

# the debugger




Computer Science Department • Indiana University of Pennsylvania



Spring 2014  
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Dr. Waleed Farag  
Editor-in-Chief

Comments?  
Suggestions?  
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## EDITOR'S NOTES

At the beginning, I need to express my cheerfulness for being the editor of the IUP Computer Science Department's newsletter, the Debugger. This is the second year in which I am editing this long-standing newsletter, time really flies. I hope this release will give you quick updates on the status of our Department and I hope you enjoy them.

In this issue, one of our most senior faculty members, Dr. Sanwar Ali, presents a quick sketch of his career at IUP. Thanks, Dr. Ali, for this article. You have been a valuable member of our Department and the Department appreciates your sincere contributions. The next section is our usual News/Updates section that includes exciting Alumni updates and Department news. That section was compiled by our Secretary, Ms. Yvonne Dougherty. We do thank you, Yvonne, for that effort. For our Alumni, we are eager and proud to know about your stories. Please keep sending us your updates.

The Institute for Information Assurance held one of the most successful Information Assurance Days on November 7, 2013. That event featured outstanding speakers from academia, government, and industry. Many of its sessions have more than 150 attendees (see the IAD article). Updates on our well-established colloquium series are also provided.

To commemorate the Computer Science Education Week just celebrated last December, an encouraging article from csedweek.org site was included. Moreover, this issue briefly presents student club updates and some other news. My best wishes of an enjoyable reading experience.

Waleed Farag, Editor

## About Dr. Sanwar Ali

*Sanwar Ali*



Dr. Sanwar Ali joined the Department of Computer Science in fall 1999 as an associate professor. He was granted tenure effective fall 2004 and was promoted to a full professor in fall 2005. Since fall 1999, Dr. Ali has been teaching 11 different courses ranging from 100 to 400-level. During the last 15 years, Dr. Ali has been actively involved in numerous department committees. He served in the Department Curriculum Committee (DCC) from August 1999 to May 2012 and chaired it from August 2001 to May 2004. During his long-term involvement with the DCC, Dr. Ali developed a new course COSC427 Introduction to Cryptography, completely revised and updated the old course CO310 Data Structure to a new course, COSC310 Data Structure and Algorithms, and the old course CO345 Data Communications to a new course, COSC345 Computer Networks. He contributed in developing a new track, B.S. in Computer Science/Information Assurance, routinely reviewed syllabi of new courses and revisions of old courses, and contributed to program revisions of all four tracks: BA, BS/Applied, BS/L&S, and BS/IA. His contribution to DCC is commendable.

Dr. Ali served in the department ABET accreditation committee from August 2005 to June 2011 including as the coordinator from August 2006 to May 2009. He has been serving in the department faculty search committee since August 2000 and chaired it from August 2003 to May 2006. In addition, Dr. Ali served and chaired in the department evaluation committee for many years, and has been serving as a member of the department tenure committee and as the chair of the department promotion committee.

Dr. Ali served in several college committees, most importantly the college curriculum committee as a member from August 2001 to May 2004. During this period, he reviewed 180 proposals for new degree programs, new tracks, new courses and program, and course revisions. He was involved in the college liberal studies ad hoc committee as a member in fall 2009. Dr. Ali provided many services to the university. He served as an elected member in the University Wide Promotion Committee for six years from August 2005 to July 2011. He served as an elected Faculty Senator-at-Large for 13 years. In this capacity, Dr. Ali proudly served in several senate committees. He served as an elected member in the University Senate Research Committee from August 2001 to May 2006 and reviewed a total of 395 University Senate Research and Senate Fellowship

proposals during this period. He served as an elected member in the University Senate Academic Affairs Committee from August 2006 to May 2010 and reviewed credentials for nearly 40 nominations for Professor Emeritus status along with regular responsibilities of this committee. Dr. Ali also served in the University Senate Award Committee as an elected member from August 2011 to May 2013 and reviewed applications and supporting credentials from faculty members who contested for the senate research, teaching, service, and creative arts awards. Dr. Ali is also actively involved in APSCUF. He served as Rep. Council member for three years and has been serving as an elected legislative member (alternate). In August 2012, he was appointed by the APSCUP president to serve as a member in the legislative committee.

