Monika Akbar

Assistant Professor
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Research Interests

Data Science (information integration and analytics), cybersecurity, and game and gamification for student engagement.

Employment

2017 – Present	Assistant Professor, Department of Computer Science, the University of Texas at El Paso, El Paso, TX.
2015 – 2020	Assistant Director, Cyber-ShARE Center of Excellence, the University of Texas at El Paso, El Paso, TX.
2014 – 2017	Research Assistant Professor, Cyber-ShARE, the University of Texas at El Paso (UTEP), El Paso, TX.

Education

- Virginia Tech. Blacksburg, Virginia, USA.   Fall 2013
  - Ph.D. in Computer Science (CGPA: 4.00/4.00).
- Montana State University - Bozeman. Bozeman, Montana, USA.   Spring 2008
  - M.S. in Computer Science (CGPA: 3.96/4.00)
- Shah Jalal University of Science and Technology. Sylhet, Bangladesh.   2005
  - B.Sc. (Engineering) in Computer Science and Engineering (CGPA: 3.86/4.00, with Honours).

Grants Awarded

External Grants

1. DOE through *CyManII*, UTSA. Vulnerability Analysis Using Publicly Available Cybersecurity Data. Role: PI. Amount: $143,466 (Federal $43,465, UTEP Cost Share: $100,001)   3/2022 – 2/2023
2. NSF-IUSE: An online tool to support productive struggles and improve the self-efficacy of undergraduate students in introductory computer science courses. NSF #2215849. Role: Co-PI. Amount: $299,950.   6/2022 – 5/2025
3. NSF-Scholarship for Service (SFS) (Renewal): Advancing a successful cybersecurity education and workforce development program at UTEP. NSF #2043250. Role: Co-PI. Amount: $4,049,354.   8/2021 – 7/2026
4. NSF STEM+C RPP: A RPP for developing Computational Thinking through linguistically and culturally relevant CS curriculum in middle school. NSF # 1923599 and 1923586. Role: Co-PI. Amount: $299,161 ($149,492 UTEP and $149,669 El Paso Independent School District).   10/2019 – 9/2022
5. Google CS4HS (Special Topics) Sol Y Agua: A PD Program for the Paso Del Norte Region. Role: PI. Amount: $32,500.   2018 – 2022
6. NSF IUSE: Collaborative Research: Active learning for out-of-class activities to improve student success. NSF # 1712030 and 1712073. Role: PI (# 1712073). Amount: $299,059 ($65,232 UTEP and $233,827 Winston-Salem State University, NC)   8/2017 – 7/2022
7. NSF CREST Partnership supplement: Building capacity in information management through a partnership with Virginia Tech's Digital Library Technology Center. Role: Senior personnel. Amount: $99,997   2016 – 2017

Internal Grants

8. Mike Loya Center funding for Border Health Information Exchange. UTEP. Role: Co-PI. $35,000.   2018 – 2018

9. UG Research Assistant through the on-campus Student Employment Program, UTEP. Role: PI. $14,592. 2015 - 2015

Publications

Google Scholar: https://scholar.google.com/citations?user=jp4c0ocAAAAJ&hl=en

Peer Reviewed Publications

1. Muztaba Fuad, **Monika Akbar**, William D Croslen. "The Effectiveness of a Mobile Educational Platform for Engaging Students in Out-of-class Activities". VII IEEE World Engineering Education Conference (EduNine), 2023.

2. Ismael Villanueva-Miranda and **Monika Akbar**. "Detecting Malware Activity Using Public Search Data," in 5th Workshop on Big Data for CyberSecurity (BigCyber-2022) in IEEE International Conference on Big Data (Big Data), 2022, pp. 2997-3006, https://doi.org/10.1109/BigData55660.2022.10020883

3. Ismael Villanueva-Miranda, Mahmud Shahriar Hossain, and **Monika Akbar**. "Human Mobility Driven Modeling of an Infectious Disease", in the Second IEEE International Workshop on Social Data Mining in the Post-pandemic Era (SocDM 2022) held in conjunction with the 2022 IEEE International Conference on Data Mining (ICDM2022).

