



SPRING SEMESTER ISSUE MARCH 17, 2008

ENGINEERING IN A GLOBAL CONTEXT



The EigC Crew at a Baroque Festival outside of Stuttgart, Germany

By Bobby Arthur

In the summer of 2007, fifteen engineering students, many of them Rodman Scholars, embarked on a trip that was the first of its kind at UVA. The Engineering in [a global] Context Program (EigC) was designed by the Rodman

Scholars Director, Dana Elzey, to give engineering students a chance to study abroad. Our group traveled to Stuttgart, an industrial and cultural center in southwestern Germany. A thriving city tucked within a picturesque rural landscape, Stuttgart was a perfect des-

tinuation to accomplish the goal of EigC: to explore the industry, education, and culture of the host country in order to establish a more global context for the engineering profession.

We all arrived in Stuttgart with the phrase “German engineering” stuck in our minds, but none of us were sure exactly what it meant. However, after visiting such well known companies as Daimler-Chrysler, Bosch, Mahle, MTU and Porsche, we learned some valuable lessons to bring back to the States. German engineering is rooted in innovation. Of the companies we visited, many were pioneers of their industries and continue to lead their field. The Ger-

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MARK YOUR CALENDARS!

- Tuesday, March 25
Rodman Dome Room Dinner
- Friday, April 5
Rodman-Echols Capture the Flag Challenge
- Friday, April 18
Team Rodman Relay for Life
- Wednesday, March 26, April 9, & April 23
Rodman Council Meetings

Rodman Outstanding Professor Award Recipient: Professor Robert G. Kelly

By Megan Bell

Professor Robert G. Kelly is a professor in the Department of Materials Science. He was recently nominated and awarded the Outstanding Professor Award offered by the Rodman Scholars Program.

This award is presented annually to someone who captures the students' atten-

tion and cultivates a sense of learning, excitement and fun for his or her subject matter. He or she stands out among peers as a person who works with the students to ensure their understanding, even when effort is required beyond the traditional hours.

Upon receiving the award, Kelly recalls, “I was

shocked, and at the same time I was deeply honored. I know how seriously the Rodmans take this award, and when I look at the list of previous recipients, I see a lot of teachers whom I deeply admire. I want to thank the students for this honor that means a great deal to me.”

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Robert G. Kelly

RODMAN PROFILE: GARY SHAMBAT



Gary Shambat

By Matt Rippe

This issue's Rodman Profile describes a college student who is both focused and hard working in his research on molecular electronics and optical filtering. Gary Shambat is a fourth year Electrical Engineering and Chemical Physics major in the Rodman Scholars Program who has been doing research in the field of nanotechnology for the past two years. Thus far, he has been awarded two Harrison Research Grants and was one of 317 students nationally to be awarded the Barry

M. Goldwater Scholarship in 2007, one of the most competitive research awards in the country. He has not yet published but hopes to do so in the current semester as he is submitting a conference paper to SPIE nanoscience and engineering conference on his work in optical filtering. He then plans on moving on to graduate school where hopes to obtain a PhD in Electrical Engineering and specialize in photovoltaics.

Gary has concentrated his research in two main areas: molecular electronics and optical filtering. As he was

applying for admission to UVA, he googled "UVA nanotech" to look for possible research opportunities. The first name that came up was John Bean, who he proceeded to email. By his second year he was working in Professor Bean's lab on molecular electronics, helping find new ways to improve integrated circuits for computer chips. Current computer chips will not be able to continue to grow smaller and cheaper as they have been doing for the past decades due to numerous physi-

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A LETTER FROM THE RODMAN CO-PRESIDENTS

EMAIL THEM AT [RODMANCOPRESIDENTS@GMAIL.COM!](mailto:RODMANCOPRESIDENTS@GMAIL.COM)

Dear current, prospective, and former Rodman Scholars,

As a first order of business, please join us in welcoming the Class of 2011 and our mid-year applicants into the Rodman program! While we have had a chance to meet almost all of our first-year Scholars, we look forward to getting to know the new Rodmans before our time at U.Va is up.

This has been a year of unprecedented growth and change in the Rodman Scholars Program. From a unity perspective, we kicked off the fall semester with an enhanced advising system for first year Rodmans, which we hope was beneficial and will continue next year. Monthly luncheons and open Rodman Council meetings

have maintained and even strengthened the bonds of friendship we formed our first year (and allowed for new inter-class bonds to be formed). In addition, we hope many of you enjoyed our newest Rodman Seminar – Wine Engineering – this past fall. We hope to continue and improve upon this and other exciting seminars in future years. From a technological perspective, our new user-edited wiki homepage

www.rodmanscholars.org) and developing alumni networking site www.rodysey.com) are extremely professional and will facilitate communication about and within the Rodman Scholars Program like never before. From a size perspective, the Class of 2011 with 63 students is the

largest Rodman class ever.

