

# Chris GauthierDickey

## 1 General Information

### 1.1 Personal

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### 1.2 Brief Biography

Chris GauthierDickey is currently an Assistant Professor in the Department of Computer Science at the University of Denver. He received his PhD in Computer Science from the University of Oregon, where he was supported by a National Science Foundation Graduate Research Fellowship. His dissertation was on large-scale and cheat-proof event ordering for multiplayer games and he continues to research in the areas of networks, security, and games.

### 1.3 Education

2001            B.S. Computer Science, University of Oregon  
2006            Ph.D. Computer Science, University of Oregon

### 1.4 Honors

2002–2005    National Science Foundation Graduate Research Fellow

### 1.5 Employment

*Assistant Professor*, University of Denver, 2006–present.  
*Graduate Research Fellow*, University of Oregon, 2001–2006.  
*Programmer*, Sax Software, Eugene, Oregon, 1998–2000.  
*Network Administrator*, Cegelec ESCA, Seattle, Washington, 1995–1998.

## **1.6 Professional Associations**

Chris GauthierDickey is a member of the ACM, IEEE, the Colorado Research Institute for Security and Privacy (CRISP), Colorado Interactive Gaming and Simulation Alliance, and the International Game Developer's Association.

## **1.7 Software Projects**

Chris GauthierDickey is an author and maintainer of two software packages: 1) the GNU project libmicrohttpd: a tiny web server library co-authored by Dr. Christian Grothoff and that was developed in the Networking class he teaches at DU, and 2) the DUP system, which is a multi-stream pipeline package that includes a mini-language for writing distributed and parallel streaming applications using multi-stream pipelines. DUP was developed in conjunction with Dr. Christian Grothoff, Dr. Matthew Rutherford, and several graduate students.

# **2 Research**

## **2.1 Research Summary**

Chris GauthierDickey's research is generally focused around networking, security and games. His dissertation was on designing and proving that cheat-proof event-ordering for large-scale multiplayer games was possible, allowing future researchers and game developers to have the tools necessary for building large-scale distributed games.

At the University of Denver, his research has continued in building large-scale, distributed multiplayer games and applying this work towards other areas. With his student Gabor Papp, GauthierDickey has investigated scalable, peer-to-peer multiparty voice communications while on the other hand with his student Daniel Pittman, they are investigating peer-to-peer and cheat-proof computations. In addition, he has investigated architectures for large-scale, multi-user augmented reality.

In terms of pure networking research, Chris GauthierDickey has collaborated with Dr. Christian Grothoff in developing a technique for peer-to-peer bootstrapping, which is the problem of locating a peer-to-peer network on the Internet when its location is not known ahead of time. In addition, GauthierDickey has worked with Dr. Grothoff and Dr. Matthew

Rutherford in developing DUP, a multi-stream pipeline system that allows programmers to develop parallel and distributed programs using a combination of filters and pipes that may have multiple input and output streams.

In the area of games, Chris GauthierDickey has collaborated with physical therapists at a local hospital to help create games for patients for rehabilitation after traumatic brain injuries and after total knee replacements. Finally, he has collaborated with local game companies on game development projects involving scalable systems.

## 2.2 Graduate Students

Chris GauthierDickey has worked with or is currently working with the following graduate students:

- Gabor Papp, Ph.D.: Dissertation title: "A Location Aware P2P Voice Communication Protocol for Networked Virtual Environments," July 2010. Gabor Papp completed his Ph.D. in July 2010 where he developed a P2P protocol that optimizes packet delivery based on the virtual location of participants in a virtual environment. This research, which took place over a 3 year period included the measurement and modeling of multiparty voice communication before the design of the protocol. Factoring in these models, Papp then creating a cheat-resistant peer-to-peer protocol that prevented malicious participants from knowing which packets to drop and which packets to forward if they were attempting to circumvent the routing protocols. This work was the first work done in scalable, cheat-resistant location-aware, and multiparty voice communications.
- Daniel Pittman, Ph.D. student: Daniel Pittman advanced to candidacy in October 2010. He is currently finishing up his dissertation work on measuring, modeling, and simulating virtual populations in large-scale multiplayer games, with a case study in P2P trading card games. In his research, he has advanced the field by creating realistic models based on measurements of popular massively multiplayer online games and also by developing the first cheat-proof P2P protocol for trading card games. He will likely graduate by May 2012.
- Craig Ritzdorf, Ph.D. student: Craig Ritzdorf completed his oral exam in 2009 and is currently preparing for his preliminary exam,

which should be completed by the end of the year. Craig helped develop DUP, a distributed stream processing language that allows one to write complex stream processing programs with simple filters and the DUP language.