4. Muztaba Fuad and **Monika Akbar**. 2022. "Effect of Peer Influence and Self-Reflection on Scaffolded Out-of-Class Activity Administered Using a Mobile Application" Education Sciences 12, no. 12: 863. https://doi.org/10.3390/educsci12120863

5. Ismael Villanueva-Miranda and **Monika Akbar**, "Integrating Heterogeneous Data for a Multi-disease Outbreak Detection Framework", in 8th Annual Workshop on Big Data Analytic Technology for Bioinformatics and Health Informatics (KDDBHI) in IEEE BigData 2021: 2828– 2837. https://doi.org/10.1109/BigData52589.2021.9671841

6. Olugbenga Iyiola and **Monika Akbar**, "Demographic Data-driven Deprivation Index for Predicting Chronic Diseases", in IEEE BigData workshop Data science for equality, inclusion and well-being challenges (DS4EIW) 2021: 4277–4286. https://doi.org/10.1109/BigData52589. 2021.9672052

7. Muztaba Fuad, **Monika Akbar**, Clay Gloster, Nathan Aun, and Lynn Zubov, "A Mobile Educational Platform based on Peer Influence and Instructional Scaffolding for Engaging Students in Out-of-class Activities", International Conference on Advanced Learning Technologies (ICALT) 2021: 61-65

8. Ahnaf Farhan, Roberto Camacho Barranco, M. Shahriar Hossain and **Monika Akbar**, "Diffusion- based Temporal Word Embeddings", in workshop on Scientific Document Understanding at the 35th AAAI Conference on Artificial Intelligence (AAAI-22), 2021.

9. Jaime Acosta, Luisana Clarke, Stephanie Medina, **Monika Akbar**, Mahmud Shahriar Hossain, and Frederica Free-Nelson, "Repeatable Experimentation for Cybersecurity Moving Target Defense", SecureComm 2021- 17th EAI International Conference on Security and Privacy in Communication Networks. Will be published by Springer through SpringerLink Digital Library, 2021.

    Note: The work was mentioned in DEVCOM ARL Public Affairs
    https://www.army.mil/article/247334/army_researchers_develop_game_changing_cybersecurity_software_tool

10. Tatiane Lautert, Nádia P. Kozievitch, Ismael Villanueva-Miranda, and **Monika Akbar**, "Public Health Units - Exploratory Analysis for Decision Support", in 25th European Conference on Advances in Databases and Information Systems (ADBIS) (Short Paper) 2021: 133-138

11. Mark A. Williams, Roberto C. Barranco, Sheikh Motahar Naim, Sumi Dey, Mahmud Shahriar Hossain, and **Monika Akbar**, "A Vulnerability Analysis and Prediction Framework", in Computers & Security. February 2020, 101751, Elsevier, ScienceDirect. **Impact factor:** 3.062. https://doi.org/10.1016/j.cose.2020.101751

12. Muztaba Fuad, **Monika Akbar**, Lynn Zubov, and Debzani Deb, "Out-of-class Activities: What Have We Been Doing and How We Can Change it for the Future", in International Conference on Computer Science & Education (ICCSE) 2019: 714-719

13. Roberto Camacho Barranco, Raimundo F. Dos Santos, M. Shahriar Hossain, and **Monika Akbar**, "Tracking the Evolution of Words with Time-reflective Text Representations", in IEEE Big Data 2018, Regular paper in the 4th Special Session on Intelligent Data Mining.

14. Mark A. Williams, Sumi Dey, Roberto Camacho Barranco, Sheikh Motahar Naim, M. Shahriar Hossain, and **Monika Akbar**, "Analyzing Evolving Trends of Vulnerabilities in National Vulnerability Database", in IEEE Big Data 2018, International Workshop on Big Data Analytics for Cyber Intelligence and Defense. December 10-13, 2018.

15. Muztaba Fuad, **Monika Akbar**, and Lynn Zubov, "Dysgu: A Mobile-Based Adaptive System to Redesign Out-of-class Activities", in proceedings of the 48th Annual Frontiers in Education (FIE) Conference, 2018, 1-5.

16. **Monika Akbar**, Lucia Dura, Ann Q. Gates, Angel Ortega, Mary K Roy, Claudia Santiago, Jesus G Tellez, and Elsa Villa, "Sol y Agua: A Game-based Learning Platform to Engage Middle-school Students in STEM", in Proceedings of the 48th Annual Frontiers in Education (FIE) Conference, 2018, 1-9.

