Vyas Sekar

Research Interests

My research is at the intersection of networking, security, and systems. My current research focuses on three broad themes: abstractions for managing and programming stateful in-network functions, improving the state of network security via novel software-defined networking solutions, designing new data-driven approaches to improve user perceived quality of experience for Internet application.

Education

Carnegie Mellon University, Pittsburgh, Pennsylvania USA

Ph.D, Computer Science, Aug 2010
Advisors: Michael K. Reiter and Hui Zhang
Dissertation: Effective Network Management via System-Wide Coordination and Optimization

Indian Institute of Technology, Madras

B. Tech, Computer Science and Engineering, May 2003
Minor in Operations Research
Winner of President of India Gold Medal

Professional Appointments

- **Jan 2014 – Present, Assistant Professor**
  Carnegie Mellon University
- **Sep 2012 – Dec 2013, Assistant Professor**
  Stony Brook University
- **May 2011 – Aug 2012, Research Scientist**,
  Intel Science and Technology Center for Secure Computing
- **Sep 2010 – Apr 2011, Research Scientist, Intel Research Berkeley**
- **Aug 2003 – Aug 2010, Graduate Student, Carnegie Mellon University**
- **Summer 2005, Intern, AT&T Labs-Research**
- **Summer 2004, Intern, AT&T Labs-Research**

Honors and Awards

- NSF Career Award
- Best paper award at ACM SIGCOMM 2012
- Best paper award at ACM CoNext 2013
- Best paper award (systems track) at ACM Multimedia 2009
- Best paper award finalist at ACM SIGCOMM 2013, ACM IMC 2014, ACM CoNext 2014
- 2nd place in CSAW Applied Security Research Competition
- Google Faculty Research Awards (twice)
- Cisco Faculty Research Award
- Facebook Faculty Research Award
- CSAW Applied Security Research Competition Finalist (twice) 2015
- Invited keynote at 10th International Conference on Information Systems Security (ICISS 2014)
- Papers fast-tracked to IEEE Transactions of Networking from ACM CoNext 2012, ACM CoNext 2013
- Invited paper to Communications of ACM Research Highlights

- President of India Gold Medal, awarded to the student with the highest GPA among graduating students, Indian Institute of Technology Madras
- B. Ravichandran Memorial Prize, awarded to the student with the best academic record in Computer Science and Engineering, Indian Institute of Technology Madras
- Visveswaraya Memorial Prize, to the student with the highest GPA, Indian Institute of Technology Madras
- Recipient of Narasimhan Fellowship for the year 2000-2001 for the CS student with best GPA for the year.
- Invited by the Prime Minister's Office to attend the Republic Day Parade for outstanding performance in national high-school examinations in 1999 and 1997

