

# COMPUTERBYTES

2015

NMSU COMPUTER SCIENCE

Photo taken by high-altitude balloon, launched by GK-12 DISSECT. See page 8 for more information



Courtesy Photo

## TABLE OF CONTENTS

New Faculty: Dr. Wen Xu	2
New Faculty: Dr. Mai Zheng	3
New Faculty: Dr. Shaun Cooper	4
Faculty Highlight: Jay Misra Awarded Grant from Department of Defense	5
Student Highlight: Students in NMSU's Game Development Club Play Hard but Work Harder	6
Outreach Highlight: NMSU Program Manager and Alumna Named Among New Mexico Women of STEM	7
Outreach Highlight: GK-12 DISSECT High Altitude Weather Balloon Launch	8
Outreach Highlight: CS Adventures	9
Recent Ph.D. Graduates	10
Support NMSU Computer Science	11
Recent Publications	12



## Dr. Wen Xu

### NMSU's Latest Data Scientist

Wen obtained her bachelor's degree in Software Engineering in 2008 and master's degree in Computer Applied Technology in 2010 from Dalian University of Technology, one of the top engineering universities in China. During her master's study, she started to gain interests on Web search and intelligent information processing. Her graduate work developed an efficient approach to extract Web communities using both Web link and text analysis. As compared to the state of the art, the optimized strategy of computing lexical similarities of Web pages could handle a variety of real social communities.

In December 2014, Wen earned her PhD degree in Computer Science from the University of Texas at Dallas, where

she found her great passion in discovering valuable knowledge and spotting trends out of large volume of data. The great thing of being such a data scientist is to be 'part analyst, part artist'. The massive data is useless unless we could find some useful knowledge hidden in it. One of the interesting applications Wen has worked on is identifying a small group of influential customers by exploiting their social network data, which helps big companies to make smart decisions during product promotions.

Wen's research focuses on (a) theoretical results on the behavior of propagation models; (b) scalable algorithms for changing the behavior of these processes e.g., for immunization,

marketing etc.; and (c) empirical studies of diffusion on blogs and online social websites. The problems she studies are central in surprisingly diverse areas: from computer science and engineering, epidemiology and public health, product marketing to information dissemination.

Wen is an active member of participating the professional services. She has served in the program committee of the 8th Annual International Conference on Combinatorial Optimization and Applications (COCOA) in 2014. She has also been the publication chair and the finance chair in the IEEE International Conference on Mobile Ad-hoc and Sensor Networks (IEEE MSN) in 2014 and 2015.

