USING THE Wii FOR MORE THAN GAMES
ALUM AARON STRIEGEL (PAGE 12)

CYCLONE GAMER ZACH ELLSBURY
FROM AMES TO EA TO INTERCEPTOR (PAGE 10)

# CONNECTIONS

SPRING SEMESTER **2013**

## ECpE GAMING

A LOOK INSIDE THE STUDENT-RUN
GAME DEVELOPMENT CLUB

IOWA STATE UNIVERSITY
Department of Electrical and Computer Engineering

www.ece.iastate.edu
Learn Invent Impact

The Spring semester is in progress and a few changes to the department are, as well. We're updating our layout, in Connections (opposite page) and in Coover Hall, and we're excited for the possibilities.

Changes to the building's first floor are underway. We have already finished and opened the Transformative Learning Area (page 9), which features cutting-edge equipment within a large, open floor plan. It was our hope that students would use the TLA for collaborative learning, and early returns are confirming this. The TLA was step one in our plans for the first floor.

Step two, which began in January, is the merging of rooms 1212 and 1208 into the new Student Advising Suite. Our current arrangement of disconnected office space limits our ability to serve our growing student population. The new suite will feature offices for our student advising staff, support staff space, meeting space, and a seated waiting area for students and parents. An efficient and effective advising center is vital for our future growth and will improve our department's ability to serve its students.

In addition, the east entrance to Coover Hall is getting a facelift. We have removed the long-standing mural in the entryway to make room for a multi-flat-panel display, which will feature promotional information about the department, the college, and the university. Our aim is to make the screen a focal point for the building and a landmark for the department and the college. The screen will go a long way toward modernizing one of our busiest entryways.

The changes we are making reflect our dedication to the department and to the students within it. I am proud to direct the department through its newest evolution and I thank you for your continued support.

Best regards,

David Jiles

**David C. Jiles**
Anson Marston Distinguished Professor, and
Palmer Endowed Department Chair
Department of Electrical and Computer Engineering

## IN THIS ISSUE




Spring 2013 • Volume 29 • Issue 2

Editor: Brock Ascher

Contributing writers: Brock Ascher, Thane Himes

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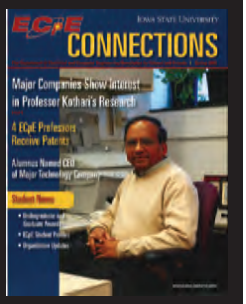
# THE NEW CONNECTIONS


"I know engineers. They love to change things."
- Leonard McCoy.



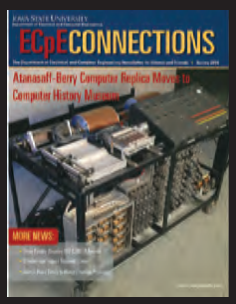

Welcome to the new Connections. It took some doing, but we've renovated our newsletter into something new, and we think you'll like some of the changes.

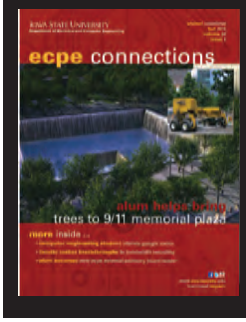
This issue marks the third major redesign of this publication since 2000 and first since the fall of 2010, but it's not just the design that has changed. Starting with this issue, Connections will feature longer, more in-depth stories on students, faculty, and alumni. We'll still deliver news and headlines – turn the page for those – but the bulk of the new Connections will consist of longer-form stories.

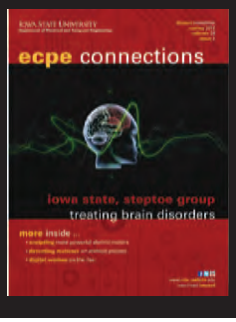
In addition, all of these stories will be exclusive to the print version, at least for a while. We'll still put them on our website, but not until well after the paper copy is in your hands. We want you to be the first to read these stories, and we want Connections to be the first place to get them.

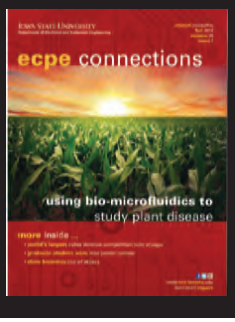
Finally, Connections will ship three times a year instead of two. Each semester, including summer, will have its own issue.

