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Envy labs, in the GAI building in Orlando.

ORLANDO: THE NEXT SILICON VALLEY

Orlando is rapidly emerging as a home to entrepreneurial and technological innovation. Hundreds of companies are being started each year here. Thanks in no small part to UCF, Orlando has a tremendous wealth of resources and skills, and a critical mass of skilled innovators and entrepreneurs. Orlando also has a network of angel investors and venture capitalists that are taking its entrepreneurial culture to the next level. Orlando has more than 5,000 technology companies and technology is its second-largest industry, employing 70,000 people (according to the Metro Orlando Economic Development Corp.).

The seeds for growth of Orlando as a tech giant were sown over the last 30-40 years when large companies working in the energy and defense industries began investing here. Energy companies that have invested here include Mitsubishi and, across the street from UCF, Siemens Energy. In the defense industry there are several large companies with a long term investment, including: Lockheed Martin, Northrop Grumman, L-3 Communications, and Harris. Since the modeling and simulation skills required by these defense companies can also be used for gaming, there have been major spin offs from the now large and established Modeling and Simulation industry, including Electronic Arts and over 400 other companies involved in digital media. Another positive for Orlando is that skilled people like living here and want to stay in the area.

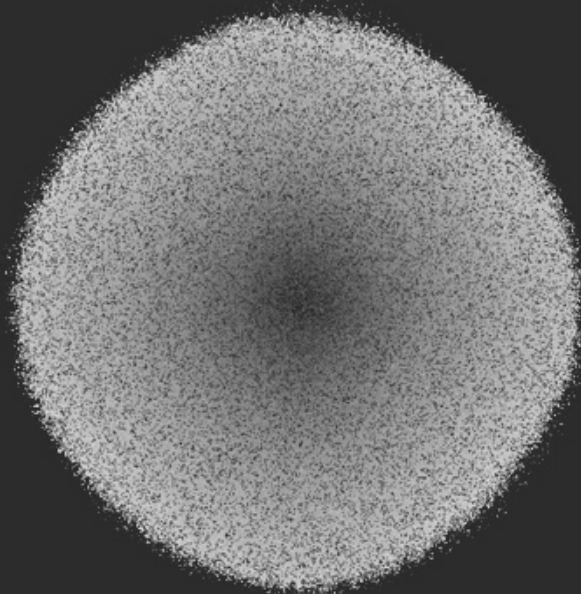
Orlando now has one generation of development of entrepreneurial companies. These innovative entrepreneurs find themselves in an ideal environment for starting companies, with cloud computing services providing an easy way to rent the infrastructure needed to run software. Furthermore, Orlando is the least expensive city in the US for entrepreneurs to launch a business (according to Boyd Co. of Princeton, NJ).

Two classroom experiences at UCF are designed to encourage the growth of this entrepreneurial spirit in Orlando. The first is the college's "Engineering Leadership and Innovation Institute," known as eli². This program, offered by our college of engineering and computer science, can be taken as a minor or as a certificate program. Students can get their feet wet by attending the eli² "Leaders Up Close" seminar series, which features many dynamic leaders including many CEOs, CIOs, and vice presidents from the IT industry. In the classes involved in the program they learn how to collaborate as a team as well as how to create and innovate. If their experience leads to a start-up idea, then they can get help and advice from UCF's new "Blackstone Launchpad," which is housed in the student union.

The second is the Senior Design sequence of classes in the Computer Science bachelor's degree program. This new course requirement (effective in the 2013-14 catalog) is modeled on the successful senior design course sequences in other engineering disciplines. Students work in teams and design and implement some significant project. The course is taught by Professor Mark Heinrich, who has had experience with two start-ups. We had a first run of this course sequence this past academic year, and I look forward to reporting more about it in the future.

Thanks to Oscar Rodriguez from the college's eli² program for help with this article.

UCF CS RESEARCHERS IMPACT UNDERSTANDING OF NATURAL EVOLUTION



A visualization reveals how evolvability increases in the simulation with distance from the starting niche, which is in the center of the image.

