This year has been another one which has seen solid growth and pending changes for the Department of Computer Science. First, Dr. J. Donald Nelson and Dr. Mark Kerstetter retired from WMU at the end of December 2015. Dr. Nelson has been at WMU since 1970 and has served as chair of the department several times. Dr. Kerstetter has been at WMU since 1977 and has been a dedicated and effective teacher his entire career. The Department will miss these two fantastic colleagues.

Over the past year, our faculty have received three National Science Foundation grants and one Qatar Foundation grant to study cloud-based memory resource management, intelligent transformation systems, high-performance big-data computing and cloud-based software testing. Congratulations to Drs. Al-Fuqaha, Saeed and Z. Yang. In addition, Dr. Ajay Gupta has been elected as the vice chair of the IEEE Computer Society Technical Activities Committee. It has been an excellent year of recognition for the Department’s faculty.

Over the next year, we expect to hire two new faculty in the areas of computer security, big data or the internet of things. This will represent a big change in the department as we hope to bring in young talent dedicated to undergraduate and graduate education. In addition, we are beginning our first classes in the new Data Science major administered jointly with the Department of Statistics. Finally, we are looking to increase our offerings in computer security significantly.

I hope you are doing well. Please don’t hesitate to drop me a note at steve.carr@wmich.edu. I’d love to hear from you.
The Department of Computer Science is pleased to announce the formation of the Center for High Performance Computing and Big Data. The Center’s co-directors will be Dr. Elise DeDoncker, Dr. John Kapenga and Dr. Fahad Saeed. The Center will support Big Data science projects using high performance computing resources from the High Performance Computational Science (HPCS) Lab facilities. These facilities include a high performance computation cluster installed in 2012 with funding from a $289,574 National Science Foundation Major Research Instrumentation (MRI) grant to support interdisciplinary projects in computational science and engineering.

The National Science Foundation (NSF) has awarded a $400,000 grant to Dr. Steve Carr (WMU, co-PI), Dr. Laura Brown (MTU, PI) and Dr. Zhenlin Wang (MTU, co-PI) for their project titled “Adaptive Memory Resource Management in a Data Center - A Transfer Learning Approach.” This project will focus on the effective management of memory resources within a cloud computing data center (DC) using transfer learning. Cloud computing has become a dominant scalable computing platform for both online services and conventional data-intensive computing. By sharing computing resources among a large set of subscribers, a cloud computing data center (DC) provides a cost effective means to give users access to computational power and data storage that is not practical in an individual setting. To guarantee Quality of Service (QoS), a DC often has to over-commit its resources to meet the goal. This proposal focuses on the effective management of memory resources within a cloud computing DC using transfer learning.
Dr. Fahad Saeed, PhD joined Western Michigan University's College of Engineering and Applied Sciences in January of 2014, having previously worked at The National Institutes of Health. Since his arrival at WMU, he has been awarded a National Science Foundation Genome Sequencing Grant, a National Science Foundation High Performance Computing Big Genomic Data Grant and National Science Foundation XSEDE Super-Computing Infrastructure Allocation. Dr. Saeed’s hope is that all of the research he is conducting will lead to precision and personalized medicine for people. What he likes most about his research is that it may significantly improve the human condition in 25-40 years, adding; “We are glad that our computational tools will likely pave the way for precision medicine and I hope it will improve many lives.”

Dr. Saeed is passionate about his research and his enthusiasm is contagious. When asked what he likes about being at WMU, he said; “The Computer Science and Electrical & Computer Engineering Departments are very supportive of research and the college has excellent undergrad students and top notch graduate students.” One of his favorite moments at WMU has been becoming comfortable teaching the undergraduate students. Dr. Saeed enjoys helping students understand what they are learning, getting them excited about what they are learning, and what it means in a global environment. Dr. Saeed has these words of wisdom, “Follow your passion. Do whatever excites you and you will be successful. And always give it your all!”
Grants and Research

**National Science Foundation Cognitive Radio Grant**
Dr. Ala Al-Fuqaha (WMU, co-PI), Dr. Bilal Khan (CUNY, PI) and Dr. Kirk Dombrowski (UNL, co-PI) have been awarded a $499,986 National Science Foundation grant entitled “Applying Behavioral-Ecological Network Models to Enhance Distributed Spectrum Access in Cognitive Radio.” In drawing the connection from the problem of resource-sharing in Cognitive Radio (CR), to models of solutions found within human/animal societies, this project evaluates the extent to which our models of patterns of co-use in biological systems can be profitably leveraged within the context of distributed uncoordinated CR societies to enable individuals and groups to maximize their utility. Of particular relevance to this endeavor is recent ethnographic research on foraging networks of indigenous peoples and human foragers, which has found social relations to be a critical context in which natural selection acts on resource use and co-use behaviors. These findings concerning human behavior lie at the forefront of anthropology, revealing the tensions between sharing networks and optimal strategies and altering our understanding of past human social evolution, and by extension, our vision of the future evolution of artificial CR societies.