Selected Publications

1. [**SIGCOMM**] Yi Sun, Xiaoqi Yin, Junchen Jiang, Vyas Sekar, Fuyuan Lin, Nanshu Wang, Tao Liu, Bruno Sinopoli *CS2P: Improving Video Bitrate Selection and Adaptation with Data-Driven Throughput Prediction*, in SIGCOMM 2016
2. [**SIGCOMM**] Zaoxing Liu, Antonis Manousis, Greg Vorsanger, Vyas Sekar, Vladimir Braverman, *One Sketch to Rule Them All: Rethinking Network Flow Monitoring with UnivMon* in SIGCOMM 2016
3. [**SIGCOMM**] Junchen Jiang, Rajdeep Das, Ganesh Ananthanarayanan, Philip A. Chou, Venkata Padmanabhan, Vyas Sekar, Esbjorn Dominique, Marcin Goliszewski, Dalibor Kukoleca, Renat Vafin, Hui Zhang *Via: Improving Internet Telephony Call Quality Using Predictive Relay Selection* in SIGCOMM 2016
4. [**NSDI**] Seyed K Fayaz, Tianlong Yu, Yoshiaki Tobioka, Sagar Chaki, **Vyas Sekar**, *BUZZ: Testing Context-Dependent Policies in Stateful Networks* in NSDI 2016
5. [**NSDI**] Junchen Jiang, Henry Milner, Davis Shepherd, **Vyas Sekar**, Ion Stoica, Hui Zhang to appear at NSDI 2016 *CFA: A Practical Prediction System for Video QoE Optimization*, in NSDI 2016
6. [**NSDI**] Victor Heorhiadi, Michael K Reiter, **Vyas Sekar**, *Simplifying Software-Defined Network Optimization Applications Using SOL*, in NSDI 2016
7. [**NDSS**] Min Suk Kang, Virgil Gligor, **Vyas Sekar**, *SPIFFY: Handling Scalable Persistent Indistinguishable Link-Flooding Attacks*, in NDSS 2016
8. [**CCS**] Soo-jin Moon, **Vyas Sekar**, Michael K Reiter *Nomad: Mitigating Arbitrary Cloud Side Channels via Provider-Assisted Migration* , in ACM CCS 2015
9. [**USENIX SECURITY**] Seyed K Fayaz, Yoshiaki Tobioka, **Vyas Sekar**, Michael Bailey *Flexible and Elastic DDoS Defense using Bohatei*, in USENIX SECURITY 2015 **Presented at NANOG 66 Research and education track**
10. [**SIGCOMM**] Xiaoqi Yin, Abhishek Jindal, Vyas Sekar, Bruno Sinopoli, *A control-theoretic approach for dynamic adaptive streaming over HTTP*, in ACM SIGCOMM 2015
11. [**NSDI**] Michael Butkiewicz, Daimeng Wang, Zhe Wu, Harsha Madhyastha, **Vyas Sekar**, *Klotski: Reprioritizing Web Content to Improve User Experience on Mobile Devices*, in NSDI 2015
12. [**NSDI**] Aditya Ganjam, Faisal Siddiqui, Jibin Zhan, Xi Liu, Ion Stoica, Junchen Jiang, **Vyas Sekar**, Hui Zhang, C3: Internet-Scale Control Plane for Video Quality Optimization, in NSDI 2015
13. [**SIGCOMM**] Naved Hamedazimi, Zafar Qazi, Himanshu Gupta, **Vyas Sekar**, Samir Das, Himanshu Shah, Ashish Tanwer, *FireFly: A Reconfigurable Wireless Datacenter Fabric using Free-space Optics*, in SIGCOMM 2014