# Dr. Mai Zheng

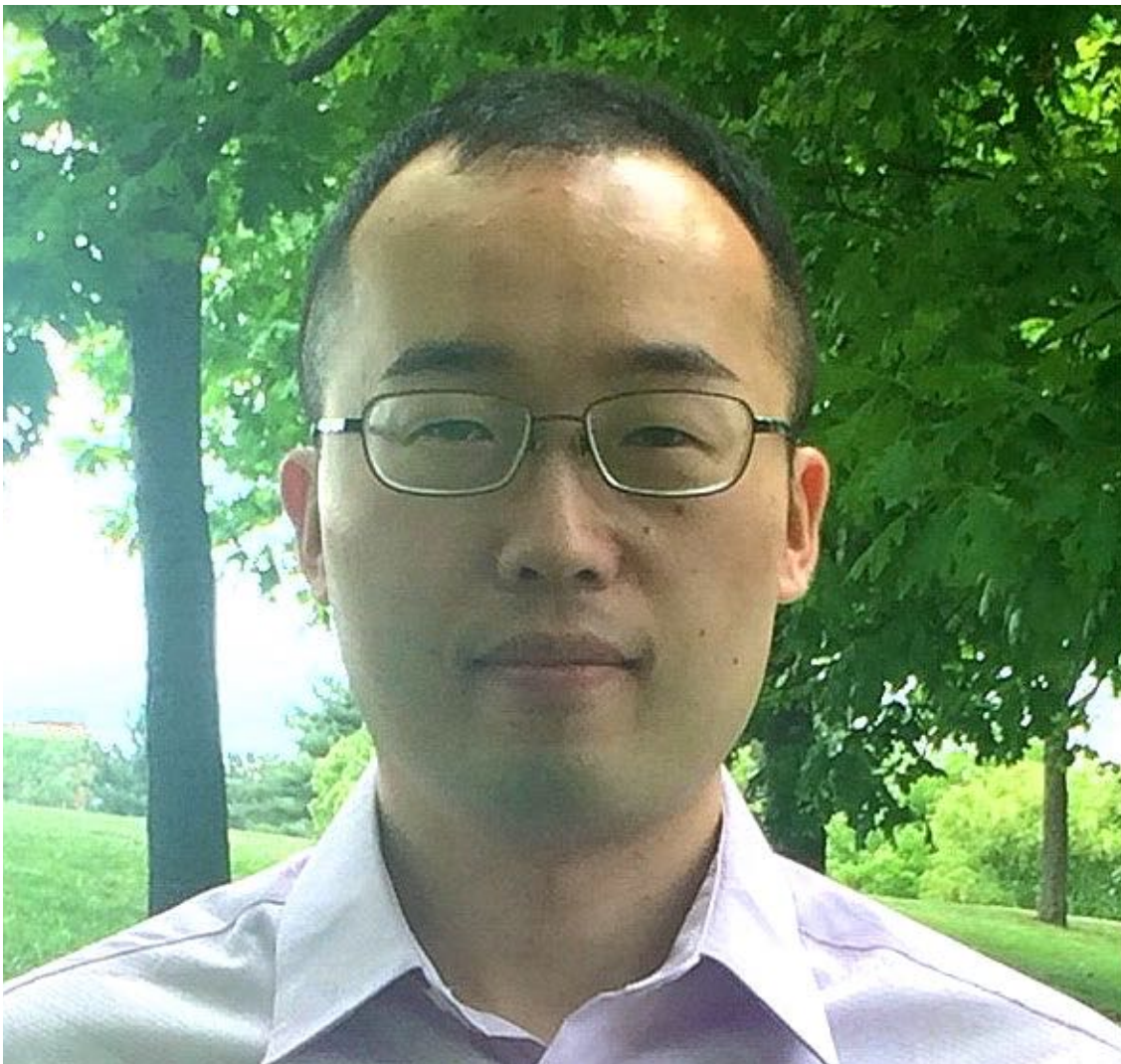
## Researching Storage Systems, Cloud Computing, and High-Performance Computing

Mai earned his bachelor's degree from Qingdao University, China, where he received the Yucai Fellowship and the Outstanding Undergraduate Student Award of Shandong Province, China. He earned his master's degree from University of Science and Technology of China and received the Huawei Fellowship. He joined the Ph.D. program in Computer Science at The Ohio State University in 2009 with the University Fellowship. He survived the program and earned his Ph.D. in 2015. He has been in close collaboration with HP Labs since 2012 and was a visiting scholar there in summer 2013.

Mai's research interests are in the broad areas of computer systems, including storage systems, parallel and distributed systems, operating systems, cloud computing, and high-performance computing. He is particularly interested in anything related to

data storage (e.g., non-volatile memory, file systems, cloud storage, data-intensive science, etc). He is starting the Data Storage Lab @NMSU, where members play with the latest storage technology and strive to advance the reliability, efficiency, and usability for data, for people.

Mai's work has been published in prestigious venues such as OSDI, FAST, PPoPP, etc., and has been reported by press including ZDNet, Slashdot, Infoworld, the RISKS Digest, etc. He has been the reviewer for IEEE Transactions on Parallel and Distributed Systems (TPDS) and IEEE Transactions on Computers (TC) since 2013. He will serve on the Program Committee for the 1st Workshop on Data-Centric Infrastructure for Big Data Science (DIBS'15, co-located with IEEE BigData 2015).



# Dr. Shaun Cooper

## NMSU Veteran Joins the CS Department

Shaun joins our team coming from a career in the professional sector. Shaun is native to Las Cruces graduating from Las Cruces High School in 1980. He earned a BS in Computer Science from the University of New Mexico in 1984, where he earned an outstanding senior awards from the Computer Science department as well at the University level. Shaun then attended the University of Texas earning his M.S. in Computer Science in 1988. In 1988, Shaun joined New Mexico State University (NMSU) in the Computer Center as a mainframe and UNIX systems programmer. Shaun earned his Ph.D. in 2000 from the NMSU Computer Science department researching the improvement of computer networks.