**Qatar Foundation Intelligent Transport Systems Grant**
Dr. Ala Al-Fuqaha (WMU, PI), Dr. Elyes Ben Hamida (QMIC, Lead-PI) and Dr. Bharat Bhargava (Purdue University, PI) have been awarded a $900,000 Qatar Foundation grant to study intelligent transport systems (ITS). Through the use of wireless technologies, ITS systems will enable vehicles to autonomously communicate with other nearby vehicles or road infrastructures and thus, will have the potential to accelerate the deployment of a wide range of road safety and driver assistive applications. This innovative project aims at establishing a long term and multidisciplinary R&D efforts between Qatari and US research centers and universities, with the objective of designing, deploying and evaluating an Adaptive ITS Framework for the dynamic adaptation of the security and performance features based on changes in the ITS applications needs and context. The proposed framework and security models will be integrated in a standard compliant ITS platform, and a set of active road safety applications will be demonstrated in Doha city through small scale deployments.
Dr. Zijiang Yang (PI) has been awarded a $65,559 National Science Foundation EAGER grant entitled “Systematic and Scalable Testing of Concurrent Software in the Cloud.” The objective of this research is to develop new algorithms and software tools to address the crucial problems of systematic and scalable testing of shared-memory concurrent software. The proposed methods, based on new symbolic execution algorithms and large-scale parallelization over clusters and the cloud, have the potential to achieve a super-linear speedup over the current state-of-the-art. If successful, this research will result in a new and practical software testing framework, which will be crucial in reducing the development cost for concurrent software, thereby leading to cheaper, more reliable, and more secure computer systems. NSF EAGER award supports exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches. In addition, Dr. Yang has received a Google Computer Science Engagement Award, which gives him an unrestricted gift of $5,000 to support his teaching and research in Computer Science.

Adaptive Memory Resource Management Project

Scott Linder is a junior at WMU majoring in computer science from Portage, Michigan. Scott has always known he wanted to go into computer science because it is the one thing that he has always enjoyed and really likes the computer science program here at Western Michigan University. One of his proudest moments at WMU was when he got his internship programming at Zoetis.

Along with being the Computer Club President in the upcoming 2015-2016 school year, Scott has been working on the Adaptive Memory Resource Management (AMRM) project. The project focuses on dynamically allocating shared resources for virtual machines in data centers. When asked to put that into terms for anyone to understand, he said, “If you have a bunch of virtual machines how do you share resources between them to maximize quality of service.” Scott enjoys the administrative aspect of the project, which includes scripting and collecting data. Challenges that Scott has faced during his time on the project are that the benchmarks are designed for a different platform and are not debugged, which requires them to be debugged. The project also requires the participants to script for data collection, which Scott said, “You need to make sure it is all accurate.” Scott hopes to learn a lot about machine learning from his experience working on the AMRM project.

The Adaptive Memory Resource Management project is a collaborative project between Western Michigan University and Michigan Tech University.
**Faculty Notables**

**WMU Computer Science Professor Elected as Vice-Chair of the IEEE Computer Society Technical Activities Committee**

Dr. Ajay Gupta has been a professor of Computer Science at Western Michigan University for 26 years. This year, he was elected as the Vice-Chair of the prestigious IEEE Computer Society (IEEE-CS) Technical Activities Committee. In addition to playing a key role in shaping technical activities of IEEE-CS, Dr. Gupta will be responsible for bringing together internationally renowned researchers at workshops, conferences, and other initiatives in order to foster innovation and collaboration for the benefit of computing technologies worldwide, stating, “I am excited I can contribute on a much larger scale and make an impact on the field.” IEEE, with over 400,000 members, is the world’s largest professional association dedicated to advancing technological innovation. For the past four years, he has been Chair of IEEE-CS Technical Committee on Parallel Processing. In his work for the Committee, he has led initiatives in promoting parallel processing research and education to various constituents worldwide, including the development of computer science undergraduate curricula integrating parallel and high-performance computing topics in undergraduate courses. Dr. Gupta hopes that his place as Vice-Chair will bring Western Michigan University in the forefront as a globally recognized university, adding; “I even show where Kalamazoo is on my hand.” During his time at WMU, he has been a faculty mentor and takes pride when he sees the students succeed. When asked if he had any words of wisdom, he said, “If you do your best, things will fall into place.”

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**Congratulations!**

Jason Johnson was this year’s recipient of the All-University Graduate Teaching Effectiveness Award with the Department of Computer Science.
Mark Kerstetter’s history is amazing. He went to LaSalle College in Philadelphia, PA, which led him to a job at The National Security Agency. While he was working for the NSA, he attended Johns Hopkins University in Baltimore and received a M.S. in Numerical Science. The next step for Mark was receiving a fellowship to Northwestern University and receiving his Ph.D. in Computer Science. Upon receiving his Ph.D., he was recruited to Kalamazoo, Michigan to interview for a position at Western Michigan University; it was the smallest city in which he had ever been. He was impressed with how friendly everyone was at WMU.