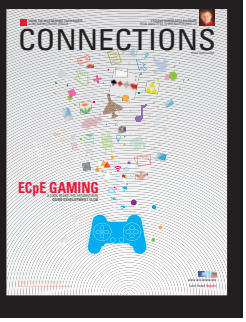
We hope you like what we've done with the place. If you have comments, questions, or concerns, feel free to email the editor, Brock Ascher, at ascher@iastate.edu.

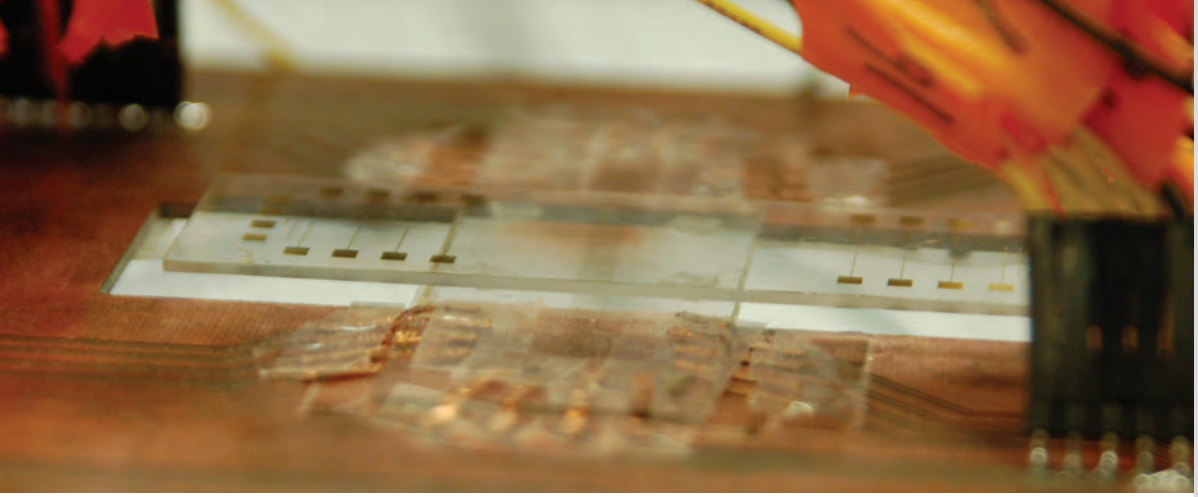












Liang Dong
Assistant Professor

# LIANG DONG FEATURED IN *LAB ON A CHIP* JOURNAL

## BY THANE HIMES

ECpE Assistant Professor Liang Dong's latest research recently was featured on the back cover of the journal, *Lab on a Chip*.

Dong's research project, which is a collaboration with Richard Martin, Professor of Veterinary Medicine at Iowa State, focuses on a high-throughput, low-cost way to monitor the movement of microscopic nematodes using a micro-electro-fluidic approach, as opposed to using an optical microscope and a video camera. The project is supported by the National Science Foundation, the National Institutes of Health, and the McGee-Wagner research fund.

"This is a chip-scale platform technology that provides a structurally simple, cost-effective, portable nematode tracking device," Dong says. "A traditional optical microscope is costly, large, and hard to carry around for field applications. Often, the number of nematodes simultaneously monitored is limited by the field of view of the microscope. Our micro-electro-fluidic approach can overcome these issues."

The primary element of the device is a set of microelectrode grids that are formed by orthogonally arranging two arrays of microelectrode lines. The arrays are spaced by a microfluidic chamber, which the nematode moves inside of.

"As a nematode moves inside the grids, its body may appear in several intersecting regions of the microelectrodes," Dong said.

Using the data gathered from the changes in electrical resistance, the physical pattern of the swimming nematode can be fully measured.

"No microscope or camera is needed," Dong said.

Dong believes his technology can benefit whole-organism bioassays in this regard. Typical applications of this data include screening drugs and chemical stress of nematodes by analyzing their movement patterns. The greater the movement of a nematode, the more resistant it will be to the drugs. Of the known nematode species, up to 33% are parasitic, causing diseases in plants, animals, and people. Parasitic nematodes are a particular problem in agriculture.

"Drug resistance has become a major concern in infecting nematodes," Dong said. "We believe this platform technology can contribute to speeding up the process of screening for drug resistance of parasites, for limiting spread of parasites, and discovering new drugs."