- Min Qi, Ph.D. student: Min Qi is currently preparing for her oral exam which will take place this October 2011. Her area of study is computer vision as it relates to hand recognition.
- Taylor Phillips, M.S., Thesis title: "Using Nearest Neighbor to Reduce Error in Sample-Based PMCCs," June 2009. Phillips helped develop a technique for using transitivity to reduce the error of sample-based Pearson's moment-product correlation coefficients (PMCCs). PMCCs are important to the data mining community in that they help identify correlations within data sets.
- Jeffrey Keene, M.S., Thesis title: "Composing Music in Constrained Search Environments," August 2010. Using his background in music, Keene developed a system using Markov chains to automatically generate rhythms in a style similar to a training set. This work advanced the field of music generation in that it allows one to create rhythms of a particular style such that one can use the generated sets to practice a particular style of play.

### 2.3 Publications

1. D. Pittman and C. GauthierDickey, "Cheat-Proof Peer-to-Peer Trading Card Games," 10th ACM/IEEE Network and Systems Support for Games (NetGames'11), October 2011. [33%]
2. K. Bader, T. Eißler, N. Evans, C. GauthierDickey, C. Grothoff, K. Grothoff, J. Keene, H. Meier, C. Ritzdorf, M. Rutherford, "DUP: A Distributed Stream Processing Language," 7th IFIP International Conference on Network and Parallel Computing, Zhengzhou, China, September 2010. [27%]
3. T. Phillips, C. GauthierDickey, R. Thurimella, "Using Transitivity to Increase the Accuracy of Sample-Based Pearson Correlation Coefficients," 12th International Conference on Data Warehousing and Knowledge Discovery, Bilbao, Spain, August 2010. [29%]

4. N. Evans, C. GauthierDickey, C. Grothoff, K. Grothoff, J. Keene, M. Rutherford, "Simplifying Parallel and Distributed Simulation with the DUP System," *43rd Annual Simulation Symposium*, Orlando, Florida, USA, April 2010. [unknown]
5. C. GauthierDickey, "Blending Games, Multimedia, and Reality," *1st Annual ACM Multimedia Systems Conference*, Scottsdale, Arizona, USA, February 2010. [Invited paper]
6. D. Pittman and C. GauthierDickey, "Characterizing Virtual Populations in Massively Multiplayer Online Role-Playing Games," *Proceedings of the 16th ACM International Multimedia Modeling Conference*, Chongqing, China, January 2010. [29%]
7. G. Papp and C. GauthierDickey, "A Location Aware P2P Voice Communication Protocol for Networked Virtual Environments," *16th ACM Symposium on Virtual Reality Software and Technology*, Kyoto, Japan, November 2009. [28%]
8. G. Papp and C. GauthierDickey, "Characterizing and Modeling Multiparty Voice Communication for Multiplayer Games," *19th ITC Specialist Seminar on Network Usage and Traffic*, October 2008. [44%]
9. C. GauthierDickey and C. Grothoff, "Bootstrapping of Peer-to-Peer Networks, *DAS-P2P*, August 2008. [47%]
10. G. Papp and C. GauthierDickey, "Characterizing Multiparty Voice Communications for Multiplayer Games (extended abstract)", *ACM Sigmetrics*, June 2008. [26%, including accepted abstracts]
11. N. Evans, C. GauthierDickey, and C. Grothoff, "Routing in the Dark: Pitch Black," *ACSAC 2007*, December 2007. [22%]
12. D. Pittman and C. GauthierDickey, "A Measurement Study of Virtual Populations in Massively Multiplayer Online Games," *ACM NetGames*, September 2007. [60%]
13. C. GauthierDickey, V. Lo, and D. Zappala, "Using N-Trees for Scalable Event Ordering in Peer-to-Peer Games," *ACM NOSSDAV*, June 2005. [38%]
14. V. Lo, D. Zhou, Y. Liu, C. GauthierDickey, J. Li, "Scalable Supernode Selection in Peer-to-Peer Overlay Networks," *Hot-P2P*, July 2005. [52%]