As an employee of NMSU for over 25 years, Shaun held many positions including Workstation Support Analyst, Manager of Workstation Support, Assistant Director overseeing Central Systems and Operations, Director of Security and Reporting Services, and lastly Chief Information Officer/Associate Vice President of Information Technology. As CIO, Shaun was responsible for strategic planning and operation of Information Technology for the entire NMSU system including the branch campuses. Shaun was directly responsible for the management of \$16M annual budget, 109 staff, 80 student

employees, and all of the core IT infrastructure covering networking, databases, and data. Of the many accomplishments at ICT (Computer Center), Shaun is most proud of his work in refactoring the Crimson Scholar Program which changed a manual, complicated, inconsistent process into an automated system which rewards high achieving NMSU students without any paper work or bureaucracy.

Shaun retired from NMSU in 2013 with the intention of returning to NMSU as a faculty member following a one year absence required by the New Mexico Retirement System. Shaun joined Computer Science part-time Fall 2014 and full-time Spring 2015. Shaun enjoys teaching, advising and, most of all, mentoring students on how to improve their personal skills in their quest for a successful career.

Shaun is a volunteer at Tombaugh elementary running a Science Program and is an 27 year active member of the New Mexico Supercomputing Challenge. This Fall Shaun will spend time at the high schools sharing the successes of the NMSU Computer Science department as well as working closely with NMSU Career Services to enrich the interactions between recruiters and our CS students.



# Jay Misra Awarded Grant from Department of Defense

## Towards Large-Scale Wireless Networks

NMSU CS Professor Jay Misra and his colleague Professor Hong Huang from the Klipsch School of Electrical and Computer Engineering was awarded a \$593,233 DoD grant for their project titled “Theories and Algorithms to Achieve Linear Capacity Scaling in Wireless Networks through Opportunistic Usage of Direct Energy Links.”

**Abstract:** “Large-scale wireless networks are central to the DoD’s vision of net-centric warfare. Past research has shown that the capacity of multi-hop wireless networks decreases as the number of nodes in the network increases. To achieve linear capacity scaling with increase in network size several significant limitations, such as long latency, high technical complexity, restricted traffic pattern, or infrastructure requirement, need to be addressed. Dr. Huang (ECE) and Dr. Misra propose to achieve close-to-linear capacity scaling through the opportunistic usage of directed energy (DE) links. The objectives of the project are to: 1) investigate the fundamental capacity limits of wireless networks with DE links, and the conditions under which close-to-linear capacity scaling is achievable; 2) investigate the practical network algorithms and protocols that can achieve close-to-linear capacity scaling. Previous research on DE links mostly focus on acquiring and maintaining reliable DE links. In this

research, the PIs aim to take a different approach and ask how best to utilize DE links even when they are unreliable and unpredictable. The PIs hypothesize that they can obtain a significant capacity increase in a large-scale network by averaging over many random unreliable DE links. Their approach is motivated by recent advances made in the network science namely, Kleinberg’s small world model, in which the network exhibits excellent performance when it is connected by a mixture of short-distance and long-distance links. Using a mixture of DE and omni-directional links, they hope to obtain similar performance gain. Scalable wireless networks are crucial to the DoD’s vision of net-centric warfare. The outcome of the research will provide an approach to close-to-linear capacity scaling that does not suffer from the limitations that existing approaches have. The project will enhance undergraduate and graduate students’ research experience in network science and will engage the participation of minority students at New Mexico State University. The project will also contribute to preparing students for employment by local area employers, which include a large presence of national laboratories and DoD establishments where network science has important applications.”

Dr. Satyajayant (Jay) Misra (left) and Dr. Hong Huang (right).





**“Game design is useful for students because it teaches them a lot of different things about, not only computer science, but also general system design at a very high level.”**

**Zachary Toups**

Photo by Darren Phillips

## Students in NMSU's Game Development Club Play Hard but Work Harder

By Dana Beasley  
(reproduced from the NMSU News Center)

Though many students have tried their hand at playing some sort of video game, it is unlikely that many could tell you the first thing about creating one — even if you offered them a cheat code.

For those interested in learning the practices behind video game creation — everything from crafting story concepts to coding — New Mexico State University's Game Development Club (GDC) has proved a valuable tool for numerous students from a variety of backgrounds.