*Lab on a Chip* is a journal that focuses on work like Dong's: the miniaturization at the micro and/or nano scale, across disciplines like biology, chemistry, bioengineering, physics, and more. The journal releases 24 issues per year.



SPRING
# CALENDAR

MARCH 8
**Distinguished Lecture Series**
Babak Hassibi
3043 ECpE Addition, 1:10 p.m.

MARCH 18-22
**Spring Break**

APRIL 4
**ECpE External Advisory Board Spring Meeting**
3043 ECpE Addition

APRIL 5
**SE External Advisory Board Spring Meeting**
3043 ECpE Addition

APRIL 5
**Distinguished Lecture Series**
Robert Lee
3043 ECpE Addition, 1:10 p.m.

APRIL 12
**Distinguished Lecture Series**
Ahmed Tewfik
3043 ECpE Addition, 1:10 p.m.

APRIL 15-21
**VEISHEA**
Times and locations vary
www.veishea.iastate.edu

MAY 10
**Master's/PhD Pre-Commencement Reception**
220-224 Scheman, 4:15 p.m.

MAY 11
**Undergraduate Pre-Commencement Reception**
Benton Auditorium, 9 a.m.

MAY 10-11
**Commencement**
Hilton Coliseum

# SOMANI NAMED AAAS FELLOW

Arun K. Somani, Anson Marston Distinguished Professor and Jerry R. Junkins Chair Professor, was named a fellow of the American Association for the Advancement of Science (AAAS) and was honored at the association's annual meeting in February. Somani was honored "For distinguished contributions to the theory and practice of dependable computing and networking systems, including design, development, implementation, and building experimentation platforms."

Somani's current research includes work in processor design to increase performance, power and reliability; dependable networking using optical fiber technologies; and visual- and sensor-based asset monitoring of computer systems.

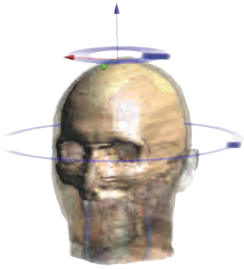
The AAAS is the world's largest general scientific society and publisher of the journal *Science*. The association includes 261 affiliated societies or academies of science and serves 10 million people. © Courtesy, *ISU News Service*

# CHARITABLE TRUST FUNDS BRAIN STIMULATION RESEARCH

The Roy J. Carver Charitable Trust of Muscatine, Iowa, recently committed $395,280 over a two-year period to establish a laboratory for brain stimulation research at Iowa State University.

"We believe this is an important area with a range of likely beneficial impacts for health care," said David C. Jiles, principal investigator for the project, and professor and Palmer Endowed Departmental Chair in Electrical and Computer Engineering at Iowa State University. "Most other organs in the human body have well-defined, well understood functions, but we know relatively little about the brain because of its complexity and its varied electrical functions as part of the nervous system."

One of the goals of the research is to find noninvasive methods of stimulating deep-lying regions of the brain that could provide treatment options for a wide range of issues – from concussion, depression and post-traumatic stress disorder, to degenerative issues such as Parkinson's disease and stroke.



Establishing a laboratory will enable the researchers to conduct research and develop better deep-brain stimulation methods involving both electromagnetic fields and ultrasonic waves. If the research achieves its objectives, a number of brain issues could be treated noninvasively, without resorting to surgery.

Jiles is partnering with researchers at Iowa State and the University of Iowa. Iowa State participants include Ravi Hadimani, a postdoctoral research associate, and Tim Bigelow, an assistant professor, both in the College of Engineering, and Anumantha Kanthasamy, the W. E. Lloyd Endowed Chair in Neurotoxicology in the College of Veterinary Medicine. Laurie McCormick, an assistant professor of psychiatry at the University of Iowa Carver College of Medicine, also will be involved. © Courtesy, *ISU Foundation*

## DEPARTMENT HEADLINES

### HADIMANI AWARDED FELLOWSHIP

Ravi Hadimani, postdoctoral researcher in the Department of Electrical and Computer Engineering, was awarded the International Young Scientist Fellowship by the National Natural Science Foundation of China. Hadimani will receive funding to travel to China and conduct research at the State Key Laboratory of Electronic Thin Films and Integrated Devices, and the University of Electronic Science and Technology of China this summer.

### JACOBSON WINS IEEE AWARD FOR EDUCATIONAL INNOVATION

Doug Jacobson, University Professor of Electrical and Computer Engineering and IEEE fellow, was presented with a 2012 Major Educational Innovation Award from the IEEE Educational Activities Board at a ceremony held in Austin, Texas, February 15.