During the last 15 years, Dr. Ali received grants totaling \$51,500 as PI and Co-PI from PASSHE and a total of \$10,218 in senate travel grants and fellowship awards. In spite of the heavy teaching load in the department, Dr. Ali was able to produce 33 scholarly works that include journal and proceeding papers, and presentations in various conferences. In addition, he attended more than 20 conferences and professional workshops. Dr. Ali has been providing scholarly services on regular basis. He reviewed two book chapters for “The Handbook of Information Security”, a three volume comprehensive handbook on Information Security, published by John Wiley & Sons in 2005, the entire manuscripts of “Introduction to Network Security” by Neal Krawetz, published by Charles River Media in 2006, and a book chapter published in “The Handbook of Computer Networks” by John Wiley & Sons in 2007.

Moreover, Dr. Ali has been serving either as conference co-chair, chair of specific tracks, a member of the technical program committee, or as a reviewer of proceeding papers to numerous international and national conferences continuously since 2003. From January 2006 to May 2010, Dr. Ali served as an appointed President of the Education Committee for World Organization for Digital Equality, a Geneva based non-profit organization, whose primary function is to reduce the digital illiteracy in underdeveloped countries using cyber technologies. He was honored as the University Faculty Fellow for the John P. Murtha Institute for Homeland Security at IUP from May 2008 to April 2010. Dr. Ali received certificates upon the completion of various important training programs, such as IP3’s ‘IT Security Workshop: Strategy to Reality’, sponsored by IP3, Inc. at George Washington University, FEMA Emergency Management Higher Education at Emergency Management Institute, U.S. Department of Homeland Security, NSA sponsored Information Assurance workshop, Hands-on Network Security workshop sponsored by the DoD Information Assurance Scholarship Program at IUP, Colloquium for Information Systems Security

Education, sponsored by NSA in Washington D.C., a short course on ‘Public-Key Cryptography’, sponsored by American Mathematical Society AMS in Baltimore, the ‘Cybersecurity Basics’ workshop sponsored by the NSF at IUP, and the NSF Chautauqua Short Course on ‘The Mathematics of Cryptology’ in Baltimore.

Prior to joining at IUP, Dr. Ali taught physics and computer science in Texas, Tennessee, and Illinois for eight years. He holds an M.S. in physics from Marquette University, an M.S. in computer science from the University of North Texas, and Ph.D. in physics from Texas Christian University. He also completed a post-doctoral fellowship in electrical engineering at the University of Texas at Arlington.



## Alumni News/Updates

### UPDATES



#### Jesse Freese (1975)

President of Fissure, an innovative leader in providing simulation powered training. Ms. Freese's company received the Continuing Education Product of the Year Award from the Project Management Institute. The 2012 Best of the Best Award was issued for their SimProject, their online project management simulation for colleges and universities. The purpose of this award is to recognize exceptional professional development instruction and training materials for project management students, trainees or practitioners. To learn more about SimProject and the award received, here is the link: <http://www.fissure.com/best-of-the-best-award.html>.



Deanna Landers, Vice Chair; Dave Tillery, Developer; Lori Tillery, Developer; Jesse Freese, Fissure President; Peter Monkhouse, PMI Chair.

#### James H. Butler (1988)

James and his son Ryan visited the campus for the IUP History Day held March 8, 2013. He mentioned the work experience received during his Summer-Fall 1987 internship with Appleton Papers, Inc. was very useful and glad to see the internship program still a vital part of the Computer Science Department. We hopefully will see his son Ryan walk the halls of Stright Hall when he graduates in about five years.