Mark made Kalamazoo his new home in 1977, when they were just forming the Department of Computer Science. He enjoyed helping create the Department from the ground up. It has been quite a journey for Mark, the department moved from Rood Hall, to Dunbar, to finally ending up at Elson S. Floyd Hall in the College of Engineering and Applied Sciences. There is one thing that Mark wishes more people know about Computer Science, the incredible facilities. He also thinks that it is a stronger program than most people think and has a good reputation. Adding, “The faculty work hard to put out a valuable product for the students.”

Surprisingly, after nearly 40 years of teaching at WMU, Mark remembers the first class he taught, it was an Intro to Programming class that had nearly 20 students. He remembers the students having to share computer terminals in Rood Hall. Mark has also faced a lot of change during his tenure, but stated, “Going from the blackboard and library mentality to the new technology and instant information has been most challenging.”

For the past 38 years, Mark has enjoyed watching his students grow and become successful in their careers, working with the students who ask good questions, teaching as long as it continued to be fun and most of all, having the opportunity to work with other curious people, adding, “Being here at Western, there is always someone with ideas and that’s exciting.”

As an avid white water kayaker, and having hiked the Appalachian Mountains, you would think that Mark’s retirement will be full of adventure. You would be correct! First on the agenda was going to the Bahamas Bowl to see the Western Michigan University football team play Middle Tennessee. Then in May, he will be taking a River Cruise down the Columbia River. He also hopes to learn piano and a foreign language.

Good Luck, Mark! We hope you enjoy retirement and all the adventures you have planned. We will miss you and we thank you for your dedication!
The year was 1970 and a young Don Nelson joined the Math Department at Western Michigan University. The technology was not what it is today; in fact, in 1970 there was no Department of Computer Science. There was one central deck computer that was accessed via teletype in Rood Hall and was timeshared among the students.

Fast forward to December 2015, we sat in Don’s office, at the College of Engineering and Applied Sciences, asking questions about his tenure here at WMU and his upcoming retirement. Technology isn’t the only thing that has changed during his time at WMU. The Computer Science department was developed and started in the mid 70’s and the department was established in the late 70’s. He remembers the influx of personal computers in the 80’s with computers being in more faculty offices and classrooms.

Don has a passion for teaching. You can tell it when he speaks of the students and that the thing he enjoyed most about being a professor was, “teaching.” For Don, “Seeing students learn and grow” has been the most rewarding experience as a professor. Don admits he’s been part of too many classes to remember the first class he taught. As for the most challenging issue Don has faced while teaching he stated, “Staying up to date with changes in attitudes, expectations and learning styles of the students. Then adapting your teaching style to keep them engaged.”

Don has accomplished many things during his time here at WMU. However, he would say a very good thing that happened was joining the Department of Computer Science in 1984 as the chair of the department. If there were one thing he wishes more people knew about the Department it would be, “Students can benefit from the faculty that has a variety of expertise.”

Being part of WMU for 45 years, people get to know one another. However, there is one thing that people may not know about Don! Between his junior and senior year of college, he worked on a tow boat on the Mississippi River between St. Louis and New Orleans. His hard work paid off and he earned enough money for an entire year of college with that summer job.

There are big shoes to fill with Don’s departure, he will be missed amongst students and colleagues. Of course one has to ask the cliché question, “What do you have planned after this?” His answer, “I don’t know yet, I will figure it out.”

The College of Engineering and Applied Sciences thanks you, Don, for all of your dedication. We will miss you and hope you enjoy your retirement.
New Bachelor Degree to be offered

A new Bachelor of Science degree in Data Science has been created by The Departments of Statistics and Computer Science that began being offered in fall 2015. The new degree in Data Science addresses a rapidly evolving discipline and sits at the intersection of Statistics and Computer Science. The evolution has been driven by the exponential increase in processing power available and the ever-increasing amount of data now collected, stored and available in every facet of business, science and government. There is an ever-increasing need for big data, and going forward it is likely that most jobs for statistics graduates will include a big data component. It is also clear that many computer science undergraduate graduate job opportunities will involve big data as well. This new B.S. degree prepares practitioners in data science. For more information regarding the requirements of the B.S. in Data Science, please visit the website at www.stat.wmich.edu.

New Capture the Flag Course

Capture the Flag is a new course that involves information security competitions. There are three common types of Capture the Flag competitions: Jeopardy, Attack-Defense and mixed. Jeopardy style has a series of tasks in a range of categories. Some categories could include; Web, Forensic, Crypto, or Binary to name a few. Teams gain points for every solved task, more difficult tasks receive more points. In order to go on to the next task, the team must first complete the previous task. With the attack-defense competitions, each team has their own network with vulnerable services. The organizer of the competition then connects all of the participants and the competition begins. Each team protects their own services for defense points and hack opponents for attack points. Mixed competitions vary in formats and can include both types of competitions in one.

To grow interest in the Capture the Flag competitions, WMU is now offering a Capture the Flag course. The one credit hour course, CS5950, is an introduction to the Capture the Flag competitions and teaches the basic rules of competition. Colin MacCreery, the team captain and vice president of the computer club, stated “You are always going to learn about something you don’t know, the competitions will challenge you.”

Most recently the WMU team competed in a jeopardy style competition placing 77th out of 245 teams.