

Teaching of Critical Computing Concepts – Using Gaming, Simulation and Visualization

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Presentation Summary

Interest in games (online and mobile) is expanding geographically and demographically. Statistics from the US Entertainment Software Association suggest that there are now more women players in the US than there are teenage gamers. Online gaming was up 40% in 2005 from 2004 and is growing about 22% a year and is expected to post \$24 billion in revenues by 2010. Online gaming represents a merger of two successful and profitable industries - entertainment (gaming) and telecommunications. By 2009, mobile gaming services in the US are expected to generate \$1.8 billion annually, or approximately 4.4% of total wireless data revenues. Additionally, by 2009, 78.6 million wireless subscribers in the US will play mobile games, and gaming downloads will increase more than tenfold from 2003 levels. Women now make up 43 percent of the \$7.3 billion video/software game market, according to the Entertainment Software Association. Several surveys have found that genders are nearly evenly balanced, with males accounting for a slightly larger portion (53 percent). With the explosion of women gamers, there needs to be a sea-change in the industry, with more female developers and more games for women. A study (NPD group) found that two-thirds 13 to 44-year-olds are using their PC or Mac instead of consoles. It concludes that online gamers spent more time playing PC games online than offline (60 percent compared to 40 percent), while the opposite was true for connected console gamers. A recent study by Nielsen's NetRatings finds that males accounted for 51 percent of the 46 million online gamers.

Business-wise online gaming promises to do well due to the following reasons: (i) Gaming is profitable and an advertiser's dream come true, (ii) Gaming is fun and addictive, (iii) Games drives the need for better hardware and software (iv) Technology for gaming can spur rapid digital evolution, (v) Easier access to broadband changes how people get and play games and hence broadband providers will embrace gamers' needs. Currently there are several types of online games. These include: Massive Multiplayer Online Role Playing Game (MMORPG), Role

Playing Games (RPGs), First Person Shooters (FPSs), Real-Time Strategy Games (RTSGs), Turn-Based Strategy Games (TBSGs), Racing and Flying Games (RaFGs), Action/Adventure (A/A).

While MMORPGs are more male-dominated, an AOL/Time Warner poll indicates that women tend to favor word, board, card and puzzle games; shying away from violent, complex, time-consuming, and expensive games. Women are more interested in games with communication and interaction and constructively putting things together when they play online. Online games also helps women feel empowered, builds confidence and a much stronger sense of self. Multi-player games may also appeal more than single-player ones since many studies have shown that women enjoy games that focus on building social networks and support structures, as evidenced by their preference for socially-focused virtual worlds like There (www.there.com) and Second Life (www.secondlife.com). The social component is vital for many women, for example, There enables a richer social interaction by employing facial and body gestures in addition to text (and voice) conversation. Even in MMORPGs one may be able to attract more women by managing the depth of the storyline and character. For example it has been reported that Prince of Persia appeals to both men and women. In addition women seem to like games that are easy to pick up, play, and master, rather than those with complicated controls that require a lot of time to learn. Charlotte Stuyvenberg, director of global communications for Xbox says that women gamers are very social, very strategic and they like to work together to solve problems.

Noticing this significant trend towards how the field of Computer Science was evolving, since the 2006 Fall semester, we have begun a 'parallel' option (titled GAME: Graphics, Animation, Multimedia and Entertainment) in the entry level classes where games are used as examples and development exercises to inculcate basic computing concepts such as lists, arrays, queues and other simple data structures. Further more we have collaborated with the English Composition teachers to develop special sections that cater to students in this option, where students learn techniques such as storyboarding, etc. Students also receive a minor in Digital Imaging from the Art department. Other coursework in Criminal Justice and Radio, Television and Film were added as appropriate substitutes to provide the students a 'holistic' experience to various issues involved with the gaming and entertainment industry. This evolution of our curriculum has been a very popular option that has stemmed the tide against declining student interest with significant improvements in our enrollment numbers. Further more, some advanced courses in Computer Science such as AI, HCI and Modeling and Simulation have also been successfully integrated into the GAME curriculum. In the Modeling and Simulation Course, students were introduced to the pervasive effect of modeling and simulation in the real world by developing an automated traffic signal monitoring and control system. Furthermore, in a capstone project students were engaged to use SecondLife to develop an integrated student / alumni / stakeholder survey system.

In this presentation I will summarize the above progress that has been made in revamping our Computing Curricula by refocusing on using Gaming, Simulation and Visualization to impart basic and advanced computing concepts to students.

References

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Brief Biography

Dr. S. S. Ramaswamy's research interests are on intelligent and flexible control, behavior modeling, analysis and simulation, software stability and scalability; particularly in the design and development of complex software systems. Specific applications include real-time control issues in automation and manufacturing, data mining and distributed real-time applications. His work is motivated by the desire to understand the various requirements to build scalable, intelligent software systems with the inherent ability to successfully respond to observed and reported behavioral changes in their environment. Over the past 10 years his research has been funded by government agencies as well as corporate organizations, and he has been a recipient of, or actively participated in, grants totaling over several million dollars. He is currently Professor and Chairperson of the Computer Science Department at University of Arkansas at Little Rock. At UALR, he is currently associated with several active research initiatives, which include: the statewide program manager for WiNS (**W**ireless **N**ano-sensors and **S**ystems) center, the principle investigator at UALR for a High Performance Computing initiative, and the research coordinator for collaboration on Engineering Innovative Software Systems for Marine Transportation Logistics with the National Institute of Applied Sciences (INSA) in Rouen, France. Since 2006 he has also initiated a very successful **High School Research Program (HSRP)** that brings talented high school students to campus and engages them through an on-campus 3-week STEM-related 'embedded' research experience and mentorship with faculty-student groups across various science and engineering disciplines.

Dr. Ramaswamy is also a successful software consultant and has built his company Resilient Systems, LLC as a customized software development and managed outsourcing company. From a business perspective his interests are in the design, development and delivery of large scale software systems, ensuring timely planning, coordination, execution and alignment of a set of sub-services while understanding issues of prioritization, perception and performance in order to deliver value-added services to address a specific business need. He has actively consulted on a National

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Institute of Standards and Technology (NIST) sponsored advanced technology project on intelligent document analysis for aligning timely research with business needs of organizations using technology roadmaps. He also serves as an expert witness on software development, database and algorithmic design for arbitrations and litigations. He serves on the board of several start-up software companies in the US and India.

Dr. Ramaswamy has published over 100 publications including over 25 peer-reviewed journal publications, including those such as the IEEE, Elsevier, Journal of Systems and Software, etc. Additionally over 36 reviews of his have appeared in the ACM Computing Surveys, the leading online review service for books and articles across all areas of computer science, providing an up-to-date overview of the computing field. In 2007, he was selected as one of their featured reviewers.

Dr. Ramaswamy earned his Ph.D. degree in Computer Science from the Center for Advanced Computer Studies (CACs) at the University of Louisiana at Lafayette. He is member of the Society for Computer Simulation International, Computing Professionals for Social Responsibility, Senior member of the IEEE and Senior member of the Association of Computing Machinery (ACM). He also serves as an Associate Editor for the IEEE Transactions on Systems, Man and Cybernetics, Part C: Applications and Reviews. In the local community, Dr. Ramaswamy is an active Rotarian in Club 99, the rotary club of Arkansas Little Rock