## Barry Day Award – 2012-2013 Recipient



Barry Day Award Presentation – April 3, 2013

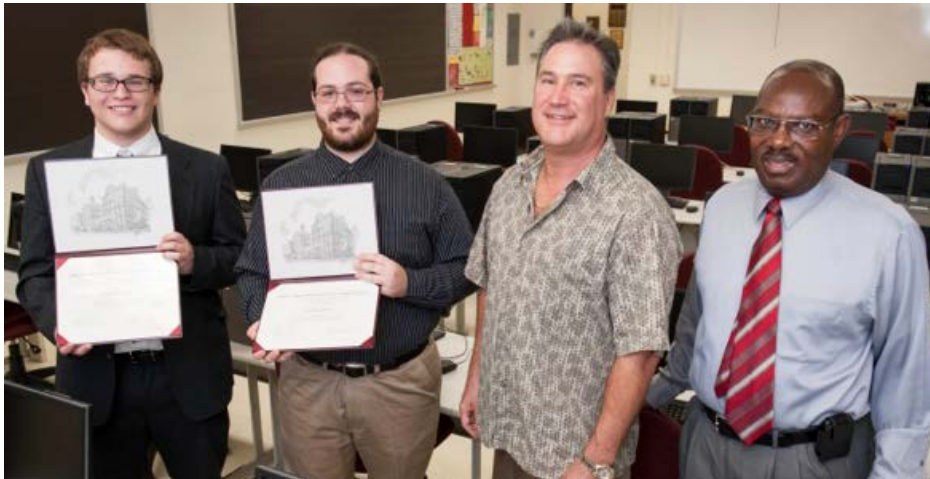
Dr. Deanne Snaveley (College of Natural Sciences and Mathematics Dean), Thomas Taylor (recipient), Barry Day (sponsor), Dr. William W. Oblitey (Computer Science Chair)

## James H. Maple Award – 2012-2013 Recipients



2012-2013 James H. Maple Scholarship Recipients – Jim Maple (1986), Nancy Maple, Kathy Maple, Brydon DeWitt (upperclassman recipient), Conner Tyger (freshman recipient), William Oblitey

## James H. Maple Award – 2013-2014 Recipients

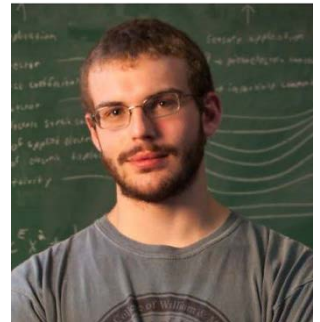


2013-2014 James H. Maple Scholarship Recipients – Samuel Grieggs (freshman recipient), David Kopczyk (upperclassman recipient), Jim Maple (1986), and William Oblitey (COSC Chair).

## Geoscience/Computer Science Student O'Hara Accepted to Summer Internship in Taiwan

Dan O'Hara, IUP '14, will be spending July and August 2013 at Academia Sinica in Taipei, Taiwan, as part of the Taiwan International Graduate Program. This competitive program gives undergraduates from around the world the opportunity to participate in cutting edge scientific research with scientists from the institute.

Dan will be working with Jian-Cheng Lee of the Earth System Science Program on active deformation in Southeast Taiwan. This work will be a natural extension of the research Dan has been doing with Jon Lewis, IUP Geoscience professor, on deformation offshore of Southeast Taiwan. Dan has been exploring the initial stages of arc-continent collision by modeling earthquake data provided by Ruey-Juin Rau of the National Cheng Kung University in Tainan, Taiwan.



## Graduate Updates

**Courtney Wirtz (May 2012)** – Air Force – Remote Aircraft Pilot

## Faculty Updates

### Fries Presents on Fault Diagnosis in Manufacturing Systems

Terry Fries, Computer Science Department, presented at the ninth annual Institute of Electrical and Electronics Engineers International Conference on Automation Science and Engineering in Madison, Wis., in August 2013.

The paper, "Automation of Rapid Faulty Diagnosis in Manufacturing Systems Using Multiple Fuzzy Agents," proposes a novel approach to quickly identify



and resolve costly faults in large-scale manufacturing systems. The conference was sponsored by the IEEE, the world's largest professional association for the advancement of technology. In addition, Fries presented two other papers in July: "Fuzzy Evolutionary Classification of TCP Packets for Network Intrusion Detection" at the Industrial Conference on Data Mining (New York), and "Conflict Resolution and Consensus Development Among Inherently Contradictory Agents Using Fuzzy Linguistic Variables" at the 10th International Conference on Cybernetics and Information Technologies, Systems and Applications (Orlando, Fla.), which received the Session's Best Paper Award.

### **Annual Alumni Homecoming Breakfast – Saturday, October 5, 2013**

For the second year, Computer Science and Mathematics co-hosted the alumni homecoming breakfast. Approximately 90 people were in attendance. Hopefully this event will continue to grow. We look forward to seeing you at our future homecoming breakfast.





## The 2013 Information Assurance Day

*Waleed Farag*

The Institute for Information Assurance at IUP with the help of the Department of Computer Science hosted the sixth annual Information Assurance Day (IAD) on November 7, 2013, 8:30 a.m. – 4:00 p.m., at the OHIO Room in the IUP HUB.



