an effective outreach program that contains all of these elements. Thanks to a partnership including the UI College of Engineering, Rockwell Collins, and the Iowa Governor's STEM Initiative, the program has exploded in the state of Iowa, growing from 2 teams in 2009 to more than 200 teams this year. The national exposure that we have received for this impressive growth has convinced people across the country that something special is happening in Iowa. The focus on the arts has arisen from our continuous effort to be the best at educating engineers who will thrive in the 21st century. In addition to the rigorous technical content in our very challenging curriculum, we emphasize the 21st century skills of communication, teamwork, leadership, entrepreneurship, global awareness, and creativity. Our recognition that engineers can benefit from understanding and exploring creativity in the arts has inspired our creation of the Virginia A. Myers Nexus of Engineering and Art. The director of the Nexus, Deanne Wortman, is an artist with a BFA and two MFAs, and her interactions and engagement with our students have already borne fruit, as described in the article in this issue. The Nexus would not have been possible without the generosity of the alumni and friends who were inspired by this vision for the importance of creativity for future engineers, and I am sure that in the coming decades the Nexus will lead to creative collaborations that we can only begin to imagine.



Alec Scranton
Dean of Engineering

Inside this issue of *Iowa Engineer*:

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FTC encourages students to work with adult mentors. Carl Gloe (left) is a Rockwell Collins employee who has mentored and volunteered with FIRST for over a decade.

TEXT BY JEAN FLORMAN

BUILDING TO A Cresc

When the new Voxman Music Building opens in fall 2017, it's a good bet that guests at the inaugural concert will spot Robert Campbell (BSEE '86): He will be the one staring at the Concert Hall ceiling.





cendo

As the theatre planner for the $152 million, 189,289 square-foot building—new home to the UI School of Music performance, teaching, and studio spaces—Campbell has spent the last three years studying proposals, programs, renderings, blueprints, 3D-CAD drawings, surfaces, materials, spans, angles, and joints. But he says when the building is complete, it is the ceiling of the 750-seat Concert Hall that will capture his eye because it will epitomize the whole of the project and the people who have made it happen.

"The ceiling in any performing arts center is complicated," says Campbell, Associate Principal of the theatre planning design firm Fisher Dachs Associates (FDA) and theatre designer for the new University of Iowa music building. "But the ceiling in the main Concert Hall posed some special challenges because the acoustics require sound to reflect back to the stage—the musicians—as well as to the audience."

While guests may notice the interesting design of the ceiling, with its angular open-



> "Those triangle openings aren't simply empty space; they accommodate airflow, stage equipment, concert lighting, and, of course, acoustics."
>
> ROBERT CAMPBELL (BSEE '86)

ings scattered across the expansive space, Campbell will see a functional but visually striking element that represents years of teamwork by the designers and builders who have worked to create an architectural feature that supports the acoustical, lighting, mechanical, and structural systems so critically important to the overall success of the concert hall and the building.

"It will be a lot more than just a ceiling, and even more than a ceiling in a typical concert hall," says Campbell, who earned a BSE degree in electrical engineering from the University of Iowa in 1986. "Those triangular openings aren't simply empty space; they are there for a reason—to seamlessly accommodate airflow, stage equipment, concert lighting, and, of course, acoustics, and to still look great."

Campbell's educational background and life experience have engendered a special appreciation for the importance of both good design in theatre and the theatricality of good design. During his high school years in Wilmette, IL, he discovered a passion not only for designing theatre sets and lighting but also for tearing apart—and, he adds, putting back together—radios, TVs, and electronics. When he learned that Iowa offered excellent educational opportunities in both engineering and theatre, he jumped at the chance to attend college in Iowa City.

"I knew before I came to the UI that I wanted to pursue electrical engineering," Campbell says. "And the College of Engineering also gave me the opportunity to take elective classes in the Theatre Department, which had recently completed construction of the new Theatre Building and offered an excellent theatre design program directed by David Thayer."

In addition, Jon Kuhl had just begun a new computer engineering program within the electrical engineering department, so Campbell says "Iowa offered the best of everything for me—an excellent program in engineering with an emphasis on computer science and excellent theatre arts."

After finishing his undergraduate degree, Campbell remained in Iowa City to take additional graduate courses in theatre design and to work on sound and lighting for productions in the old Voxman Music Building, University Theatres, and Hancher Auditorium.