14. [**NSDI**] Seyed Fayazbakhsh, Luis Chiang, **Vyas Sekar**, Minlan Yu, Jeffrey C. Mogul, *Enforcing Network-Wide Policies in the Presence of Dynamic Middlebox Actions using FlowTags*, *in NSDI 2014*
15. [**CoNext**] Ashok Anand, Athula Balachandran, **Vyas Sekar**, Aditya Akella, and Srinivasan Seshan, *Enhancing Video Availability and Accessibility Using Information-Bound References*, in ACM CoNext 2013
Best paper award
16. [**SIGCOMM**] Seyed Fayazbakhsh, Amin Tootoonchian, Yin Lin, Ali Ghodsi, Teemu Koponen, KC Ng, Bruce Maggs, **Vyas Sekar**, Scott Shenker *Less Pain, Most of the Gain: Incrementally Deployable ICN*, *in SIGCOMM 2013*
17. [**SIGCOMM**] Zafar Qazi, Cheng-Chun Tu, Luis Chiang, Rui Miao, **Vyas Sekar**, Minlan Yu *SIMPLE-fying Middlebox Policy Enforcement Using SDN*, *in SIGCOMM 2013*
18. [**SIGCOMM**] Athula Balachandran, **Vyas Sekar**, Aditya Akella, Srinivasan Seshan, Ion Stoica, Hui Zhang *Developing a Predictive Model of Quality of Experience for Internet Video*, *in SIGCOMM 2013*
19. [**SIGCOMM**] Ali Ghodsi, **Vyas Sekar**, Matei Zaharia, Ion Stoica, *Multi-Resource Scheduling for Packet Processing*, *ACM SIGCOMM 2012. Best paper award*
20. [**SIGCOMM**] Xi Liu, Florin Dobrian, Henry Milner, Junchen Jiang, **Vyas Sekar**, Ion Stoica, Hui Zhang *A Case for a Coordinated Internet Video Control Plane*, *ACM SIGCOMM 2012.*
21. [**SIGCOMM**] Justine Sherry, Shaddi Hasan, Colin Scott, Arvind Krishnamurthy, Sylvia Ratnasamy, **Vyas Sekar** *Making Middleboxes Someone Else's Problem: Network Processing as a Cloud Service*, *ACM SIGCOMM 2012.*
22. [**NSDI**] **Vyas Sekar**, Norbert Egi, Sylvia Ratnasamy, Michael K. Reiter, and Guangyu Shi, *Design and Implementation a Consolidated Middlebox Architecture*, in *USENIX NSDI 2012.*
23. [**SIGCOMM**] Florin Dobrian, **Vyas Sekar**, Asad Awan, Dilip Joseph, Aditya Ganjam, Jibin Zhan, Ion Stoica, and Hui Zhang, *Understanding the Impact of Video Quality on User Engagement*, *ACM SIGCOMM 2011. Selected for CACM Research Highlights*
24. [**SIGCOMM**] Ashok Anand, **Vyas Sekar**, and Aditya Akella, *SmartRE: An Architecture for Coordinated Network-wide Redundancy Elimination*, *ACM SIGCOMM 2009.*
25. [**Multimedia**] Hao Yin, Xuening Liu, Tongyu Zhan, **Vyas Sekar**, and Hui Zhang, *Design and Deployment of a Hybrid CDN-P2P System for Live Video Streaming: Experiences with LiveSky*, *ACM Multimedia 2009*
(*Selected as best paper in systems track and one of 4 best papers*)
26. [**NSDI**] **Vyas Sekar**, Michael K. Reiter, Walter Willinger, Hui Zhang, Ramana Rao Kompella, and David G. Andersen, *cSamp: A System for Network-Wide Flow Monitoring*, *USENIX NSDI 2008.*
27. [**SIGMETRICS**] Ashwin Lall, **Vyas Sekar**, Jim Xu, Mitsu Ogihara, and Hui Zhang, *Data Streaming Algorithms for Estimating Entropy of Network Traffic*, *ACM SIGMETRICS 2006* 5
28. [**IEEE S&P**] Yinglian Xie, **Vyas Sekar**, David A Maltz, Michael K Reiter, and Hui Zhang, *Worm Origin Identification Using Random Moonwalks*, *IEEE Symposium on Security and Privacy 2005.*

All Conference and Workshop Publications [1]