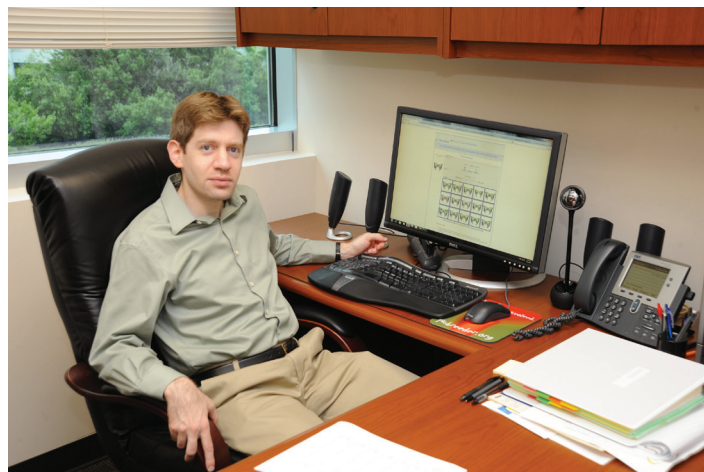
Experience with artificial evolution sometimes yields surprising insights into evolution in nature. In fact, one of these insights, from former UCF student and Ph.D. graduate Joel Lehman and UCF Professor Kenneth Stanley, ended up on the front page of Science Daily, a top website for science news. Most of the work from Professor Stanley's Evolutionary Complexity Research Group focuses on harnessing the power of evolution to produce artificial intelligence (AI). For example, their projects include evolving artificial neural networks (which are like miniature artificial brains) for such tasks as controlling robots and generating music. However, sometimes their results have much wider implications.

The novel insight that Science Daily reported on concerns a phenomenon called "evolvability," which refers to the ability of organisms to change over time through mutations. In a sense, evolvability is the fuel necessary to propel evolution. If mutations had no effect, or if they always led to a failure to develop, then there would be no variation from which evolution could select. Scientists have long observed that evolvability seems to increase over the course of evolution, but the explanation for this increase is not entirely understood. Conventional theories hypothesize that the evolutionary pressure to adapt itself encourages increasing evolvability.

In contrast to this conventional story, what Dr. Lehman and Dr. Stanley showed through computer simulations of evolution is that it is possible for evolvability to increase even without adaptive pressure. This result is very surprising because intuitively it would seem that evolvability would be the result of selection pressure, but it turns out that there is another explanation, as explained in their PLOS One article, "Evolvability Is Inevitable: Increasing Evolvability without the Pressure to Adapt": A genetic drifting process alone can lead to a separation of different kinds of organisms in which the more evolvable organisms separate more quickly from the less evolvable. This process ultimately can lead to evolvability increasing on average, even without direct selection pressure.

This result and consequent insight was sufficiently surprising and novel that it appeared not just as the top story on Science Daily, but on a number of science websites and blogs across the internet, including in a video from the Discovery Channel (available at <http://www.youtube.com/watch?v=jHQcKUJGZSM>, titled "Can We Evolve Without Competition?"). The main surprise is that an important facet of evolution appears not to require a selective explanation. Both Dr. Lehman (now a postdoctoral researcher at the University of Texas at Austin) and Dr. Stanley continue to run computer experiments to gain insight into the fundamental principles that guide evolution in nature.

The original PLOS One article is available at: <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0062186>.



Dr. Ken Stanley , Assoc. Prof. of Computer Science at UCF

ALAN WRIGHT HONORABLY MENTIONED AS CRA OUTSTANDING UNDERGRADUATE RESEARCHER



Alan Wright,
Undergraduate Student in Computer Science at UCF

Alan Wright was selected for Honorable Mention in the Computer Research Association's (CRA) Outstanding Undergraduate Researcher Award in 2013. Alan received this honor because he exhibited exemplary work and abundant potential in computer research. In 2011 Alan helped teach programming to high-school students on Saturday mornings for two semesters to help promote computer science in the community. He also participated in Research Experience for Undergraduates (REU) project funded by National Science Foundation during the summer of 2012. His mentors were Professors Mubarak Shah and Niels Lobo and a graduate student Enrique Ortiz. He worked on a "Face Recognition in Movie Trailers" project. A paper summarizing this work was accepted at 2012 IEEE Conference on Computer Vision, which is one of the most prestigious conferences in Computer Vision and has a very low acceptance rate. Alan did his internship at Microsoft, Redmond Washington during the summer of 2013. Currently, Alan is working on his Bachelor of Science in Computer Science with a Minor in Digital Media. This summer he will intern again with Microsoft. Alan commendably continues to maintain academic excellence in his classes, tutoring

for the Computer Science department and is currently continuing his research in face tracking.