We have a lot planned for the remainder of the year. The Rodman Dome Room Dinner, complete with speaker and U.Va catered dining, is scheduled for March 25th. A final outdoors advising event will be possible with the departure of the cold, and a trip to a team-building ropes course facility is emerging as the lead candidate. We will be organizing as many as four Rodman Seminars the Fall semester, a larger offering to support our growing ranks. We currently are working on Rod-Sems about blacksmithing, futuristic dystopia films, wine tasting, and a new global trends seminar that would involve guest lectures from 8 non-engineering professors highlighting new paradigm shifts or emerging

fields in their areas of expertise.

Our main mission this year is to get you involved in our program. If you are a current student, we want to see you at our meetings and social events. If you are a former Rodman, look out for future reunions and join our networking site so that we can keep you informed. If you're picking up this newsletter to find out exactly what "Rodman Scholar" means, contact us and we'll be happy to schedule a time to meet with you.

It is your excitement and your involvement that drives this program.

Thanks and have a great spring!

Christina Stamper and Matt Fifer

RODMAN REFLECTIONS

By Vinu Ilakkuvan

From learning the programming language Pascal during his undergraduate years in the Engineering school to serving as Vice President for Business Development at Any Transactions, Inc., a start-up voice biometrics company, Andrew Cohen has worked with a range of technologies through the years.

Cohen graduated from the University in 1983, with a Bachelor's degree in Systems Engineering. He then stayed on for a fifth year to complete his Master's, also in Systems. Since graduating, he has spent 17 years at Accenture, three years at a small IT consulting firm called HPTi in Reston, Virginia, and is now with AnyTransactions, Inc.

Throughout it all, he said what he has liked best "is the opportunity to continue learning and growing. I've rarely been in a situation doing things I already know."

Cohen said that although he has known some things going into a job, he is always working with "new applications, new technologies, new markets."

He added that this constant process of "learning and growing" is a big part of what he learned at the University, especially through the Rodman program.

"The program gave us exposure to technologies and approaches to analysis and design," Cohen said. "It was unstructured, forcing us early on to be creative, even in defining the problem."

As a Class of 1983 graduate, Cohen was in the first class of Rodman scholars.

"We were kind of inventing the Rodman program," he said. "We could interpret requirements a little differently. I spent 20 years as a consultant, reinterpreting the way it was always done. The Rodman program was helpful preparation for being in those kinds of roles."

Another part of the Rodman program Cohen recalled was an emphasis on communication, in addition to more technical aspects of engineering. In addition, his Rodman class lived with Echols scholars their first year, just as Rodman scholars today do. Also similar to today's Rodmans, Cohen's class took a design course unique to the program.

"The design course was a big deal," Cohen said.

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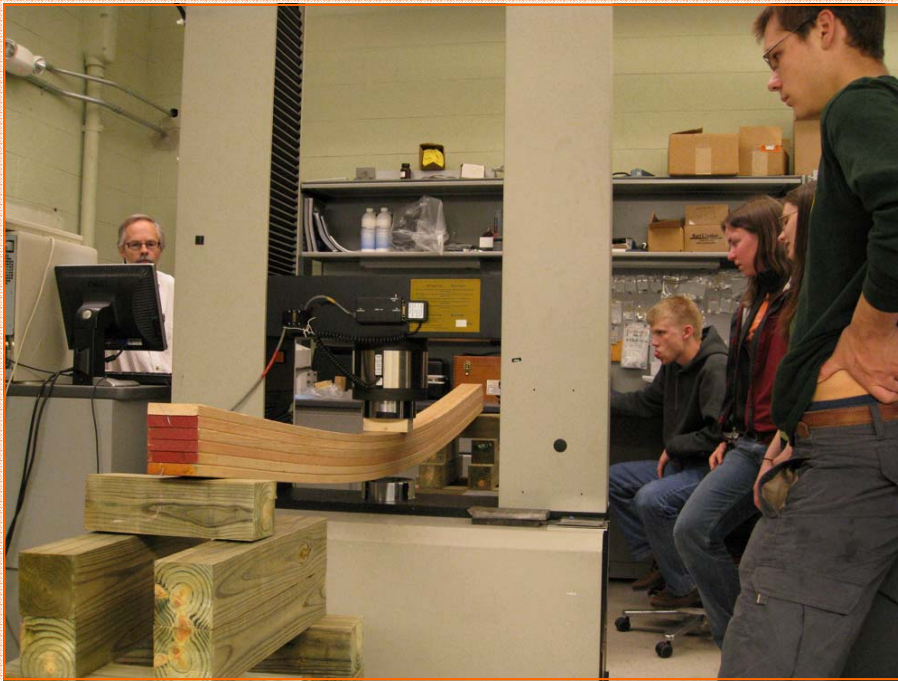
mans seem to be driven by progress; they innovate because it excites them. At the same time though, German engineering is organized. They do not innovate recklessly, but rather carefully, keeping tradition, sustainability, and ethics in mind. Their organization allows innovation to happen smoothly, from ideas, to design, to production. Out of this environment emerges a certain pride that must be associated with German engineering. From top-tier engineers to factory workers, the Germans care deeply about their work; their engineering is a reflection of themselves and of their country.