The award recognized Jacobson's career in instruction and educational outreach, citing him for "creating innovative materials that support the teaching of information technology and information assurance to students of all ages."

### FAYED NAMED NSF CAREER AWARD WINNER

Ayman Fayed, assistant professor, was awarded a National Science Foundation (NSF) CAREER Award for his project "Multi-Frequency Multi-Output Switching Power Converters for Dynamic Energy Distribution in Highly Integrated Systems."

Fayed's project is two-fold. The research aspect will focus on finding new ways of saving power in hightech devices. The academic side of the project will focus on teaching power systems principles as part of the VLSI cirriculum in an attempt to better integrate the two fields.

MORE ONLINE

Keep up with the latest news online
www.ece.iastate.edu

Department

Students

Alumni

# GAMING AT ECpE

The Game Development Club, one of ECpE's fastest-growing student groups, teaches the tools, tricks, and techniques of game design.

BY BROCK ASCHER

Brian Kraus, Robert Romore, and Jacob Cramer are architects, but they don't build museums. They're designers, but they don't lay out magazines. They work with physics, but they're not physicists. All three are software engineering majors, but they consider themselves game developers at heart. Kraus, Romore, and Cramer build worlds, design characters, and program how they move with a few keystrokes and a lot of dedication.

Last May, the three joined with computer engineering major Brittany Oswald and others to found the Game Development Club (GDC), a student-run organization established to provide students with knowledge and support for game-related projects. The club, which has swelled from the four founding members to more than 170 in nine months, offers students the opportunity to experiment with a variety of game design tools.

"Plenty of students are interested in making video games," Oswald says. "There are lots of tools that are available that students might not be aware of. If we can teach some of these tools to students, or even just bring awareness to them, we can go a long way."

Game designers use a variety of tools to make their worlds come alive. The most important of these tools is the game engine, which serves as a framework for the game. The engine dictates how graphics are rendered, how physics are handled, how characters animate, and much more. Currently, one of the most popular game engines is the Unreal Engine, which was used in the development of top hits like Borderlands 2, Mass Effect 3, and XCOM-Enemy Unknown in 2012.

"We've introduced the Unreal Engine," Cramer says. "But it's a little complicated for beginners. Things like Unity, are a lot easier to get into and are a lot friendlier."

Unity, originally launched as a Macintosh-only platform in 2005, has grown to become the engine of choice for mobile game developers. According to Gamasutra, a site that focuses on game development, more than half of all mobile developers use Unity, making it the perfect engine for Kraus, Romore, Cramer, and Oswald to start with.

**Spudnik**
Kraus, Romore, Cramer, Plata and others are working on the mobile space shooter Spudnik in their spare time.

"We use Unity a lot," Oswald says, "but we also get into things like XNA, which is a C# development framework, Stencyl, and others. We try to make things as inclusive as we can."

The group doesn't only teach basic software skills. Often, the meetings include discussions on game design principles or larger, philosophical issues; such as the role of violence in games. Meetings can be hours of coding, but just as often they turn into a vibrant discussion on the merits of certain games and design elements.

Part of the group's purpose, along with teaching design tools and fostering discussion, is to actually make games, and teams within the club are doing just that.

## Space Shooter

Zach Plata is a composer, but he's not a music major. Plata is a freshman in the software engineering program and joined the club to compose video game music.

"It's very open," Plata says of the GDC, "There are lots of resources that we use and explore. Something I like about the GDC is that they let me focus on the musical aspect."

Plata uses Finale, a composing program, to arrange music.

"It's kind of like a blank palette," Plata says. "You just click along notes and figure out what kinds of sounds you want to use, instrumentation, that kind of thing. From there I can figure out what the team needs me to do. It's really easy just to let my imagination go."

Plata's musical talents and software engineering know-how make him a valuable asset to any would-be game design team. Kraus, Romore, and Cramer recruited him to help with their top-down mobile space shooter project, Spudnik.

"One of the things from last semester was NaGaDeMo (national game design month), where you make a game in a month," Kraus says. "The easiest way to describe [Spudnik] would be like a bullet-hill shooter, where you're at the bottom and you dodge asteroids as they fall down. Also, it's important to know that you're an astronaut potato, which is where the name Spudnik comes from."