1. [**SIGCOMM**] Yi Sun, Xiaoqi Yin, Junchen Jiang, Vyas Sekar, Fuyuan Lin, Nanshu Wang, Tao Liu, Bruno Sinopoli *CS2P: Improving Video Bitrate Selection and Adaptation with Data-Driven Throughput Prediction*, in SIGCOMM 2016
2. [**SIGCOMM**] Zaoxing Liu, Antonis Manousis, Greg Vorsanger, Vyas Sekar, Vladimir Braverman, *One Sketch to Rule Them All: Rethinking Network Flow Monitoring with UnivMon* in SIGCOMM 2016
3. [**SIGCOMM**] Junchen Jiang, Rajdeep Das, Ganesh Ananthanarayanan, Philip A. Chou, Venkata Padmanabhan, Vyas Sekar, Esbjorn Dominique, Marcin Goliszewski, Dalibor Kukoleca, Renat Vafin, Hui Zhang *Via: Improving Internet Telephony Call Quality Using Predictive Relay Selection* in SIGCOMM 2016
4. [**NSDI**] Seyed K Fayaz, Tianlong Yu, Yoshiaki Tobioka, Sagar Chaki, **Vyas Sekar**, *BUZZ: Testing Context-Dependent Policies in Stateful Networks* in NSDI 2016
5. [**NSDI**] Junchen Jiang, Henry Milner, Davis Shepherd, **Vyas Sekar**, Ion Stoica, Hui Zhang *CFA: A Practical Prediction System for Video QoE Optimization*, in NSDI 2016
6. [**NSDI**] Victor Heorhiadi, Michael K Reiter, **Vyas Sekar**, *Simplifying Software-Defined Network Optimization Applications Using SOL* , in NSDI 2016
7. [**NDSS**] Min Suk Kang, Virgil Gligor, **Vyas Sekar**, *SPIFFY: Handling Scalable Persistent Indistinguishable Link-Flooding Attacks*, in NDSS 2016
8. [**SOSR**]Zafar Ayyub Qazi , Phani Krishna, **Vyas Sekar**, Vijay Gopalakrishnan, Kaustubh Joshi, Samir Das *KLEIN: A Minimally Disruptive Design for an Elastic Cellular Core* , in SOSR 2016
9. [**ICDCS**] Victor Heorhiadi, Shriram Rajagopalan, Hani Jamjoom, Michael K. Reiter, **Vyas Sekar**, *Gremlin: A Software-defined Framework for Testing the Resiliency of Microservices*, in ICDCS 2016
10. [**AsiaCCS**] Yu-Ming Ke, Chih-Wei Chen, Hsu-Chun Hsiao,Adrian Perrig, **Vyas Sekar**, *Congesting the Internet with Coordinated And Decentralized Pulsating Attacks* in AsiaCCS 2016
11. [**HotNets**] Zaoxing Liu, Greg Vorsanger, Vladimir Braverman, **Vyas Sekar**, *Enabling a "RISC" Approach for Software-Defined Monitoring using Universal Streaming* , in HotNets 2015
12. [**HotNets**] Tianlong Yu, Yuvraj Agarwal, Vyas Sekar, Srini Seshan, Chenren Xu , *Handling a trillion (unfixable) flaws on a billion devices: Rethinking network security for the Internet-of-Things* in HotNets 2015
13. [**CCS**] Soo-jin Moon, **Vyas Sekar**, Michael K Reiter *Nomad: Mitigating Arbitrary Cloud Side Channels via Provider-Assisted Migration* , in ACM CCS 2015
14. [**USENIX SECURITY**] Seyed K Fayaz, Yoshiaki Tobioka, **Vyas Sekar**, Michael Bailey *Flexible and Elastic DDoS Defense using Bohatei*, in USENIX SECURITY 2015
15. [**SIGCOMM**] Xiaoqi Yin, Abhishek Jindal, **Vyas Sekar**, Bruno Sinopoli, *A control-theoretic approach for dynamic adaptive streaming over HTTP*, in SIGCOMM 2015
16. [**NSDI**] *Klotski: Reprioritizing Web Content to Improve User Experience on Mobile Devices*, Michael Butkiewicz, Daimeng Wang, Zhe Wu, Harsha Madhyastha, **Vyas Sekar**, in NSDI 2015

[1] From Google Scholar Jun 24, 2016: 4298 citations total, h-index 32, i-10 index 53