“Game design is useful for students because it teaches them a lot of different things about, not only computer science, but also general system design at a very high level,” said Zachary Toups, assistant professor of computer science and faculty adviser for the club.

While the technical aspects of what students learn are applicable across several disciplines, Toups asserts that approaching these subjects through game design has a major advantage: students are actually interested in it.

“They're excited,” Toups said. “They're kind of intrinsically motivated to come out and to work on a project — in this case a project with over a dozen

people, with different specialties, with different roles in the project.”

With a major priority being female and minority engagement, the club has partnered with NMSU's student organization Women and Minorities in Computing for several campus events.

“The Game Development Club continually strives to be as diverse and open-minded as possible,” said Tony Varin, assistant club adviser and employee with NMSU's ICT department. “We aim to recruit interested members from all backgrounds, which provides us with a wide range of ideas and skills.”

With many new members, the club has developed and continues to work on multiple game concepts applicable to mobile devices, traditional game consoles and computers, or for use with an Oculus Rift virtual reality headset.

Some of the GDC's projects will take years to finish, while others act more as exercises and can be developed in as little as one day.

“Using the tools and experiences we've gained through the fund, our ultimate goal is to bring a product to

market and try to fund our club through sales,” said Varin. “Our club doesn't require a lot of money to sustain itself, but being able to upgrade our equipment and continue to bring experts out will be where we need the funds.”

“In my opinion, the most important aspect of the Game Development Club is the chance to bring together like-minded individuals and have them collaborate on new ideas, see the joy in the brain-storming sessions, and, in many cases, have students speak in front of the team who normally don't like to speak in public at all,” Varin said.

For Jonathan Beck, co-leader of the GDC and double major in computer science and engineering physics, the club is built around helping others and “giving them an environment where they can really learn and expand together.”

Regardless if they choose to pursue a career in game development or design, club members acquire a number of skills that are useful from a computer science, software engineering, system design, and even social perspective.

For more information on NMSU's Game Development Club, visit [web.nmsu.edu/~tonyv/](http://web.nmsu.edu/~tonyv/).

# NMSU Program Manager and Alumna Named Among New Mexico Women of STEM

For Their Contributions in Motivating Young Women!

By Minerva Baumann  
(reproduced from the NMSU News Center)

Rebecca Galves and Patty Lopez are among 17 women across the state honored this month for their contributions in motivating young women to pursue education and careers in science, technology, engineering and math (STEM) fields.

Galves, manager of NMSU's Young Women in Computing program over the last five years, and Lopez, a senior platform applications engineer with Intel who earned her bachelor's, master's and doctorate from NMSU, were selected along with women from a variety of organizations including universities and colleges across the state as well as Albuquerque Public Schools and Los Alamos and Sandia National Labs.

"I am honored to be included with this group of outstanding women in NM," Galves said. "But my inclusion is a mere representation of the phenomenal work performed by our entire YWiC team. This group, including the founders, helped to establish the highest level of service and creative programming that isn't found anywhere else in the country."

Lopez, who has seven patents in software and hardware and was among the first women to earn a Ph.D. in computer science at NMSU, has received



**"My inclusion is a mere representation of the phenomenal work performed by our entire YWiC team."**

Rebecca Galves

numerous honors for her volunteer work. She is also a founding member of the international Latina's in Computing organization.

"As a distinguished alumna of New Mexico State University, it's been a privilege to work with Rebecca Galves, and the YWiC program," Lopez said. "I've mentored several of the YWiC alumna, who are now stepping up as leaders and mentors for the next generation of young women. I look forward to meeting the rest of the honorees and continuing to provide opportunities for these young women to engage and excel in STEM."

Galves has watched the numbers of women enrolled in computer science at NMSU triple since the program began in 2006, due in large part to the pipeline of middle and high school girls who have participated in various YWiC programs.

"Informal education programs like YWiC provide specialized, hands-on training in computing and STEM fields that allow young women the freedom to impact and own their learning," Galves said. "By providing a solid base to grow from, YWiC alumni are empowered to embrace their interests and continue

building on their fantastic ideas to be developed into next-level projects and research experiences. That is what keeps young women interested in computer science and STEM. That is why it's critical to provide this opportunity for young women."