In the bubble of the engineering school, it is sometimes easy to forget what is going on in the real world. Unlike other disciplines, we tend to forget that there are people all across the globe practicing engineering. Although we share many common goals, these people have their own history, their own methods, and their own challenges. It was eye opening to realize this, and to see it first hand in Germany. Beyond the realm of engineering, it was awesome to experience the people and culture of another place. I could not imagine a more hospitable environment than the one we encountered in Stuttgart. Everyone we met was excited to join us in conversation, guide us in the right direction, or even speak to us in English, rather than German. We were given a positive view of globalization as we saw for ourselves the benefits of sharing ideas with people across national boundaries.

I hope that the success of the first EigC study abroad trip can open a new window of opportunities for engineering students at UVA. Currently, many more trips are in the works, including another to Stuttgart in 2008, and one to Istanbul in 2009. In addition, efforts are being made to expand engineering students' access to foreign language classes. Through EigC and other programs, engineering students will no longer just learn about globalization from a classroom in Charlottesville, they will have the ability to experience it on a personal level, in a way that they will never forget.



Evan Newkirk & Bobby Arthur - Rodmans '10 - at Schloss Lichtenstein



RODMAN SEMINAR UPDATE

Members of the Applied Medieval Warfare RodSem, taught by Rodman Program Director Dana Elzey, perform a bending test on wooden beams. Through the seminar, the team is attempting to build and test a ballista designed by Leonardo DaVinci. To their knowledge, the design has never actually been built; they are guided only by one of DaVinci's sketches. Is the design feasible? Look for more information in the coming months!

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cal effects at these small scales. In order to solve this problem, it was originally thought that we would have to totally replace the current silicon devices with some sort of molecule that could perform the same functions. It rapidly became apparent that this was not feasible and that we would have to find some way of hybridizing various technologies to make faster chips and streamline the production process. Currently, integrated circuits are made using a "top down" approach, requiring multiple complicated steps to deposit chemicals in very precise patterns, one on top of the other. Gary is working with Professor Bean and Dr. Lin Pu (of the chemistry department) to develop a method by which the circuits are made by self assembly.

This method of self assembly would involve depositing some pattern of molecules on top of a silicon wafer in order to alter the properties of that wafer in a desirable manner. This technique is largely unresearched so a great deal of preliminary studies are required, which is where Gary comes in. He uses his own techniques of chemical deposition to process the surface of the wafers in order to syn-

thesize the samples. He then spends a great deal of time analyzing the effects of the various molecules that have been deposited on the overall properties of the material. After he determines the changes that were induced by his experiments, Gary must outsource to other universities to use their more sophisticated equipment in order to continue to characterize the materials. He has flown to Rice University to perform X-ray Photoelectron Spectroscopy, through which he can determine exactly which elements are on the surface. Gary is mainly concerned with determining the surface state charge effects of the molecules which would lend knowledge as to how silicon devices change when molecules are added.

Gary has been working with Professor Bean on this project since his second year, but he did take a small break during the summer before his fourth year in order to do some research for the MITRE Corporation in northern Virginia. This is a non-profit government contractor concerned with research development. There, he worked on optical filtering, the ability to allow only certain frequencies of light to pass through a medium. This an important area of research, especially from a medical standpoint, in that healthy eyes

reflect light differently than do diseased eyes. Optical filters have been developed before in many different labs, but most currently can only filter a single wavelength of light. This is not very useful for the medical applications described above because your eyes reflect many frequencies of light at once, all of which cannot be seen by these single band filters. Therefore, MITRE is attempting to develop a multi-band filter using holes to alter the properties of the materials used. Gary is helping them by doing computer modeling simulations of the theoretical devices. He determines and models the most promising filter concepts by varying electromagnetic radiation codes and analyzing the virtual output. Collaborators at the University of North Carolina in Charlotte have begun to create the filters modeled by Gary. They have not yet been tested as the experiment is still underway.

After all of this experience in research, Gary does have some advice for other current undergraduates. His conviction was evident as he told me to make sure that I expressed the importance of undergraduate research. Undergraduate research, he says, is the only true way to get real experience in engineering, or any other field before establishing your career.

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“They were giving us unstructured problems and seeing what we did with them. It was a different kind of focus from any lecture or lab course – more of an application of everything we had learned, or hadn’t yet learned,” which, according to Cohen, was just motivation for learning even more things.