17. [**NSDI**] *C3: Internet-Scale Control Plane for Video Quality Optimization,* Aditya Ganjam, Faisal Siddiqui, Jibin Zhan, Xi Liu, Ion Stoica, Junchen Jiang, **Vyas Sekar**, Hui Zhang, in NSDI 2015
18. [**PAM**] *Internet Outages, the Eyewitness Accounts: Analysis of the Outages Mailing List*, Ritwik Banerjee, Abbas Razaghpanah, Akassh Mishra, Luis Chiang, Phillipa Gill, Yejin Choi, **Vyas Sekar**, in PAM 2015
19. [**ICISS**] *SNIPS: A Software-Defined Approach for Scaling Intrusion Prevention Systems via Offloading*, Victor Heorhiadi, Seyed Kaveh Fayazbakhsh, Michael Reiter, **Vyas Sekar** in ICISS 2014 (invited)
20. [**HotNets**] *Using Video-Based Measurements to Generate a Real-Time Network Traffic Map*, Yi Sun, Junchen Jiang, **Vyas Sekar**, Hui Zhang, Fuyuan Lin, Nanshu Wang, in HotNets 2014
21. [**HotNets**] *Toward a Principled Framework to Design Dynamic Adaptive Streaming Algorithms over HTTP*, Xiaoqi Yin, **Vyas Sekar**, Bruno Sinopoli in HotNets 2014
22. [**HotNets**] *EONA: Experience-Oriented Network Architecture*, Junchen Jiang, **Vyas Sekar**, Xi Liu, Ion Stoica, Hui Zhang in HotNets 2014
23. [**CoNext**] Yi Sun, Seyed Kaveh Fayazbakhsh, **Vyas Sekar**, Yang Guo, Yun Jin, Mohamed-Ali Kaafar, Steve Uhlig, *Trace-Driven Analysis of ICN Caching Algorithms on Video-on-Demand Workloads*, in ACM CoNext 2014
24. [**IMC**] Fatima Zarinni, Ayon Chakraborty, **Vyas Sekar**, Phillipa Gill, Samir Das, *A First Look at Performance in Mobile Virtual Network Operators*, in IMC 2014
25. [**SIGCOMM**] Naved Hamedazimi, Zafar Qazi, Himanshu Gupta, **Vyas Sekar**, Samir Das, Himanshu Shah, Ashish Tanwer, *FireFly: A Reconfigurable Wireless Datacenter Fabric using Free-space Optics*, in SIGCOMM 2014
26. [**HotSDN**] Seyed Kaveh Fayazbakhsh, **Vyas Sekar** *Testing Stateful and Dynamic Dataplanes with FlowTest*, in HotSDN 2014
27. [**NSDI**] Seyed Kaveh Fayazbakhsh, Luis Chiang, **Vyas Sekar**, Minlan Yu, Jeffrey C Mogul, *Enforcing Network-Wide Policies in the presence of Dynamic Middlebox Actions using FlowTags*, in ACM/USENIX NSDI 2014
28. [**HotMiddlebox**] Seyed Kaveh Fayazbakhsh, Michael K Reiter, **Vyas Sekar**, *Verifiable Network Function Outsourcing: Requirements, Challenges, and Roadmap*, in ACM CoNext HotMiddlebox 2013
29. [**CoNext**] Junchen Jiang, **Vyas Sekar**, Ion Stoica, Hui Zhang, *Shedding Light on the Structure of Internet Video Quality Problems in the wild*, in ACM CoNext 2013
30. [**CoNext**] Ashok Anand, Athula Balachandran, **Vyas Sekar**, Aditya Akella, and Srinivasan Seshan, *Enhancing Video Availability and Accessibility Using Information-Bound References*, in ACM CoNext 2013
    Best paper award
31. [**HotNets**] Navid Hamedazimi, Himanshu Gupta, **Vyas Sekar**, Samir Das, *Patch Panels in the Sky: A Case for Free Space Optics in Datacenters*, in ACM HotNets 2013
32. [**IMC**] Athula Balachandran, **Vyas Sekar**, Aditya Akella, Srinivasan Seshan, Analyzing the Potential Benefits of CDN Augmentation Strategies for Internet Video Workloads in IMC 2013

33. [**HotSDN**] Seyed Fayazbakhsh, **Vyas Sekar**, Minlan Yu, Jeff Mogul, *FlowTags: Enforcing Network-Wide Policies in the Presence of Dynamic Middlebox Actions*, *in HotSDN 2013*

34. [**SIGCOMM**] Seyed Fayazbakhsh, Amin Tootoonchian, Yin Lin, Ali Ghodsi, Teemu Koponen, KC Ng, Bruce Maggs, **Vyas Sekar**, Scott Shenker *Less Pain, Most of the Gain: Incrementally Deployable ICN*, *in SIGCOMM 2013*

35. [**SIGCOMM**] Zafar Qazi, Cheng-Chun tu, Luis Chiang, Rui Miao, **Vyas Sekar**, Minlan Yu *SIMPLE-fying Middlebox Policy Enforcement Using SDN*, *in SIGCOMM 2013*

36. [**SIGCOMM**] Athula Balachandran, **Vyas Sekar**, Aditya Akella, Srinivasan Seshan, Ion Stoica, Hui Zhang *Developing a Predictive Model of Quality of Experience for Internet Video*, *in SIGCOMM 2013*

37. [**SIGMETRICS**] Athula Balachandran, **Vyas Sekar**, Aditya Akella, Srinivasan Seshan, *Understanding Video Access Patterns: Measurements and Implications*, *in SIGMETRICS 2013*

38. [**VEE**] Chen Chen, Petros Maniatis, Adrian Perrig, **Vyas Sekar**, Amit Vasudevan, Towards Verifiable Resource Accounting for Outsourced Computation *in VEE 2013*

39. [**HotMobile**] Michael Butkiewicz, Zhe Wu, Shunan Li, Pavithra Murali, Vagelis Hristidis, Harsha V Madhyastha, **Vyas Sekar**, Enabling the Transition to the Mobile Web with WebSieve *in HotMobile 2013*