I am honored and at the same time so proud to report to you that this year's event was an outstanding success. This IAD brought out to IUP a number of distinguished security experts from academia, federal government, industry and the PA government, similar to the last year event. Moreover, attendance in almost all talks has approached and exceeded 150 attendees and thus we have chosen the OHIO room in the HUB for the first time to accommodate this crowd. The event was attended by IUP students, faculty, and staff particularly the IT-Support-Center personnel. Moreover, students and faculty members from surrounding colleges and members of the local community were among the attendees. The event was well-publicized in various IUP news outlets and the local newspaper. The IAD featured five talks that addressed a broad-spectrum of security topics that range from research-oriented to very practical security aspects of our daily digital life. My special thanks go to our Dean, Dr. Deanne Snavelly, who delivered the opening remarks for the event. I have the pleasure of giving the welcome message as the Director for Institute for Information Assurance at IUP. Below is a brief description of the five delivered talks.

The first talk, titled “Increasing Querier Privacy in Distributed Database Systems”, was presented by Dr. Adam Lee of the Computer Science Department at the University of Pittsburgh. Dr. Lee has strong research backgrounds that lie at the intersection of the computer security, privacy, and distributed systems fields. Dr. Lee received his MS and PhD degrees in Computer Science from the University of Illinois at Urbana-Champaign. In this talk, Dr. Lee presented a high-quality, research-oriented subject and shared with the attendees his experience introducing a novel system for the enforcement of querier privacy constraints on the execution of distributed database queries. The talk described SQL extensions that allow users to enforce strict privacy constraints or partially ordered privacy/performance preferences over the execution of their queries. Moreover, the talk addressed the implementation of a privacy-enhanced query optimizer for PostgreSQL.

Dr. Limin Jia, an Assistant Research Professor at Carnegie Mellon University's Electrical and Computer Engineering (ECE) Department, presented a state-of-the-art research topic titled "The design, implementation, and verification of an extensible hypervisor framework". The talk discussed an Extensible and Modular Hypervisor Framework that aims to achieve modular extensibility and automated verification. The proposed design was able to verify the memory integrity property of the system by breaking the verification process into two phases: identifying local properties required and an analytical proof that uses these local properties as assumptions to show that memory integrity property was held. Dr. Jia obtained her Ph.D. in Computer Science from Princeton University. Her research interests include language-based security, programming languages, logic, and program verification. Dr. Jia's research focuses on formal aspects of security. She is particularly interested in applying language-based security techniques as well as formal logic to model and verify security properties of software systems.

The third talk titled "Cybersecurity Jobs – the Reality" was presented by Ms. Caren Saxe of the U.S. Department of State. Ms. Saxe elaborated in the discussion on her long-term experience working as security engineer in the foreign service of the Department of State. Ms. Saxe is currently the Chief of the Information Assurance Branch (IAB) at the Diplomatic Security Training Center, a DHS Center of Excellence. Her center is responsible for providing cybersecurity role-based, instructor led training to the Department of State and other agencies through the DHS-sponsored Information Systems Security Line-Of-Business (ISSLOB) Program. In her talk, she provided realistic descriptions and practical advice about cyber-related positions in the government, the skills needed to perform them well, and the various methods of entry. To help students decide if a government position truly matches up with their career goals, she articulated several important recommendations that deemed very important to the students on the subject. Many people attended this talk which was concluded by a productive discussion during the Q&A session.

Dr. Isaac Porche of the RAND Corporation presented an extremely interesting and practical talk titled "Examining the Trade-offs Between Net-Centricity and Information Assurance". In his talk, Dr. Porche elegantly discussed the dilemma of providing for security while working on a totally heterogeneous environment. The presentation also addressed challenges of the level of connectivity and collaboration sought and appreciated nowadays. These challenges were compared to the level of information assurance needed. Trends in both connectivity and information assurance were presented along with the existing trade-offs that occur between them. Dr. Porche is a senior engineer at the RAND Corporation, where he

serves as associate director of the RAND Arroyo Center's Force Development and Technology Program. His areas of expertise include cybersecurity; network and communication technology; intelligence, surveillance, and reconnaissance (ISR); information assurance; and computer network defense. He has led research projects for the U.S. Navy, U.S. Army, the Department of Homeland Security (DHS), the Joint Staff, and the Office of the Secretary of Defense.