The team emerged from the larger club and began work on Spudnik last summer. The team thought its astronaut potato angle was funny enough to work, but the project came together when one of Kraus and Romore's friends came up with the name.

"We knew we had the astronaut potato idea, and we were walking to lunch trying to think of a name," Kraus says. "One of our friends stopped mid-stride and said 'wait for it…Spudnik.' And our minds were blown right there."

The team made enough progress on the game that month to produce a playable demo with finished graphics and controls. Work continues on Spudnik, but the team is already branching out into other, more involved, projects.

"I'm wanting to develop a really complex game," Romore says. "My idea is a Minecraft-type game, but it would be set out in the universe. So you'd have a revolving planet with stars and stuff."

The group has different ideas on what to do next, but for them, that's what makes gaming so interesting in the first place.

## On Games

Video games are a malleable art form. They can take on any task and perform to any requirement the designer puts on them. It's no wonder, then, that the founding members of the GDC can interpret and appreciate the same game in such different ways.

"I recently started playing Dark Souls again," Cramer says. "It's really deliberate and there's a lot of really subtle storytelling in there. They don't tell you anything, but there's a lot of story stuff that's happening. If you want it you can have all of that, but if you don't you can just play."

"That's a game," Kraus says of Dark Souls, "That if you play for too long a time, it starts messing with your head. It can be suffocating. I really respect how they did that."

"I like Dark Souls, but that's a game that I like for the concept of the game," says Oswald. "I wouldn't play it – I don't like being afraid – but I'll watch as someone else plays and appreciate the design."

Oswald, in particular, has her sights set on using games and game design for more than just amusement.

"I want to make games that are beneficial for people, for teaching and learning," she says. "It's not just pure entertainment. There's a lot of potential to use it for more than just entertainment. For instance, I'm interested in virtual learning environments and how video games and virtual worlds can be better utilized in education."

Making a game, educational or just for fun, can be rewarding, but it can be a difficult and sometimes tedious prospect. The Spudnik team advises would-be game designers to expect this from the start.

"Right from the beginning, it really was much more tedious than we thought it would be," he says. "We were all excited and thinking 'we're

# Keep in touch

We want to hear about your career moves and personal news for future issues of *ECpE Connections*! Please fill out the form below or online at *www.ece.iastate.edu/alumni* (click Alumni News Form) to share your news.

Name: _____ Graduation year(s) and degree(s): _____

Address: _____ City: _____

State: _____ Zip code: _____

Country: _____ E-mail address: _____

Home phone: _____ Business phone: _____

News I'd like to share: _____

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# Support the Department

The ECpE department relies heavily on the support of our alumni and friends to ensure that students have access to scholarships and the latest lab facilities and classroom spaces, that faculty can continue to support graduate students and conduct state-of-the-art research, that department facilities remain updated for staff to do their jobs efficiently, and that student organizations and department events can continue to thrive.

If you would like to help the department continue to be one of the best in the country, you can support the department through several funds. Additional opportunities are available to support endowments and building space. Please check the appropriate box below if you want to offer your support today, or visit *www.foundation.iastate.edu*. For more information about the funds, contact the ISU Foundation's Adam Laug at 515 294-4883 or alaug@iastate.edu.

I'd like to support:

**Electrical/Computer Engineering Excellence Fund**

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**ECpE Coover Hall Building Project**

❑ $1,000 ❑ $500 ❑ $250 ❑Other $ _____

Please contact me about supporting:

- ❑ endowed chairs and professorships
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- ❑ laboratories and classroom space
- ❑ ECpE Coover Hall Building Project

Payment Type:

❑ Check enclosed (payable to ISU Foundation)

❑ Credit Card Select Type: ❑ Visa ❑ Mastercard ❑ Discover

Credit card number: _____ Name as shown on credit card: _____

Expiration date: _____ Cardholder signature: _____

***Thank You!***

**Mailing Instructions:** Detach this form along the perforated edge. Fold the form in thirds so that the ECpE address shows on the outside. Tape the form closed and place your stamp in the labeled box. If you're mailing a check, remember to completely seal the edges of the form or send the form along with your check in a standard envelope.

L-R: Brian Knaus, Brittany Oswald, and Robert Romore discuss game design.

going to make a game, it's going to be cool.' But it takes a lot of time, and you have to be prepared for that."