In addition to the department chair recommending Alan for the award, two different faculty members had to submit nominations on his behalf, in order for him to be eligible. The awards are intended to support the need to encourage talented undergraduates to pursue computing research in graduate school or research related careers.

The Selection Committee for the CRA awards is comprised of faculty members from various North American colleges and universities. In regards to the 2013 Undergraduate Researcher Award, the Selection Committee wrote: "This year's nominees were a very impressive group. A number of them were commended for making significant contributions to more than one research project, several were authors or coauthors on multiple papers, others had made presentations at major conferences, and some had produced software artifacts that were in widespread use. Many of our nominees had been involved in successful summer research or internship programs, many had been teaching assistants, tutors, or mentors, and a number had significant involvement in community volunteer efforts. It is quite an honor to be selected for Honorable Mention from this group."

UCF CYBER DEFENSE CLUB WINS NATIONAL TITLE



UCF CCDC Team victory photo with the Alamo Cup
(Kneeling L to R): Kevin DiClemente and Alex Davis,
(Standing L to R): UCF Captain Carlos Beltran, Grant Hernandez,
Austin Brogle, Co-Captain Jason Cooper, Troy Micka,
Dr. Tom Nedorost, and Mark Ignacio

The UCF Collegiate Cyber Defense Competition Team captured 1st place in the Raytheon National Collegiate Cyber Defense Competition to win the National Championship and bring the highly coveted Alamo Cup home to UCF. UCF finished ahead of 9 other finalist teams including 2nd place winner Rochester Institute of Technology and 3rd place winner University of Alaska at Fairbanks. Other teams competing at Nationals this year included the University of California at Berkeley, Western Washington University, the US Air Force Academy, Dakota State University, Towson University, Northern Kentucky University, and Southern Methodist University.

What is even more impressive is that the UCF team has only been in existence for two years. During the team's inaugural season in 2013, the team won 1st Place in the Southeast Collegiate Cyber Defense Competition. This year, the UCF Team once again finished in 1st place at the Southeast regional which is held annually at Kennesaw State University in GA. "I knew we had something very special and unique in our team" said Dr. Tom Nedorost, the team's faculty sponsor and Computer Science lecturer.

Nedorost's intuition proved accurate when the UCF team finished in 1st place at the Raytheon National Collegiate Cyber Defense Competition in San Antonio, TX. "I couldn't be more pleased with the team and their performance this season," said Nedorost. Earning a combined total of 5335 points, UCF finished with the highest overall score besting 2nd place Rochester Institute of Technology by a healthy 171 point lead. UCF also earned the most points for Service by maintaining overall uptime of 91.82% for all services and lost the fewest points for SLA penalties which occur if a service remains down for 6 consecutive polling cycles. UCF earned the most points for Business Injects by submitting a whopping 78 professionally written injection response reports.

"Seeing a team formed in January 2013 rise to become the National Champion in Cyber Defense in its second season of competition is a clear indication that our students take cyber security seriously" said Nedorost. The team practices together 18 hours per week including two weekend nights and one weekend day. Between practices, team members are assigned topics and techniques to research and prepare to brief the team on at an upcoming practice session. "Participating on the team requires a serious time commitment...but I love it" said Team Captain Carlos Beltran. "In the competition, everything is hands-on, real time, real world....practical experience we don't learn in classes reading textbooks and answering exam questions" added Beltran. Nedorost agreed that the competition offers valuable hands-on experience for the team members.