One more opportunity the Rodman program provided Cohen’s class was a computer programming course. “Everyone else learned Fortran, and they taught us Pascal,” Cohen said. The class involved interactive programming, with students working on a Cathode Ray Tube.

Besides being involved with the Rodman program, while he was the University, Cohen was also a member of the Engineering fraternity Trigon, a member of the Honor Committee, and in his third year – President of the student body. Cohen said he balanced his academic and extracurricular activities “as best as [he] could. I think that my academic time suffered. I was sucked into student government – it was exciting, and I just had to make time for both [student government and academics]. Both were important.”

Cohen’s involvement with the University did not end upon graduation. He has been a trustee with the U.Va. Engineering Foundation, serving two terms as a pro tempore (a non-voting member). He also returned to the University regularly for career fairs as an active recruiter for both Accenture and HPTi. Currently, he is the Co-chair for the Class of 1983’s 25th reunion, to be held in June.

He has also maintained connections with the University through other alumni. His wife is a class of 1982 Echols Scholar, and they were at her reunion last year.

“We actually didn’t meet when we were here [at the University],” Cohen said of his wife. They met through one of his wife’s classmates at a gathering of U.Va. alumni at a bowling alley in Northern Virginia.

Cohen’s connections with University alumni have also had an impact on his professional life. He became involved with AnyTransactions, Inc. approximately four years ago, when he saw Eric Tumperi, a class of 1983 Trigon brother and Chairman/CEO of AnyTransactions, Inc., at an alumni event.

“I had retired as a partner from the IT company,” Cohen said. “I was curious about

what Eric was doing, I asked ‘Do you need help?’, and he said, ‘Funny you should ask.’”

As is evident, Cohen’s connections with University alumni, as well as the University itself, have lasted long after his initial years at the University and as a Rodman scholar. As for today’s Rodmans, Cohen had some advice to pass on: he encouraged everyone to stay involved with the University after graduation in ways that are meaningful to them. He also added a few words about the Rodman Program in particular.

“When I joined the Rodman Program, it was great, it was exciting,” Cohen said. “It was up to us to give it meaning. From what I hear, it’s more defined, but it’s [still] up to students to make it meaningful. And my experience has been that more and more in professional and nonprofessional activities, that’s the kind of approach people are taking. More and more, companies are really relying on staff to define [things]. The Rodman Program is a great environment to try that in and learn how to do that powerfully and skillfully. The program will serve [current Rodmans] very well over and over and over if they realize that.”



THE RODMAN COUNCIL

Back Row (left to right): Dan Quinn, Matt Rippe, Blake Thomas, Matt Fifer, Ian Czekala

Front Row: Chris Heywood, Hallett Connor, Chris Belyea, Christina Stamper, Frankie Wolf, Bobby Arthur, Blair Stocks

rodchat

The Rodman Scholars' Newsletter

The Rodman Program

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UNIVERSITY of VIRGINIA

The Rodman Scholars Program is the honors program for the University of Virginia School of Engineering and Applied Science. Founded in 1979, it is dedicated to the development of the skills that will be most beneficial to engineering students both during and after college. Each year, approximately 60 first year students are admitted to the program, based on both their academic achievements and their potential to contribute to the engineering school and the U.Va. community at large. If you have any questions about the program, please contact Program Director Dana Elzey at dme2j@virginia.edu.

'RodChat - The Rodman Newsletter' is written and compiled by current Rodman students. If you have any questions or comments about the newsletter, have ideas for articles to include in the next issue, or would like to join the staff, please contact:

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This is not the first teaching award Professor Kelly has received while here at The University. In 1999, he received the H. H. Uhlig Award for young educators. In 2000, he was the recipient of UVa's Materials Science Engineering Undergraduate Teaching Award. Most recently, he was presented with the All-University Teaching Award in 2004.

By placing himself in a student's position, Kelly enhances his efficacy as an educator. "I see my role as that of helping students wrestle with challenging concepts until they...can apply their knowledge... I think students recognize that I am on their side in this fight."

Kelly's students are not, however, coddled through their classes. They are continually encouraged to deepen their understanding. "I set high standards, but I try to do all I can to help students reach

those standards. I hope that each student takes away from the course new skills, new knowledge and a new appreciation for the subject matter."

Kelly is currently teaching MSE 209: Introduction to the Science and Engineering of Materials and co-teaching MSE 301: Corrosion, Batteries/Fuel Cells along with Professor John Scully.

In 1997, Professor Kelly became an associate professor at the University of Virginia. Before teaching at the University, he received his Bachelor of Science for Biomedical Engineering and Materials Science & Engineering at Johns Hopkins University in 1984. He also received his Masters and PhD degrees at Johns Hopkins.

His current research focuses on corrosion and its effect on various alloy systems and aging aircraft. He also develops applications of his findings, including embeddable corrosion microinstruments and modeling electrochemical processes.