The cover of the New Mexico Women of STEM calendar will feature Jill Hruby, who was recently appointed manager of Sandia National Labs, and is the first woman to hold that position. Each month will feature a different "STEM Sunflower." The theme symbolizes the spreading of seeds to a younger generation of female STEM professionals.

The calendar was the brainchild of Supercomputing Challenge program manager Patty Meyer who said of project, "It will show all young women, regardless of race or background that they can succeed in STEM careers too."

The Supercomputing Challenge, one of the main sponsors of the calendar, recently wrapped up its 25th year of introducing middle and high school students across New Mexico to the combined power of supercomputers, modeling and problem solving.



Taylor Burgett (fourth from left) and the rest of the crew before the balloon launch.

Courtesy Photo

## GK-12 DISSECT High Altitude Weather Balloon Launch

By Raena Cota

On July 11th, 2015, Taylor Burgett, a graduate student in the Klipsch School of Electrical and Computer Engineering at NMSU and a GK-12 DISSECT fellow, launched a High-Altitude Weather Balloon from Hatch Valley High School (HVHS). Taylor Burgett started working on this project in the Spring 2015 school year, with students from Arrowhead Early College High School/Medical Academy as part of the DISSECT program. Students in teacher Christin Slaughter's Earth Science classroom, assisted in building the payload for the weather balloon.

The spring semester ended before the weather balloon launch could take place, so the launch was integrated into the CS Adventure summer camp, hosted by the GK-12 DISSECT and iCREDITS programs. The weather on July 11th was great for the launch, with low morning temperatures (~70F) and a predicted high of 90F.

The launch crew consisted of Taylor Burgett, and two EE undergraduate students Mark Alarcon, and Melissa Moreno. The crew and observers (CS Adventures participants and their families) arrived at HVHS at 8:30 and started to put each part of the apparatus together. The crew checked each sensor to make sure they were working properly and the parachute and line were unrolled and checked for knots. The latex balloon was unrolled and carefully filled with helium, the crew very carefully closed the opening to prevent the helium gas from escaping and then proceeded to connect the line with the parachute and payload attached. One last check, and we were ready launch. After release the balloon rose quickly, but was in sight for at least 5 min following the launch.

Once the balloon was launched the crew was able to track the balloon using the spot tracker app. The balloon was tracked over the Caballo Mountains

headed northeast, towards the Spaceport. The balloon reached a max elevation of 94,898 feet (~18 miles) and the total flight time was 3 hours and 16 minutes. After the balloon had landed and stopped moving, the crew went on a mission to recover the payload. They ended up getting permission to travel on private land to recover the payload, which had landed in a bison farm northeast of Elephant Butte Lake. Nine hours after the launch the payload was successfully recovered.

The GoPro camera captured shots of the Spaceport, White Sands National Monument, Elephant Butte Lake, the Caballo and San Andres Mountain ranges, and the Rio Grande. The students were excited to see the pictures and to pick out the landmarks.

For more information on the GK-12 DISSECT Program, please see our website at: <http://www.cs.nmsu.edu/gk-12/>.



CS Adventures summer camp participants post for a group picture.

## CS Adventures

By Rebecca Galves

The NMSU Department of Computer Science, along with the GK-12 DISSECT and iCREDITS Programs, hosted a two-week summer camp with the focus of bringing computational thinking and introducing smart grid technologies to area high school students.

CS Adventures 2015 was a day camp held on the NMSU campus from 10 AM-3 PM, Monday-Friday, July 6 – 17, 2015. The camp hosted 30 high school students, of which 47% were young women and 60% self-identified as Hispanic. Participants were provided with lunch, materials and supplies, swag (such as shirts, bags, notepads, and pens), and a stipend. Camp instructors were NMSU GK12, iCREDITS, and YWiC graduate and undergraduate students.

The summer camps are tailored to achieve four major goals:

- 1) Build community among students through hands-on projects in computational thinking, smart grid information, and computing technologies;

- 2) Increase student's interest in computational and smart grid technologies;

- 3) Gain knowledge and experience in introductory programming; &

- 4) Drastically increase all students' confidence in programming, computational thinking, and smart grid technologies.