In 1987 he left Iowa City to earn a Master of Fine Arts degree in theatre design and planning from the Yale School of Drama (1990); he then joined the international theatre design firm, Fisher Dachs Associates, Theatre Planning and Design in New York City.

A prototype of a ceiling panel.





Renderings of the outside and inside of the new building. Renderings and ceiling element photo courtesy of LMN Architects.

For more than three decades, he has served as designer and project manager for some of the most renowned performing arts centers in the world, including the Montreal Symphony Center, New York City Center, and Washington D.C.'s iconic Arena Stage, whose dramatic $125 million design transformation Campbell directed.

He also has been instrumental in making FDA become the go-to firm for the design and renovation of major university performing arts centers. His early years working in the classroom, rehearsal, and performance spaces of the old Voxman Music Building, Hancher, and University Theatres have proven to be particularly important for his understanding of how to optimize the planning, design, and construction of teaching, rehearsal, and performance spaces in academic institutions around the world, including the University of Iowa's new Voxman Music Building in Iowa City.

"I learned a lot about what doesn't work in performing arts buildings during the years I worked as a student and recent alum in the old building," Campbell says. While acknowledging the loss felt by School of Music and community members when the old building and much of its contents were destroyed by the 2008 flood, he notes that "the old building had no passenger elevator, and instruments had to be brought to the second floor via the freight elevator at the Hancher loading dock."

As it rises on the Iowa City bluff east of the Iowa River, the stunning new Voxman Building attests to the fact that Campbell has applied the lessons he learned as a young UI engineer and theatre technician. He has been particularly keen on getting input from UI music school faculty, staff, and students. As a result, unlike the previous building, the new Voxman will provide a student commons, plenty of places for students to "plug in," and what Campbell calls "found spaces"—areas that students and others can spontaneously "make their own" to read, work, and perform, individually or together.

Campbell has managed the Voxman project through three stages, starting with facilitating conversations with School of Music students, faculty, and staff, UI administrators, community members, stage agencies, architects, and building engineers. As those wide-ranging discussions about the building location and user needs continued, the concept and design stages began. The new facility project design includes four major performance spaces: a 700-seat Concert Hall, a 220-seat Recital Hall, an Organ Recital Room, and Opera and Chamber Music Rehearsal Rooms. With members of the lead architectural firm LMN Architects from Seattle and Neumann Monson Architects of Iowa City, Campbell has particularly attended to traffic flow into and through the building, prominently situating the main entrance at the corner of Burlington and Clinton Streets, planning wide corridors that will facilitate easy movement of people and instruments, and distinguishing public performance spaces and behind-the-scenes rehearsal, teaching, and office spaces.

"It's critical, for instance, to situate the percussion studio close to and on the same level as the concert hall stage and large rehearsal rooms in the building," he says.

Although to the untrained eye certain aspects of the project may appear obvious, building a performing arts structure is anything but simple. In fact, Campbell says that with the exception of hospitals, no other type of building presents such complex design and construction challenges as academic performing arts structures.

"In Voxman the concert hall itself is 128' long, 75' wide and over 45' tall with no internal structural support," he says. "The area above the stage must support tons of stage equipment and quiet air supply ducting, and the auditorium must have the capacity for catwalks and concert lighting anywhere over the space—all without impediments to sight-lines and with superb acoustics. And in a venue like Voxman, there can be as many as 600 dimmed lighting circuits."

To add to the complexity of this kind of work, some FDA performing arts centers are built to do more than serve traditional functions. Among Campbell's recent projects are venues whose main level seating systems are designed to be mechanically removed from the auditoriums quickly so the rooms can transform from performance spaces into large flat-floor event spaces in a matter of minutes.

Campbell says that while each project presents its own special challenges, the Voxman effort has been unusually problem-free.

"It's also been an awful lot of fun," he says, not only because of the "complex features of the design" but also because the architects, engineers, builders, technicians, University faculty, staff, and students, and community members have worked so well together as a team.

"It's been a fantastic experience to work on a project that has everything to do with the school, especially the students," Campbell says. "We expect to make this building work well for faculty, visitors, and especially for students a hundred years from now.

"And not only that, it's my alma mater. For me, that's the icing on the cake."