The work involved in making a game can be overwhelming, but it can be worth it for a particularly good idea. The Indie game scene on download services like Steam and Xbox Live Arcade can be a particularly friendly environment for good games.

"With all the tools that are available," Kraus says, "it's pretty cool what you can accomplish by yourself. It's exciting, getting into development now, knowing that if your idea is good enough that you could be the next Notch [Markus Persson, creator of Minecraft] or something like that – totally self-made."

All this hard work is driven by passion, and passion comes from experience. Each member of the team can cite specific games that displayed to them the promise of the medium. Everyone's game or moment is different, a fact that only adds to the inherent flexibility of the medium.

"The one for me is Zelda: Ocarina of Time," Romore says, "After I played that, I was just enthralled with video games. It's what introduced me to all the things that are possible."

"My favorite game growing up was Twisted Metal," Kraus says. "My cousins and I would play it when I was really little."

"I used to be a big fan of Final Fantasy," Plata says, but one of the biggest things that got me hooked was Mega Man Legends. I was really captivated by the whole adventure and that's what really got me started in games."

A good idea and some dedication can go a long way in the GDC. Still, Cramer offers a final piece of advice for would-be developers.

"You just have to get started."

# TLA OPENS

ECpE's new Transformative Learning Area is a cutting edge, collaborative space.

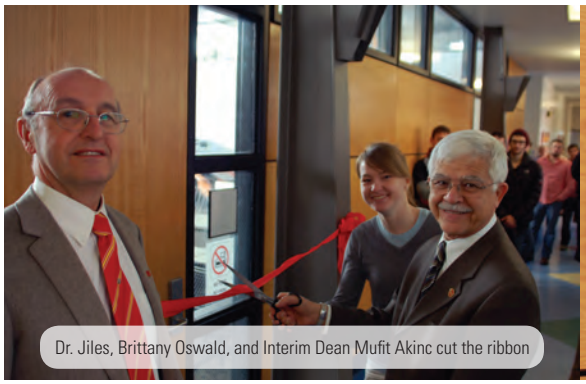
The Transformative Learning Area, ECpE's modernized and updated space within the old Coover High Bay Area, opened with a ribbon-cutting ceremony last December. David C. Jiles, Palmer Endowed Department Chair and Anson Marston Distinguished Professor, Mufit Akinc, Interim Dean of the College of Engineering, and senior CprE major Brittany Oswald, delivered remarks.

"The growing population of ECpE undergraduates has increased the department's need for adaptable space," said Jiles. "The Transformative Learning Area provides our students with a place to work, a place to learn, and a place to collaborate."

The space was designed with functionality in mind. In addition to banks of PCs and Macs, the TLA contains state-of-the-art lab equipment and large meeting areas. The idea was to create a collaborative learning space where students could work together and learn from each other. In addition, the space was designed to adapt to future changes in curriculum and trends in electrical and computer engineering, calling back to the original area's purpose.

"The original space was constructed to be adaptable to the changing needs of the department." Jiles said. "Today, we are continuing that approach."

Originally built to house power systems equipment, the Coover High Bay Area has seen many changes over the last 60 years. Prior to becoming the state-of-the-art TLA last December, the space was known as the Active Learning Complex from 1999-2012.



Dr. Jiles, Brittany Oswald, and Interim Dean Mufit Akinc cut the ribbon


The TLA sign, constructed of acrylic and stainless steel materials, ties the space to the style of the ECpE Addition.

# CYCLONE GAMER

## ISU alum Zach Ellsbury's journey from Ames to EA to Interceptor Entertainment

BY THANE HIMES

Zach Ellsbury
AI Lead - Rise of the Triad
Interceptor Entertainment
Founder - Seraphic Software

Zach Ellsbury is living the dream. Ellsbury is an Iowa State University alumnus who has done work for Electronic Arts, started his own software development company, and currently is working on a highly anticipated PC game; the reboot of the classic shooter "Rise of the Triad." All from his home in Des Moines.

Ellsbury always was a gamer, and when he arrived at Iowa State in 2006, he hoped to learn the skills necessary to work in the video game industry.

"I spent most of my time in the computer science program," Ellsbury said. "Whatever it is you want to accomplish with your degree, don't wait for your classes to get that for you. You get out of your degree what you put into it."

Ellsbury quickly learned that it's important to make your degree work for you, doing everything he could to cater his classes to what he wanted to do. For his final project in his Software Development Practices class, he and some of his friends designed a video game, a 4-player side-scrolling shoot-em-up that they called "Skyblitz."