15. S. Zhao, V. Lo, and C. GauthierDickey, "Result Verification and Trust-Based Scheduling in Peer-to-Peer Grids", *IEEE International Conference on Peer-to-Peer Computing*, August, 2005. [19%]
16. C. GauthierDickey, D. Zappala, and V. Lo, "A Fully Distributed Architecture for Massively Multiplayer Online Games, *ACM NetGames*, August 2004. [47%]
17. C. GauthierDickey, D. Zappala, V. Lo, and J. Marr, "Low-Latency Cheat-Proof Event Ordering for Peer-to-Peer Games," *ACM NOSS-DAV*, June 2004. [25%]
18. D. Zappala, V. Lo, and C. GauthierDickey, "The Multicast Address Allocation Problem: A Theoretical Framework and Performance Evaluation," *Special Issue of Computer Networks*, Elsevier Science, Vol. 45, Issue 1, pp. 55–73, May 2004. [unknown]
19. V. Lo, D. Zappala, and C. GauthierDickey, "A Theoretical Framework for the Multicast Address Allocation Problem," *Global Internet at IEEE Globecom*, October 2002. [31%]
20. D. Zappala, C. GauthierDickey, V. Lo, "Modeling the Multicast Address Allocation Problem," *Global Internet at IEEE Globecom*, October 2002. [31%]

## 2.4 Funding

- \$299,000 (Co-PI), *National Science Foundation*, (Sep. 2009–Aug. 2011) "Collaborative Research: A Partnership for Developing the IA Workforce (#0911991)," This grant was given to increase research in security at the University of Denver and the University of the District of Columbia by creating a collaborative partnership. In addition, the goal of this grant was to increase capacity in the Information Assurance workforce.
- \$405,000 (Co-PI), *WIRED*, (May 2008–Dec. 2009), "Innovative Partnership for Job Creation and Employment". The goal of this grant was to establish a new program in the Computer Science Department at the University of Denver that would train and certify students in mainframe administration. To date, 40 students have been accepted into the program and the first 20 have graduated, with IBM informing the department that the WIRED students were the highest

performing group they had ever had taking the mainframe administration examination. GauthierDickey was responsible for developing and teaching the first course in the 2-course sequence of the program.

- \$88,000 (PI), *Paper Clip Entertainment*, (Jan. 2009–Mar. 2010), “The Development of New Rapid Design Techniques for Video Game Creation” (PI). This grant was given by a local start up company to help develop a game engine that they will be using for a game idea they have. All content and code created will remain property of DU with the stipulation that DU will license the game engine and content to Paper Clip Entertainment for their game. Dr. GauthierDickey was responsible for the design of the game engine and the management of the students and project.

### 3 Teaching

Chris GauthierDickey has taught a variety of courses, from introductory freshmen classes to advanced graduate student classes. All classes listed are those which he was the primary instructor, except as noted.

#### 3.1 University of Denver

- *Distributed Stream Processing* (co-taught), Graduate.
- *Secure Memory Models*, Graduate.
- *Augmented Reality*, Graduate.
- *Computer Networking*, Undergraduate and Graduate.
- *Networks and Games*, Undergraduate and Graduate.
- *Game Programming I*, Undergraduate and Graduate.
- *Unix Tools*, Undergraduate, Graduate, and non-traditional students.
- *Systems Programming (C/C++)*, Undergraduate and Graduate
- *Introduction to Computer Science III*, Undergraduate.

### **3.2 University of Oregon**

- *Introduction to Game Programming*, Undergraduate and Graduate
- *Introduction to XML*, Undergraduate and Graduate
- *Advanced XML*, Undergraduate and Graduate

## **4 Service**

### **4.1 Technical Conference/Workshop Committees**

- Committee member of the International Workshop on Massively Multiuser Virtual Environments (MMVE), usually held in conjunction with IEEE Virtual Reality.

### **4.2 University Committees**

- University of Denver, Faculty Senate (representative for computer science (2009-2011)).
- University of Denver, Faculty Search Committee (2006–2009)
- University of Denver, Computer Science Facilities Committee (2006-2009)

### **4.3 Reviews**

- ACM Siggraph
- ACM NOSSDAV
- ACM Sigcomm
- IFIP Networking
- ACM Transactions on Networking
- ACM Transactions on Multimedia Computing Communications and Applications
- Elsevier Computer Networks