40. [**CoNext**] Victor Heorhiadi, **Vyas Sekar**, and Michael K Reiter, *New Opportunities for Load Balancing in Network-Wide Intrusion Detection Systems*, *in ACM CoNext 2012*

41. [**CoNext**] Junchen Jiang, **Vyas Sekar**, Hui Zhang, *Improving Fairness, Efficiency, and Stability of HTTP Video Adaptive Streaming using FESTIVE*, *in ACM CoNext 2012*

42. [**HotNets**] Athula Balachandran, **Vyas Sekar**, Aditya Akella, Srinivasan Seshan, Ion Stoica, Hui Zhang *A Quest for an Internet Video Quality Metric*, *in HotNets 2012*

43. [**HotNets**] Udi Weinsberg, Qinxi Li, Nina Taft, Athula Balachandran, Gianluca Iannaccone, **Vyas Sekar**, Srinivasan Seshan, *CARE: Content-Aware Redundancy Elimination for Challenged Networks*, *in HotNets 2012*

44. [**IMC**] Neil Gong, Wenchang Xu, Prateek Mittal, Emil Stefanov, Ling Huang, **Vyas Sekar**, Dawn Song *Evolution of Social Attribute Networks: Measurements, Modeling, and Implications using Google+*, *IMC 2012.*

45. [**SOUPS**] Erika Chin, Adrienne Felt, **Vyas Sekar**, David Wagner, *Measuring User Confidence in Smartphone Security and Privacy*, *SOUPS 2012.*

46. [**SIGCOMM**] Xi Liu, Florin Dobrian, Henry Milner, Junchen Jiang, **Vyas Sekar**, Ion Stoica, Hui Zhang *A Case for a Coordinated Internet Video Control Plane*, *ACM SIGCOMM 2012.*

47. [**SIGCOMM**] Justine Sherry, Shaddi Hasan, Colin Scott, Arvind Krishnamurthy, Sylvia Ratnasamy, **Vyas Sekar** *Making Middleboxes Someone Else's Problem: Network Processing as a Cloud Service*, *ACM SIGCOMM 2012.*

48. [**SIGCOMM**] Ali Ghodsi, **Vyas Sekar**, Matei Zaharia, Ion Stoica, *Multi-Resource Scheduling for Packet Processing*, *ACM SIGCOMM 2012*
Best paper award