The last talk was presented by Cpl. Gerhard Goodyear of the PA State Police. Cpl. Goodyear's presentation covered the role of the State Police in the Computer Forensic field, and how forensics may be conducted. Additionally, brief case studies were introduced. Cpl. Goodyear has been with the state police for the past nineteen years. He is currently assigned to the Bureau of Criminal Investigation, Computer Crime Unit and conducts undercover investigations involving the use of computers of other electronic devices. He has been deputized by the US Marshals and is a member of both the state and federal Internet Crimes Against Children task forces. His talk was well-received and many attendees were actively participating in the discussion.

All in all, we had an exceedingly successful event in which high quality presenters delivered several state-of-the-art security-related topics. The event had also a very good turnout from IUP students, staff, and faculty members. Finally, my sincere thanks go to all who played any role and helped us to achieve such a brilliant Information Assurance Day.

For additional details, please check the event site at:

<http://www.iup.edu/page.aspx?id=103128>



## Colloquium Status

*Waleed Farag*



Dear Readers,

As the Department's Colloquium Series Coordinator, I would like to give you a brief status report on the progress of our series during the recent semesters. Over the past few years, our colloquium series has been a valuable resource to our students and faculty alike. Since 2006, our series has been a continuous success and featured several nationally known scholars in the field and also many of our alumni who showed willingness to share their real-life expertise and success stories to the newer student generations. Starting from last fall of 2013, our series featured a new interesting trend in which IUP faculty who had recognized recent research contributions were invited to present their experience to our students and faculty. Our department web site is always updated with plenty of information about each talk including talk abstract, date, flyer, presentation if any, and biography of speakers. Please check the following link for information about recent talks <http://www.iup.edu/page.aspx?id=72705>. For a complete archival list of all talks dated to 2006, please check this link <http://www.iup.edu/page.aspx?id=143354>.

In the fall of 2013 semester, two talks were presented. I had the pleasure of delivering the first one titled "Comparing Achievement of Intended Learning Outcomes in Online Programming Classes with Blended Offerings" on 9/24/2013. In this talk, I shared my research findings of a multi-year, in-depth quantitative study with the objective of assessing the effectiveness of delivering computer programming courses online and analyzing the quality of this delivery mechanism. The discussion addressed several aspects of comparing tradition/blended offerings with fully online offerings. This research was presented and published in the ACM SIG-ITE/RIIT International conference in fall 2012. It is worth noting that this paper won the best paper award in that conference, a significant achievement given the status of such a recognized ACM conference.

The second talk in fall 2013 was delivered on 10/16/2013 by Dr. Sanwar Ali and had the title "How is Quantum Cryptography used for Secure Financial Transactions?". This research was published at the Second International Conference on e-Technologies and Networks for Development (ICeND 2013) in Kuala Lumpur, Malaysia in spring 2013. In this talk, Dr. Ali briefly introduced the fundamental principles of Quantum Cryptography (QC), an increasingly important

technique to secure financial transactions. Dr. Ali also reviewed the systematic and chronological development of QC, pioneering methods of Quantum Key Distribution (QKD), QKD products, secure quantum networks, and how QC has been used to securely transfer funds in Europe.

The prior semester, spring 2013, has featured three talks in our colloquium series. The first one titled “An Introduction to API Design in Java” was presented on 3/13/2013 by Eric Stein. Mr. Stein is a software engineer who currently runs Fulminatus Consulting, a small company focused on the design and evolution of Application Programming Interfaces. This talk discussed high-level strategies for API design, and some best practices for implementation.

The second talk was presented on 4/24/2013 by Mike Tintera and Veliyan Georgiev of the UPMC IT Department. The talk discussed various opportunities for our students to join the UPMC IT staff and was an excellent recruitment chance for them. After the talk, the presenters were seeking resumes from our students in order to consider them for possible job careers at UPMC. The third talk titled “Software Development in an Enterprise Environment: A New Programmer's Perspective” was delivered by Martin Pardee on 5/3/2013. Mr. Pardee currently works as the head of technology in Citigroup's Buffalo office and has presented an interested talk on newer perspectives adopted while developing real-world software.

I hope this briefing managed to familiarize you with our series and please contact me if you are interested in presenting at one of our talks.