17. Jaime C. Acosta, Salamah Salamah, Edgar Padilla, **Monika Akbar**, and Alex Fielder, "A Collaboration Pipeline for Cybersecurity Research, Analytics, and Tools", in Cyber Security and Information Systems Information Analysis Center (CSIAC) journal, 2018 (https://www.csiac.org/journal-article/a-collaboration-pipeline-for-cybersecurity-research-analytics-and-tools/).

18. Francisco Osuna, **Monika Akbar**, and Ann Q. Gates, "On Using Disparate Scholarly Data to Identify Potential Members for Interdisciplinary Research Groups", in IEEE International Conference on Information Reuse and Integration (IRI), 59-68, 2017.

19. Prashant Chandrasekar, Islam Harb, **Monika Akbar**, Ann Gates, Chris Frank, Warren Bickel, Edward Fox and Elsa Tai, "A DL framework and case studies with linked open data", RUMOUR 2017, a workshop held in conjunction with ACM/IEEE-CS Joint Conference on Digital Libraries, Toronto, Canada, June 19-23, 2017.

20. Francisco Osuna, Bhanukiran Gurijala, Patricia Esparza, **Monika Akbar**, and Ann Q. Gates, "A Feasibility Study of an Approach to Extend Research Footprints Using Disparate Sources", in AAAI workshop of Scholarly Big Data: AI Perspectives, Challenges, and Ideas, 2016.

21. Juan Jose Rodriguez Vila, Nádia Puchalski Kozievitch, Tatiana M. C. Gadda, Keiko Fonseca, Marcelo O Rosa, Luiz C. Gomes-jr, and **Monika Akbar**, "Urban Mobility Challenges – An Exploratory Analysis of Public Transportation Data in Curitiba", in Revista de Informática Aplicada, Volume 12, number 1, 2016.

22. **Monika Akbar**, "Digital Technology Shaping Teaching Practices in Higher Education", mini Review in Frontiers in ICT, Volume: 3, 2016.

23. Nadia P. Kozievitch, Luiz C. Gomes-Jr, Tatiana M. C. Gadda, Keiko V. O. Fonseca, and **Monika Akbar**, "Analyzing the Acoustic Urban Environment - A Geofencing-Centered Approach in the Curitiba Metropolitan Region, Brazil", in Proceedings of the 5th International Conference on Smart Cities and Green ICT Systems (SmartGreens), Rome, Italy, April 23-25, 2016, 78-85.

24. Elsa Tai Wai Yan, Ann Q. Gates, and **Monika Akbar**, "Cyber-infrastructure Support for the Integration and Analysis of Student Success Data", in Frontiers in Education (FIE), El Paso, Texas, USA, 2015, 1-5.

25. **Monika Akbar**, Clifford A. Shaffer, Weiguo Fan, and Edward A. Fox, "Recommendation Based on Deduced Social Networks in an Educational Digital Library", International Conference on Digital Libraries (DL 2014), London, Sept. 2014, 29-38. Long paper, acceptance rate < 25%.

26. Edward A. Fox, **Monika Akbar**, Sherif Hanie El Meligy Abdelhamid, Noha Ibrahim Elsherbiny, Mohamed Magdy Gharib Farag, Fang Jin, Jonathan P. Leidig, and Sai Tulasi Neppali, "Digital Libraries", in Computing Handbook Vol. 2 (Information Systems and Information Technology), Section 3, Ch. 18, ed. by Heikki Topi, Chapman & Hall/CRC Press, Taylor and Francis Group, in press for 2014, http://www.crcpress.com/product/isbn/9781439898444.

27. **Monika Akbar**, Clifford A. Shaffer, Edward A. Fox, "Social Networks in Digital Libraries", ed. by Edward A. Fox and Jonathan P. Leidig. Digital Library Applications: CBIR, Education, Social Networks, eScience/Simulation, and GIS. Morgan & Claypool Publishers, San Francisco, March 2014, 175 pages, ISBN paperback 9781627050326, ebook 9781627050333.

28. Davinia Hernandez-Leo, **Monika Akbar**, Deborah Tatar, and Edward A. Fox, "Social tools for educators: supporting the needs of specific communities". IEEE Learning Technology Newsletter special theme on "Social Networks and Social Computing in Technology-Enhanced Learning", 2012.