"We got permission to make a game that fit the requirements of the course," Ellsbury said. "On the day my group presented, we brought an Xbox into the classroom. It was extremely fulfilling watching them pass the controllers around, enjoying something we worked on."

Ellsbury also took advantage of Iowa State's extensive selection of courses, seeking out elective classes that interested him. It paid off.

"I think ISU prepared me quite a bit," Ellsbury said. "I took an AI (Artificial Intelligence) course just for fun, and it turns out that that's actually been a core fundamental for my career. Three out of the four games I've worked on was for the NPC's (non-playable character) AI."

After graduating from ISU, Ellsbury attended graduate school at the Florida Interactive Entertainment Academy (FIEA), a video game development program at the University of Central Florida. At FIEA, Ellsbury worked on programming


for the FIEA Capstone project games Erado and Nexus, where he worked on general gameplay programming and the companion AI.

In his last semester, he was an intern for Electronic Arts, one of the largest video game companies in the world.

"The program [at FIEA] was very helpful in getting me situated in a very large company," Ellsbury said.

At EA, Ellsbury worked on the game NBA Live 13, focusing on the offensive AI. It was a big responsibility to work on such a prolific game series, and Ellsbury described his work on the game to be an eye-opening experience.

"It's difficult to truly appreciate just how massive big-budget games really are until you're forced to stare down the entire system and figure out where your bug is hiding," Ellsbury said.

When his internship was over and Ellsbury

Interceptor Entertainment's forthcoming first-person shooter, "Rise of the Triad" was named one of the 15 most-anticipated PC games of 2013 by Gameranx.com.

had completed grad school, EA offered him a full-time position. For family reasons, Ellsbury needed to turn the offer down and return to Iowa, but he was able to do work for EA out of Des Moines.

During that time, he started his own software development company, Seraphic Software. Through Seraphic, Ellsbury has done a great deal of web development work, including tournamentseeker.com. Ellsbury hopes to grow Seraphic into a gaming studio of his own, taking advantage of his industry knowledge from EA. For now, though, his company has been put on hold for his current project: working for Interceptor Entertainment, a Denmark-based game company with employees all over the world.

Making it in any part of the entertainment industry requires a high degree of self-motivation and good networking skills. According to Ellsbury, once you have the skills you need to work in the gaming industry, and you have a major company like EA on your resume, the offers will come.

"I got the job for Interceptor because I had reached out to them and asked if they needed any help with anything," Ellsbury said. "They were impressed with my experience with EA, and they invited me to work with them."

Ellsbury is the AI lead for "Rise of the Triad", responsible for the design and implementation of enemy and non-playable character behaviors in the game. "Rise of the Triad" is a remake of the classic 1994 shooter game, set for release via Steam in 2013. Gameranx.com, a video game news website, called Rise of the Triad one of the 15 most anticipated PC games of 2013.

Ellsbury has found the process of working with people all over the world very exciting.

"What's interesting about Interceptor is that the entire company is remote, so there's lots of Skype, we have weekly meetings on Team Speak, there's a lot of online interaction," Ellsbury said. "I was actually just working one night and I got a call from someone from Denmark and someone from New Zealand, and we just talked about how our work was going."

"Once things get rolling, it's amazing to see what you've accomplished," Ellsbury said.

# MORE THAN JUST FUN AND GAMES

Aaron Striegel
Associate Professor
Associate Chair
Notre Dame Computer Science and Engineering

ECpE alum Aaron Striegel's post-Iowa State story and using the Nintendo Wii to treat stroke victims

BY THANE HIMES

Department

Students

Alumni

At only 36 years old, Aaron Striegel's (BSCprE '98, PhDCprE '02) career has been phenomenal. Besides being an accomplished professor at the University of Notre Dame, his research has explored subjects from phone usage to using the Nintendo Wii to help stroke victims recover their balance.

When the Wii came out in late 2006, Striegel used it for a side project – teaching MATLAB – to teach basic concepts without bogging down students with heavy details. At the same time, Striegel worked with another professor who was in rehabilitation after a stroke.

"The question became 'Can we use the Wii to help a stroke victim recover'," Striegel said.

Striegel found that the Wii and its balance board accessory was effective at measuring balance, and far less expensive than machines specifically designed for this task in medical facilities. Using scoring systems on a number of different exercises, the Wii let patients quantify their recovery progress.