Each goal was achieved through specific sets of activities implemented in the summer camp. Participants learned programming, computational thinking skills, and smart grid information through a variety of interactive software and hardware tools, including Parallax Boe-Bots, Arduino Solar Tracker, Solar Panel Car with Arduino, and App Inventor.

The CS Adventures 2015 summer camp was a resounding success, and the Department will continue with this outstanding effort in the summer of 2016.



## Recent Ph.D. Graduates

**Onwards to Make a Difference in the World!**

Please join us in congratulating Drs. Federico Campeotto, Saurabh Gupta, James Obert, Rajaa Shindi, and Yang Zhang (pictured above), who successfully defended their Ph.D. dissertations in the previous 2014-2015 academic year.

Dr. Campeotto's dissertation is on "Exploring the use of GPGPUs in Constraint Solving." He is advised by Dr. Enrico Pontelli and is now a software engineer at MathWorks.

Dr. Gupta's dissertation is on "Applications of Distributed Constraint Reasoning Framework for the Control and Management of Customer-Driven Micro-Grids." He is co-advised by Drs. Enrico Pontelli and Satishkumar Ranade from Electrical and Computer Engineering. He is currently an applications engineer at Oracle.

Dr. Obert's dissertation is on "Differentiated Multipath Security in Fixed Bandwidth Networks" and he is advised by Dr. Inna Pivkina. He is currently working at Sandia National Laboratories as a Computer Scientist

Dr. Shindi's dissertation is on "An Interactive Brain Training System for Children With Low Match Achievement and Attention Disorder." She is advised by Dr. Enrico Pontelli and is currently a Systems Administrator in the Department of Institutional Analysis and teaches computer science at Doña Ana Community College.

Finally, Dr. Zhang's dissertation is on "Nonparametric Statistical Methods for Biological Network Inference." He is advised by Joe Song and is currently a Scientist at Amyris.

When asked for their advise to current and aspiring graduate students, Federico enthusiastically shared, "be curious!" James chimed in, "During the research process, it is advisable to reach out to fellow researchers to gain perspective and share ideas. This exchange of ideas is essential in helping you clearly define your contributions and in identifying proper venues for publication." Finally, Saurabh added, "Perseverance is the key to success. Seek opportunities to share your knowledge and expertise."

## OUTSTANDING STUDENT AND FACULTY AWARDS FOR 2014-15

### Outstanding Teaching Assistant Awards

Gaurav Panwar  
(*Spring 2015*)

Mohammed Tanash  
(*Fall 2014*)

### Outstanding Research Assistant Awards

Ping Hou (*2014*)

### Outstanding Graduate Faculty Award in Teaching

Shaun Cooper (*2015*)

### Outstanding Graduate Faculty Award in Mentoring

William Yeoh (*2015*)

# Support NMSU CS

## We Need You!

If you are an alumnus or alumna, current student, or just a friend of the NMSU CS Department, and you would like to support our activities and mission – Thank You! There are many different ways to give back to the department.

The simplest way is to make a donation. Your donation will support the students pursuing their educational dreams, through scholarships, renovation of equipment and acquisition of materials and supplies. You have also the option of supporting our faculty members, enabling them to be more effective in their research and educational efforts. In particular, we are launching a new campaign at creating new opportunities to help young women interested in pursuing studies in Computer Science.

Your donation is tax deductible and even a small contribution will make a big difference! Donations can be made using the online NMSU donations system at [fndforms.nmsu.edu/giving.php](http://fndforms.nmsu.edu/giving.php).

The following are some of the funds that you can contribute to:

- Young Women in Computing  
*(Supporting outreach efforts to attract women to computing)*
- Mark Nesiba Memorial Endowed Scholarship for Women in Computing  
*(Supporting a talented undergraduate woman in Computer Science)*
- Richard H. Stark Scholarship  
*(Supporting outstanding undergraduate CS students)*
- Founders' Endowment Fund  
*(Supporting faculty in the CS department)*
- General Scholarships Fund  
*(Supporting outstanding undergraduate and graduate CS students)*
- Equipment and Maintenance Fund  
*(Supporting the CS department in renovating its infrastructure)*
- Software and Educational Materials Fund  
*(Providing students with funds to acquire software and other educational materials)*
- J. Mack Adams Fund  
*(Supporting the establishment of an endowed professorship in CS)*

## DONATION TIERS

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Donors will be acknowledged  
in the newsletter and on our website.