29. **Monika Akbar**, Clifford A. Shaffer, Edward A. Fox, "Deduced Social Networks for an Educational Digital Library", in Proceedings of the 12th ACM/IEEE-CS Joint Conference on Digital Libraries (JCDL 2012), Washington D.C., June 10-14, 2012, 43-46.

30. Eric Fouh, **Monika Akbar**, and Clifford A. Shaffer, "The Role of Visualization in Computer Science Education", Computers in Education, Volume 29, issue 1-2, 2012, pages: 95-117.

31. M. Shahriar Hossain, **Monika Akbar**, and Nicholas F. Polys, "Narratives in the Network: Interactive Methods for Mining Cell Signaling Networks", Journal of Computational Biology, Volume 19, issue 9, September 2012, pages: 1043-1059. **Impact factor:** 1.7.

32. **Monika Akbar**, Weiguo Fan, Clifford A. Shaffer, Yinlin Chen, Lillian N. Cassel, Lois M. L. Delcambre, Daniel D. Garcia, Gregory W. Hislop, Frank M. Shipman III, Richard Furuta, B. Stephen Carpenter II, Hao-wei Hsieh, Bob Siegfried, and Edward A. Fox. "Digital Library 2.0 for Educational Resources", in 15th International Conference on Theory and Practice (TPDL):89-100. Acceptance rate = 19%.

33. Clifford A. Shaffer, **Monika Akbar**, Alexander Joel D. Alon, Michael Stewart, and Stephen H. Edwards, "Getting Algorithm Visualizations into the Classroom", in Proceedings of the 42nd ACM technical symposium on Computer science education (SIGCSE), 2011, 129-134.

34. Clifford A. Shaffer, Matthew L. Cooper, Alexander Joel D. Alon, **Monika Akbar**, Michael Stewart, Sean Ponce, and Stephen H. Edwards, "Algorithm Visualization: The State of the Field", in ACM Transactions on Computing Education (TOCE), Volume 10, issue 3, 2010, pages: 9:1-9:22.

35. Edward A. Fox, Yinlin Chen, **Monika Akbar**, Clifford A. Shaffer, Stephen H. Edwards, Peter Brusilovsky, Dan Garcia, Lois Delcambre, Felicia Decker, David Archer, Richard Furuta, Frank Shipman, Stephen Carpenter, and Lillian (Boots) Cassel, "Ensemble PDP-8: Eight Principles for Distributed Portals", in Proceedings of ACM and IEEE Joint Conference on Digital Libraries (JCDL), 2010, 341-344. Acceptance rate = 25%.

36. M. Shahriar Hossain, **Monika Akbar** and Nicholas F. Polys, "Storytelling and Clustering for Cellular Signaling Pathways", International Conference on Information and Knowledge Engineering (IKE'09), Las Vegas, Nevada, USA, Volume: 1, 2009, 109-115.

37. **Monika Akbar** and Rafal A. Angryk, "Frequent Pattern-Growth Approach for Document Organization", ACM 17th Conference on Information and Knowledge Management (CIKM 2008), the 2nd International workshop on Ontologies and Information Systems for the Semantic Web, Napa Valley, California, October 26-30, 2008, 77-82.

38. M. Shahriar Hossain, **Monika Akbar**, and Rafal A. Angryk, "Sense Based Organization of Descriptive Data", 2007 IEEE International Conference on Systems, Man and Cybernetics, IEEE Press, Montreal, Quebec, Canada, October 7-10, 2007, 468-473.

39. M. Shahriar Hossain, **Monika Akbar**, and J. Denbigh Starkey, "Inexpensive Construction of a 3D Face Model from Stereo Images", 10th International Conference on Computer and Information Technology (IEEE Co-sponsored ICCIT '07), Dhaka, Bangladesh, December 27-29, 2007, 196-201.