UCF CCDC Team members actively engaged in managing the IT infrastructure for the fictitious Warp Core Gaming company at the Raytheon National Collegiate Cyber Defense Competition in San Antonio, TX. (Pictured L to R): Mark Ignacio, Grant Hernandez, Jason Cooper, Austin Brogle, Kevin DiClemente, Troy Micka, Carlos Beltran, and Alex Davis

While UCF is a relative new comer to this competition, the National Collegiate Cyber Defense Competition was established in 2005 in conjunction with the US Department of Homeland Security by the Center for Infrastructure Assurance and Security at the University of Texas at San Antonio. DHS recognized the extreme shortage of Cyber Security professionals in the workforce and sought a solution to improve awareness of cyber security and increase the number of highly skilled cyber security graduates entering the workforce.

The competition is held annually during the Spring semester. This year, 180 teams comprised of more than 2000 students entered the 3-tier elimination process. The teams initially compete in a state or virtual qualification competition. The top teams are invited to compete in their respective regional competition. The winning teams from each of the 10 US regions advance to compete at the National Competition in San Antonio, TX every April. During the 3 day competition, the teams take control of a fictitious small company network.



News of the National Championship victory quickly spread across the country. The UCF CCDC Team's photo was prominently displayed on an electronic billboard in New York City's Times Square on Monday, April 28, 2014.

break into the teams' networks and systems to steal customer data or confidential documents, deface the teams' website, change passwords and take control of the teams' servers, or delete files or entire servers. Teams lose points if (and when) their systems are breached by the Red Team. A team can recover some of the points lost to the Red Team if they are able to promptly identify the breach by the Red Team, take steps to contain/recover the damage, and promptly thoroughly document the breach, identify what information was compromised, and what steps they have taken to patch the vulnerability and recover from the breach.

The competition requires multidisciplinary skills from the team members and intertwines cyber security, system and network administration, and business policy and compliance. The theme and challenges change every year. This year, the fictitious company was Warp Core Gaming, a video game company that provided online video games and presented PCI compliance challenges related to customer credit card data. Last year, the scenario involved managing the IT department for the Clark County Detention Center (CCDC...get the pun) which included a jail management system and an online commissary where family and friends of inmates could purchase toiletries and snacks for their incarcerated relatives and presented some FISMA compliance concerns. The scenario the previous year involved running Go Mommy, a web hosting company whose client included Quickie Pills, an online pharmacy that presented many HIPAA compliance challenges.

The competition network simulates a typical small company network consisting of 50 to 100+ user accounts, 7 to 10 servers both physical servers and cloud based servers, multiple versions of Windows, Linux, and Unix operating systems, and common Internet services including web servers, mail servers, database servers, e-commerce sites, DNS and FTP sites. Competition Director Dwayne Williams stated "The scope of work a team is required to complete during the 3 day competition is equivalent to a full month of work for a typical small IT department."

More than two dozen prominent companies help sponsor the competition. Raytheon signed on as the title sponsor this year. The sponsoring companies hosted a recruiting reception one evening after the competition wrapped for the day. In addition to Raytheon, major companies including Boeing, Juniper Networks, Goldman Sachs, FireEye, Amazon, Walmart, Tesla, and others spoke with UCF team members about internship and full time career opportunities.

"I'm very optimistic about the teams' future" said Nedorost. All of the members on this year's championship team are eligible to compete again next year. "I am proud and honored to be able to work with this extremely talented group of students." However, training is on hold during the summer while team members are scattered across the country for summer internships. Team members have internships with Microsoft, Amazon, Facebook, Disney, FireEye, Citibank, HD Supply, and Guide Point Security this summer.

In May, the UCF CCDC Team was recognized at the UCF Board of Trustees meeting and luncheon. Later this summer, Raytheon is hosting the team for a visit to their Government Cyber Operations Center near Washington, DC.

The UCF CCDC Team members are part of the 200+ member Collegiate Cyber Defense Club @ UCF (aka Hack@UCF), a student club established in 2012 to promote a security aware generation in Central Florida. The club meets weekly during the school year, hosts cyber security guest speakers, provides training in offensive and defensive security techniques, and regularly participates in virtual international Capture-The-Flag competitions under the name KnightSec.