"For acute patients, it's very important to have quantified data," Striegel said. "It's good for therapists to have and it's a good way to show the payoff of a patient's trust in a therapist."

Striegel's research is still under development, but his system has already helped more than 100 stroke victims regain their balance. Striegel hopes to expand the use of the Wii to other kinds of patients, including those in orthopedic surgery, and possibly those with traumatic brain injuries.

Striegel grew up in northern Iowa, and came to Iowa State to study computer engineering.

"I came from a high school of about 50 students," Striegel said. "It was a big transition."

Striegel graduated in 1998, but later returned to grad school.

"When I was in grad school, I originally planned to return to the professional world, but then I took a class from a future advisor who made me work harder than I ever had," Striegel said. "I taught a class over the summer, and I just got hooked."

Striegel's enthusiasm for academia surged. He took a variety of classes, joined clubs, and practiced martial arts like karate and tae kwon do. His advisor, Manimaran Govindarasu, professor and associate chair of the Department of Electrical and Computer Engineering, pushed him to get his Ph.D. and to think seriously about conducting research.

Striegel earned his Ph.D. in 2002. He joined the Computer Science and Engineering Department at Notre Dame, where he continues to work as an associate professor and associate chair of the department.

"With my research and associate chair duties, I have a low teaching load, but I love doing it," Striegel said. "It's very fun teaching the lower level programming courses."

Striegel's hands-on teaching


style emphasizes interactive learning and demonstrating a topic's practical applications.

"Often you learn the best from your failures," Striegel said. "So the question becomes, how do you set up structured failure? How can I demonstrate these topics have real-world relevance?"

Striegel continues to conduct research projects in a variety of areas. One of his other most recent works involved networking research with cell phones. Striegel and his team gave 200 free phones to freshmen at Notre Dame under the condition that the team could monitor usage habits for two years. He's gathered data on everything from who the students call or text, data usage, where they are when they use their phone, and more. Striegel hopes to use the data to learn more about friendships in the age of smartphones and social networks.

"For the industry, it's hard to get social data because of privacy concerns," Striegel said. "But now we have two years' worth of data, which should give us real insight into user behavior."

Striegel advises current students to get involved in as much as they can.

"Enjoy a wide variety of courses, try not to hyper focus too much on a particular discipline," Striegel says. "Once you graduate, it's harder to broaden your horizons. The time to get involved is now."

Striegel has peer-reviewed research for 10 different journals, including *IEEE Transactions on Networking*, *IEEE Transactions on Parallel and Distributed Systems*, and the *Journal of High Speed Networking*. Striegel has supervised PhD and M.S. students, as well as many undergraduate projects. He also is an active member of IEEE and ACM.

IOWA STATE UNIVERSITY
**Department of Electrical and Computer Engineering**
**2215 Coover Hall**
**Ames, IA 50011-3060**

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# WHAT MAKES A GOOD GAME?

Connections asked a roundtable of Game Development Club members **Brittany Oswald**, **Robert Romar**, and **Brian Kraus** the question: "What makes a good game?"

***Oswald:*** It could be several things. It's just like asking 'what makes a movie good?' Maybe it's a good movie if it made you cry or made you laugh. Some games have different approaches to this.

***Romar:*** It varies, but the most important things are storytelling and the features of the game. Like I said, for me, [The Legend of Zelda] Ocarina of Time really introduced me to the possibilities of the medium.

***Kraus:*** The thing that I like most, and that I want to try to create is a game where decisions you make interacting with the game cause things that you didn't expect. I played Far Cry 2 over break, and that game is really good at emergent gameplay. You throw a molotov cocktail, and a brushfire would start. It would spread and you would get caught up in your own brushfire, completely by accident.

***Romar:*** I hope you learned your lesson.

***Kraus:*** Yeah, don't play with fire in the African Sahara. Anyway, there seems to be, like, three different trends in games right now. You've got games like Uncharted, that are moving definitely toward linear storytelling. You're seeing everything that the developer wants you to see. Then you've got games that go in the opposite direction, where it's just you interacting with the world. Minecraft for example. Where it's you telling your own stories.

***Oswald:*** Then you have games like Skyrim where there's the storyline that you can follow, but you can do anything else and maybe the developers want to leave things open-ended

***Kraus:*** I think all are valid. It's just whether you do it well or not.