# Recent Publications

## What Your NMSU CS Students And Faculty Members Have Been Up To

- W. Alhohlani, J. Cook, J. E. Cook.** *Accurate Statistical Performance Modeling and Validation of Out-of-Order Processors Using Monte Carlo Methods*. International Performance Computing and Communications Conference, 2014.
- F. Fioretto, T. Le, E. Pontelli, W. Yeoh, T. C. Son.** Exploiting GPUs in Solving (Distributed) Constraint Optimization Problems with Dynamic Programming. *International Conference on Principles and Practice of Constraint Programming*, 2015.
- Y. Hao, H. Cao, C. Hu, K. Bhattacharai, S. Misra.** *K-anonymity for Social Networks Containing Rich Structural and Textual Information*. Springer Social network analysis and mining journal, 2014.
- Y. Jin.** *Unifying Router Power Gating with Data Placement for Energy-Efficient NoC*. International Symposium on Computer Architecture and High Performance Computing, 2015.
- S. Misra, N. E. Majd, H. Huang.** *Approximation Algorithms for Constrained Relay Node Placement in Energy Harvesting Wireless Sensor Networks*. IEEE Transactions on Computers, 2014.
- J. Obert, I. V. Pivkina, H. Cao, H. Huang.** *Dynamically Differentiated Multipath Security in Fixed Bandwidth Networks*. IEEE Military Communications Conference, 2014.
- H. N. Sharma, Z. O. Toups, A. Jain, A. Kerne.** *Designing to Split Attention in a Mixed Reality Game*. Symposium on Computer-Human Interaction in Play, 2015.
- T. C. Son, E. Pontelli, C. Baral, G. Gelfond.** *Exploring the KD45 Property of a Kripke Model After the Execution of an Action Sequence*. AAAI Conference on Artificial Intelligence, 2015.
- A. Sosa, R. Stanton, S. Perez, C. Keyes-Garcia, S. Gonzalez, Z. O. Toups.** *Imperfect Robot Control in a Mixed Reality Game to Teach Hybrid Human-Robot Team Coordination*. Symposium on Computer-Human Interaction in Play, 2015.
- S. T. To, T. C. Son, E. Pontelli.** *A generic approach to planning in the presence of incomplete information: Theory and implementation*. Artificial Intelligence, 2015.
- Z. O. Toups, W. A. Hamilton, C. Keyes-Garcia, S. Perez, R. Stanton.** *Collaborative Planning Gameplay from Disaster Response Practice*. Symposium on Computer-Human Interaction in Play, 2015.
- W. Xu, H. Chen.** *Scalable Rumor Source Detection under Independent Cascade Model in Online Social Networks*. International Conference on Mobile Ad-hoc and Sensor Networks, 2015.
- W. Xu, W. Wu, D. Du.** *Nonunique Probe Selection*. Encyclopedia of Algorithms, Springer, 2015.
- J. Zhang, J. Yu, W. Pei, X. Li, J. I. Said, M. Song, S. Sanogo.** *Genetic analysis of Verticillium wilt resistance in a backcross inbred line population and a meta-analysis of quantitative trait loci for disease resistance in cotton*. BMC Genomics, 2015.
- Y. Zhang, L. Z. Liu, M. Song.** *ChiNet uncovers rewired transcription subnetworks in tolerant yeast for advanced biofuels conversion*. Nucleic Acids Research, 2015.
- M. Zheng, J. Tucek, F. Qin, M. Lillibridge, E. Yang, B. Zhao.** *Reliability Analysis of SSDs under Power Fault*. ACM Transactions on Computer Systems, 2016.

## Contact Us

If you are an alumnus or alumna of the NMSU CS Department, we want to hear from you! Let us know what you are doing so we can share your successes.

Please join our Facebook page ([facebook.com/NMSUCS](https://facebook.com/NMSUCS)) and follow us on Twitter ([twitter.com/NMSUCS](https://twitter.com/NMSUCS)) and help us develop a community of NMSU CS Alumni and Friends. If you are in the neighborhood, please come by and visit! Or simply send us your ideas: your experience is valuable to assist with development, to help our students connect with alumni and potential employers, and to grow into a bigger and stronger department.

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