For additional information, visit <https://hackucf.org> follow them at <https://twitter.com/HackUCF> and <https://ctf-time.org/team/2500/> like them at <https://www.facebook.com/HackUCF> and join them at <https://www.facebook.com/groups/ucfccdc>.

Each competing team receives identical networks with the same hardware, software, applications, and many inherited vulnerabilities. A team earns points in several ways. The first is by maintaining uptime...keeping their team's network and servers fully operational while they rush to update, patch, and secure the servers and services running on them. The second way to earn points is by completing "Injects." Injects are typical business requests that an IT department would receive such as creating a new users' group with special permissions, migrating an e-commerce application from one server to a different server, or installing and managing a computerized access control system.

While the competing teams rush to complete these activities, a Red Team composed of volunteer professional Penetration Testers actively attempt to

2014 CYBER SECURITY CONFERENCE @ UCF



Mr. Donald Hale, Dir. of Gift Planning of UCF Foundation and Dr. Sheau-Dong Lang Assoc. Prof. of Computer Science at UCF



Ms. Sandra Osborne, Digital Forensics Unit, Orange County Sheriff's Office

The inaugural Cyber Security Conference @UCF was held on Saturday, March 15, 2014 from 8:30 AM to 12:30 PM on the UCF campus. The conference was organized by Dr. Sheau-Dong Lang, Associate Professor of Computer Science, and Mr. Donald Hale, Director of Gift Planning of UCF Foundation. A UCF alumna, Ms. Casey Swann, Class of 1983, sponsored the conference through a gift to UCF Foundation.

Speakers of the conference and their presentations included:

- Ms. Kristen Pratt, a current UCF student who has been the victim of a cyber-stalking case that reached national headlines, gave a testimonial a her cyber stalking incidents;

- Professor and Dean-Emeritus Jon Mills, from the University of Florida College of Law, presented a talk entitled "National Security and the Media vs. Individual Privacy: Who's Winning?"

- Ms. Sandra Osborne from the Digital Forensics Unit in the Orange County Sheriff's Office, presented a talk that discussed Florida's Computer Crimes Act and related computer laws, including cyber stalking, video voyeurism, "sexting," bullying/harassment, offenses against computer users; and provided a checklist for evidence needed when reporting a computer crime;

- Investigator Eric Walton of the UCF Police Department, gave a talk about computer-related crimes that occur on the UCF campus and nearby communities, and gave some crime prevention tips; Ms. Nasa Quba and Ms. Kausar Khiza, Forensic Consultants and UCF Alumni, presented a talk entitled "Security Risks of Mobile Devices And Their Mitigation";

- Associate Professor Dr. Cliff Zou of UCF Computer Science, talked about strategies and his research work on strengthening cyber domain security, including: botnet modeling, malware spreading trend detection, intelligent fuzzing tests for software vulnerability, and rootkit research.

- Dr. Sheau-Dong Lang, program coordinator of UCF's MS degree in Digital Forensics, talked about UCF's Master of Science in digital forensics program, the roles of digital forensics in cybersecurity, and shared some firsthand experience of a hacking incident investigations and related digital forensics issues.

In addition, UCF's Collegiate Cyber Defense Club members demonstrated security tools and provided a free CD of security tools to the attendees. The list of tools included on the CD are for the following applications: anti-virus, system optimization and cleaning, system backup and restore, file recovery, and anti-malware search and destroy tools.

This event was free of charge, and over 70 people attended the conference. The attendees included current students, UCF alumni, and citizens of the Central Florida community. More details including the conference agenda are available at <http://msdf.ucf.edu/cybersecurity/>.

SYNTHETIC REALITY RESEARCH BY DR. HUGHES



Virtual and robotic with virtual face; animatronic; fully robotic with virtual face

Avatar-mediated experiences are no longer limited to Hollywood movies. An advanced system, Avatar-Mediated Interactive Training & Individualized Experience System (AMITIES™), developed by the Synthetic Reality Laboratory (SREAL) under the direction of Professor Charles Hughes now makes it possible to remotely control one's avatar, in either a virtual or physical manifestation. Charlie, as he likes to be known came to UCF in 1980 to work with others in developing the newly-approved Computer Science (CS) PhD program. His research over the years has varied greatly, from theoretical work at the onset to his current applied focus. His SREAL lab's interdisciplinary research team, housed at the Institute for Simulation and training, is co-directed with Dr. Greg Welch, who holds a secondary joint appointment in CS. The images shown with this story are examples of multiple manifestations that can be controlled using AMITIES.