Selected Peer-reviewed Abstracts

40. Monika Akbar, Katherine Mortimer, Grecia Navarrete, Stephanie Galvan, George Molina, Romelia Reyes, Cynthia Ontiveros, Scott Gray, Sarah Escandon, Monica Lyons, Pedro Delgado, Victor Medrano, Haleigh Kneedler, Patricia Benitez, Jacob Ramirez, Jesus Vazquez, and Melissa Anderson, "The Sol y Agua RPP: A Bilingual and Culturally Responsive Approach to Introduce Computational Thinking in Middle School", in SIGCSE 2021: 1096

41. Muztaba Fuad, **Monika Akbar**, and Lynn Zubov, "Keeping Students Occupied with the Course Contents After Leaving the Classroom", in ITiCSE 2020: 545-546

42. Muztaba Fuad, **Monika Akbar**, and Lynn Zubov, "Social Learning and Scaffolding to Improve Student's Self-efficacy and Engagement", in SIGCSE 2020: 1288

43. Muztaba Fuad, **Monika Akbar**, and Lynn Zubov. "Active Learning for Out-of-Class Activities by Using Interactive Mobile Apps", in Sixth International Conference on Learning and Teaching in Computing and Engineering, April, 2018 Auckland, New Zeland, http://par.nsf.gov/biblio/10057677.

44. Ann Q. Gates, Mary Roy, **Monika Akbar**, Florencia Larsen, Ivonne Lopez, Christian Murga, Angel Ortega, Jesus Tellez, and Rebecca Urbina, "The Sol y Agua Project: Enhancing Middle School Education through Computing with an Emphasis on Simulation and Data Science", in SIGCSE, 2016, 699. doi: {10.1145/2839509.2850574}

45. Yanet Garay, **Monika** Akbar, and Ann Q. Gates, "Towards Identifying Potential Research Collaborations from Scientific Research Networks Using Scholarly Data", in Proceedings of the 16th ACM/IEEE-CS on Joint Conference on Digital Libraries, 2016, 217-218. https://dl.acm.org/doi/10.1145/2910896.2925439

46. Ann Q. Gates, **Monika Akbar**, Mary K. Roy, Angel Ortega, Jesus Tellez, Ivonne López, Christian Murga, and Kevin Lanahan, "Sol y Agua project: Promoting information science in middle school classrooms for a socially and environmentally responsible world", IEEE Tenth International Conference on Research Challenges in Information Science (RCIS), Grenoble, France, 2016: 1-2

47. **Monika Akbar** and Clifford A. Shaffer, "User Type Clustering to Refine Search and Browse for Educational Resources", in Proceedings of the 43rd ACM Technical Symposium on Computer Science Education, 2012, 666. doi: {10.1145/2157136.2157371}

48. **Monika Akbar**, Weiguo Fan, Lillian Cassel, Lois Delcambre, Clifford A. Shaffer, and Edward A. Fox, "How Educators Find Educational Resources Online", Conference on Innovation and Technology in Computer Science Education (ITiCSE), Germany, 2011, 367. doi:{10.1145/1999747.1999880}

Misc., Audio/Video Recording, Presentation:

- Katherine Mortimer, **Monika Akbar**, et. al (2021). Sol y Agua: Bilingual, culturally relevant CS curriculum. 2021 STEM For All Video Showcase. https://multiplex.videohall.com/ presentations/2139

- Jaime C. Acosta., **Monika Akbar**, Alex Fielder, "Comprehensive Data Analytics for Threat Detection," Short paper in HICSS Symposium on Cybersecurity Big Data Analytics, 2017.

Courses Taught

- CS 4364/5364: Information Retrieval and Information Visualization
- CS 4342/5342: Database Management
- CS 2401: Elementary Data Structures and Algorithms
- CS 1301 and CS 1101: Introduction to Computer Science
- CS 1310: Computational Thinking
- CS 1320: Introduction to Programming for Scientists and Engineers

Awards and Honors

- Hopper Dean Faculty Fellow at UTEP in 2022.
- Co-authored a paper that was one of the 11 papers nominated for the best paper award at the IEEE Technical Committee on Learning Technology (ICALT) conference in 2021.
- UTEP Edge Fellow – selected by the UTEP provost's office to participate in high-impact practices.
- Supervised a research group that won first place in the Emerging Researchers National Conference in STEM (ERN) video contest, 2017.
- Mentored a student who won first place in the Undergraduate Poster session in ERN 2017.
- Selected to participate in CRA-W Early Career Mentoring Workshop at SIGCSE 2017.
- Secured Second place, Student Research Competition (SRC) – Graduate level at ACM SIGCSE 2012.
- Selected to participate in the FORWARD to Professorship workshop in 2010.
- Member of Upsilon Pi Epsilon (UPE) at Virginia Tech.
- Virginia Tech AWC scholarship for participating in the Grace Hopper Conference in 2010.
- Selected to participate in the 2007 CRA-W Grad Cohort Workshop, San Francisco, CA.
- The B.Sc. (Engineering) degree was awarded with Honours.