# Computer Science is Foundational

Source [csedweek.org](http://csedweek.org)

## What Is Computer Science?

Computer science develops students' computational and critical thinking skills and shows them how to create, not simply use, new technologies. This fundamental knowledge is needed to prepare students for the 21st century, regardless of their ultimate field of study or occupation.

Additional Background: Computer science education encompasses “the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society.” A few of the topics and activities that might be included in a computer science course include:

- Algorithmic problem-solving
- Computing and data analysis (managing, processing, visualizing and interpreting data)
- Human-computer interaction
- Modeling and simulating real-world problems
- Creating and manipulating graphics
- Programming (including game design)
- Security (including cryptography)
- Web design (illustrating principles of programming, human-computer interaction and abstraction)
- Robotics (designing and programming)
- Ethical and social issues in computing

Foundational computer science courses in K–12 teach the fundamental concepts of computing, much like a physics course teaches fundamental concepts around the laws of motion and energy. The new AP computer science course under development focuses around seven big ideas at the core of computer science—creativity, abstraction, data, algorithms, programming, Internet and impact—that are fundamental to computer science, but applicable to analysis in many disciplines.

## How is Computer Science Used in Various Careers?

Computer science develops students' computational and critical thinking skills and shows them how to create, not simply use, new technologies. This fundamental knowledge is needed to prepare students for the 21st century, regardless of their ultimate field of study or occupation.

**Additional Background:** In the 21st century, information technology is permeating many aspects of daily life and big data, software, and the Internet are being integrated into businesses and products throughout society. The knowledge and skills learned from studying computer science prepare students for careers in a variety of sectors. Examples include.

- In information technology—designing security software and hardware systems or developing mobile communication devices, networks and applications.
- In manufacturing—designing and using simulations to improve products. What is Computer Science and What do People Do Once They Know It?
- In healthcare—exploring the vast quantities of data produced by new DNA sequencing techniques, developing new remote monitoring systems for patients, or designing security and privacy for medical records.
- In retail—analyzing data to predict trends and improve inventory management.
- In weather forecasting—developing and interpreting models that predict the behavior of hurricanes.
- In the arts—designing new special effects for movies or composing digital music.
- In financial services—designing and overseeing automated trading services

The breadth of ways in which computing knowledge prepares people for multiple careers is borne out by looking at the people working in computing occupations by sector. In fact, over 70 percent of computing occupations are outside of the information technology industry: 9 percent are in information services, 12 percent are in financial services, 36 percent are in professional and business services, 7 percent are in government and public education services, and 12 percent are in manufacturing. The College Board states studying AP Computer Science can open the pathway to 130 career areas and 48 college majors.

Conversely, even those whose majors were not in computing often move later into occupations focused in these areas; of the 2.2 million workers in computer and

math occupations in 2009, 35 percent had computing or math-related degrees, 27 percent had degrees in other STEM fields, and 39 percent had non-STEM degrees.

Finally, an understanding of the core principles of computer science is key even for jobs not directly focused on computing skills--a June 2011 McKinsey Global Institute report predicts a shortfall of 1.5 million “data-savvy” manager and analysts by 2018.

For more information on computing careers see: <http://computingcareers.acm.org>.





## Club Updates

### **Computer Science Club** **Chance Feick**

As of Fall 2013, the Computer Science Club has continued to host bi-weekly meetings and a series of informal, student-led workshops. The purposes of these workshops are to create an environment where individuals are exposed to some of the latest and greatest technologies, as well as to promote the discussion of the latest industry trends. Each workshop typically begins with a presentation of some emerging technology, a discussion of the advantages and disadvantages, then concludes with demoing the technology. Among some of the topics introduced so far are AngularJS, Node.js, and Go. Fundraising efforts have continued as well, such as the selling of Computer Science Club t-shirts, and a bake sale. Our mission remains to assemble those interested and/or knowledgeable in the area of Computer Science to promote discussion, collaboration and advocating within the Computer Science field.

### **Information Assurance** **Collin Donaldson**

The Information Assurance club has meet biweekly to learn more about various types of viruses, hacking techniques, and IA related software through a mix of presentations and hands-on workshops. IA club was present to assist with Information Assurance Day and will be again next year. This semester IA club will continue learning about different viruses and hacking techniques, hopefully diving into some Unix and Linux as well. The club has also considered holding fundraisers to purchase a set of Raspberry Pi microprocessors as an introduction to Unix and programming on different platforms.





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