TeachLivE™, a collaborative effort with UCF's College of Education, is a prime example of the use of this technology. This application and its processes provide a teaching environment that supports teacher practice in classroom management, pedagogy and content delivery to 41 partner universities and 4 school districts across the US, with over 10,000 teachers already having experienced the system. It is estimated that each of these teachers interacts with at least 50 students a year resulting in an effective annual outreach of over 500,000 students. Each university partner utilizes TeachLivE™ in a unique manner depending on the needs of their students, teachers, professors, and community stakeholders. Moreover, studies have shown that four ten-minute TeachLivE™ sessions are sufficient to change a single targeted skill, e.g, increasing higher-order questioning.

The technological affordances of the AMITIES™ system allow users to have a sense of physical immersion in environments consisting of synthetic characters that exhibit a wide variety of appearances, cultural backgrounds, behaviors and personalities. In the case of TeachLivE™, teachers have the opportunity to experiment with new pedagogical or content delivery approaches without fearing the adverse consequences of failure or presenting any danger to the learning of "real" students in a classroom. In addition to professional development for teachers, AMITIES™ is used for workforce development (preparing people for job interviews), trainer development (preparing trainers to lead debriefing sessions), protective strategies development (preparing young people to address peer pressure) and enterprise culture development (preparing people to understand and be part of an enterprise's culture).

Charlie's current research funding is about \$5.3M, with projects being supported by the Bill & Melinda Gates Foundation, The National Science Foundation, the National Endowment for the Humanities and the Office of Naval Research.



The UCF CS team presents their research to the Fraunhofer Institute Department of Media Technologies.

CS AND CPE UNDERGRADUATE EXPERIENCE INTERNATIONAL RESEARCH

In March 2014, Dr. Avelino Gonzalez, a Computer Science (CS) professor, and three of his students visited Paris, France and Erfurt, Germany to share the results of their NSF-funded research with faculty and students at both locations. The research as well as the travel, was sponsored by the National Science Foundation under an International Research Experience for Students grant (IRES). The four-year grant, co-directed by Dr. Avelino Gonzalez of the CS Division and Dr. Ronald DeMara of the Electrical and Computer Engineering (ECE) Division of our EECS department, has allowed 11 different CS, CpE and EE students since 2010 to travel to Paris to take part in the research project. Several of the students participated in long term stays (one to six months duration) in Paris while working on their research.

In this most recent visit, the UCF team comprised of Dr. Gonzalez and three students, James Hollister (PhD, CpE), Clayton Barham (BS, CS) and Jorge Guerra (BS, CpE) participated in a workshop at the Universite de Pierre et Marie Curie in Paris (UPMC - also called Paris VI) along with their collaborator at UPMC, Dr. Patrick Brezillon, and his students. Dr. Brezillon, who is also a member of the research faculty at the prestigious Laboratoire d'Informatique de Paris VI (LIP6) is one of the world's leading experts on using the use of context in computer modeling of human behavior. His work on Contextual Graphs (CxGs) was the basis of the research conducted as part of this grant.

As part of the IRES research, the UCF team built a dialog management system that had been previously built at UCF, and incorporated CxGs to make it more resilient to the high word error rates encountered in the automatic speech recognition systems used to communicate with a Lifelike avatar. The Lifelike avatar research, another NSF grant also co-directed by Drs. Gonzalez and DeMara, seeks to represent virtual images of specific people who can communicate with a human user in natural spoken language using questions and answers. Another aspect of the team's IRES research was to have the lifelike avatar speak and understand French.

After participating in the workshop at UPMC, the group went to Erfurt, Germany to participate in a similar workshop with the Fraunhofer Institute for Digital Media Technology, Children's Media Department. The objective of this second visit was to disseminate the results of their work in the IRES project as well as to look for opportunities to collaborate in future research.

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