Service

- Member of the Faculty search committee in the department of Computer Science at UTEP in Fall 2020, Spring 2023.

- Member of the fundamental course committee and M.S. in Data and Information Science committee.

- Faculty advisor, UTEP chapter of Women in CyberSecurity (WiCyS) (https://sites.google.com/view/mcsc-wicys-utep/home) since 2020.

- Member of the Faculty Senate (representing the department of Computer Science) at UTEP. 2019 to the current date.

- Member of the University Withdrawal Committee, UTEP – since Fall 2022.

- Member of the Student Services Fee Committee, The University of Texas at El Paso. Spring 2020.

- Team Member, Coordinated Vulnerability Awareness (CVA) group of the Cybersecurity Manufacturing Innovation Institute (CyManII, https://cymanii.org/).

- Served on National Science Foundation (NSF) panels to review proposals – 2022, 2021, 2020, 2019.

- Served as ad-hoc reviewer for NSF proposals – 2021, 2019, 2018.

- Associate Editor, Frontiers in Computer Science and Frontiers in Education journal – since 2015..

- Program committee member – 29th International Joint Conference on Artificial Intelligence 17th Pacific Rim International Conference on Artificial Intelligence (IJCAI-PRICAI) 2020, Joint Conference on Digital Libraries (JCDL) 2018, Information Reuse and Integration (IRI) 2018, Multimedia Information Processing and Retrieval (MIPR) 2018, 2019.

- Reviewer for Joint Conference on Digital Libraries, Doctoral Consortium 2022, Springer Journal of Social Network Analysis and Mining 2021, PLoS One 2019, Complexity, Informatics and Cybernetics: IMCIC 2019, Frontiers in Psychology - Educational Psychology 2019, International Conference on Bangla Speech and Language Processing (ICBSLP) 2018, Springer Scientometrics 2018, International Journal of Cooperative Information Systems (IJCIS) 2017, AAAI-15 Special Track on Computational Sustainability, IEEE Transactions on Industrial Informatics – the International Conference on Progress in Informatics and Computing (PIC'14), and Transactions on Computing Education (TOCE) 2013.

- I organized a teacher professional-development workshop to introduce computational thinking in K-12 in the El Paso region (https://www.facebook.com/media/set/?set=a.2033017306733316&type=1&l=b0c1aa2156). The workshop was supported by a Google grant and used Sol y Agua (https://sourceforge.net/projects/sol-y-agua/) – an educational game developed at UTEP. 2019.

- I am a member of the Coordinated Vulnerability Awareness (CVA) group at CyManII. The goal of CVA team is to reshape industry risk management practices around mitigating/preventing categories of vulnerabilities in manufacturing automation and supply chain networks. The CVA group worked with other stakeholders for launching a Special Interest Group (SIG) for ICS in 2022. The goal of this SIG is to unify the efforts in identifying and mitigating ICS/OT security weaknesses, especially in critical infrastructures. The SIG meets once a month. Over the past year the SIG members further analyzed the 20 categories of ICS/OT weaknesses documented by SEI ETF. The effort enriches the CWE View related to ICS vulnerabilities.

- I collaborate with Dr. M. Shahriar Hossain on Computing4All.com (https://computing4all.com/) to increase access to and inclusion in computing. This is a free-to-access website that hosts a series of video lectures we created on early Computer Science topics and advanced Data Science concepts. Since 2020.

- Member, Poster Session Committee, Women in Cyber-Security Conference, Tucson, AZ, 2017.

- Judge, Emerging Researchers National Conference in STEM, Washington D.C., 2017.

- Judge, Graduate student research Expo, University of Texas at El Paso, Fall 2016.

- Member of Virginia Tech Association for Women in Computing (VT–AWC).

- Assisted in designing and building Computer Science materials for outreach programs at Virginia Tech for COE STEP, NASA INSPIRE, C-Tech[2], and CEED Imagination groups in Summer 2011.

- Mentor for Montana Apprenticeship Program (MAP), Summer 2008.