49. [**NSDI**] **Vyas Sekar**, Norbert Egi, Sylvia Ratnasamy, Michael K. Reiter, and Guangyu Shi, *Design and Implementation a Consolidated Middlebox Architecture*, in *USENIX NSDI 2012*.
50. [**HotNets**] **Vyas Sekar**, Sylvia Ratnasamy, Michael K. Reiter, Norbert Egi, and Guangyu Shi, *The Middlebox Manifesto: Enabling Innovation in Middlebox Deployment*, *ACM HotNets 2011*.
51. [**CCSW**] **Vyas Sekar** and Petros Maniatis, *Verifiable Resource Accounting for Cloud Computing Services*, *ACM CCS Cloud Computing Security Workshop 2011*.
52. [**IMC**] Michael Butkiewicz, Harsha Madhyastha, and **Vyas Sekar**, *Understanding Website Complexity: Measurements, Metrics, and Implications*, *Internet Measurement Conference 2011*.
53. [**SIGCOMM**] Florin Dobrian, **Vyas Sekar**, Asad Awan, Dilip Joseph, Aditya Ganjam, Jibin Zhan, Ion Stoica, and Hui Zhang, *Understanding the Impact of Video Quality on User Engagement*, *ACM SIGCOMM 2011*.
54. [**CoNext**] **Vyas Sekar**, Ravishankar Krishnaswamy, Anupam Gupta, and Michael K. Reiter, *Network-Wide Deployment of Intrusion Detection and Prevention Systems*, *ACM CoNEXT 2010*.
55. [**HotNets**] Ashok Anand, Aditya Akella, **Vyas Sekar**, and Srinivasan Seshan, *A Case for Information-Bound Referencing*, *ACM HotNets 2010*.
56. [**IMC**] **Vyas Sekar**, Michael K Reiter, and Hui Zhang, *Revisiting the Case for a Minimalist Approach for Network Flow Monitoring*, *Internet Measurement Conference 2010*.
57. [**HomeNets**] Ashok Anand, Aaron Gember, **Vyas Sekar** and Aditya Akella, *Tracking Semantic Relationships for Effective Content Management in Home Networks*, *ACM SIGCOMM HomeNets Workshop 2010*.
58. [**Comsnets**] **Vyas Sekar**, Anupam Gupta, Michael K. Reiter, and Hui Zhang, *Coordinated Sampling sans Origin-Destination Information: Algorithms, Analysis, and Evaluation*, *COMSNETS 2010*.
59. [**ICISS**] Michael K. Reiter, **Vyas Sekar**, Chad Spensky, and Zhenghao Zhang, *Making Contribution-Aware Peer-Assisted Content Distribution Robust to Collusion Attacks Using Bandwidth Puzzles*, *ICISS 2009*.
60. [**IMC**] Hao Yin, Xuening Liu, Feng Qiu, Ning Xia, Chuang Lin, Hui Zhang, **Vyas Sekar**, and Geyong Min, *Inside the Birds Nest: Measurements of Large-Scale Live VoD from the 2008 Olympics*, in *Internet Measurement Conference 2009*
61. [**Multimedia**] Hao Yin, Xuening Liu, Tongyu Zhan, **Vyas Sekar**, and Hui Zhang, *Design and Deployment of a Hybrid CDN-P2P System for Live Video Streaming: Experiences with LiveSky*, *ACM Multimedia 2009*
(*Selected as best paper in systems track and one of 4 best papers*)
62. [**SIGCOMM**] Ashok Anand, **Vyas Sekar**, and Aditya Akella, *SmartRE: An Architecture for Coordinated Network-wide Redundancy Elimination*, *ACM SIGCOMM 2009*.
63. [**N2S**] Li Ming Chen, Meng Chang Chen, Yeali S. Sun, Mike Hsiao, **Vyas Sekar**, and Hui Zhang, *Scalable Long-term Network Forensics for Epidemic Attacks*, *IFIP/IEEE N2S 2009*.

64. [**USENIX ATC**] Pratap Ramamurthy, **Vyas Sekar**, Aditya Akella, Balachander Krishnamurthy, and Anees Shaikh, *Remote Profiling of Resource Constraints of Web Servers Using Mini-Flash Crowds*, *USENIX Annual Technical Conference 2008*.

65. [**IMC**] George Nychis, **Vyas Sekar**, David G. Andersen, Hyong Kim, and Hui Zhang, *An Empirical Evaluation of Entropy-based Anomaly Detection*, *Internet Measurement Conference 2008*

66. [**NSDI**] **Vyas Sekar**, Michael K. Reiter, Walter Willinger, Hui Zhang, Ramana Rao Kompella, and David G. Andersen, *cSamp: A System for Network-Wide Flow Monitoring*, *USENIX NSDI 2008*.

67. [**INM**] Pratap Ramamurthy, **Vyas Sekar**, Aditya Akella, Balachander Krishnamurthy, and Anees Shaikh, *Using Mini-Flash Crowds to Infer Resource Constraints in Remote Web Servers*, *ACM SIGCOMM Workshop on Internet Network Management (INM) 2007*.

68. [**ICNP**] Yinglian Xie, **Vyas Sekar**, Michael K. Reiter, and Hui Zhang, *Forensic Analysis for Epidemic Attacks in Federated Networks*, *IEEE ICNP 2006*.

69. [**USENIX ATC**] **Vyas Sekar**, Nick Duffield, Kobus van der Merwe, Oliver Spatscheck, and Hui Zhang, *LADS: Large-scale Automated DDoS detection System*, *USENIX Annual Technical Conference 2006*.

70. [**DSN**] **Vyas Sekar**, Yinglian Xie, David A. Maltz, Michael K. Reiter, and Hui Zhang, *A Multi-Resolution Approach for Worm Detection and Containment*, *IEEE/IFIP DSN 2006*.

71. [**LSAD**] Z. Morley Mao, **Vyas Sekar**, Oliver Spatscheck, Jacobus van der Merwe, and Rangarajan Vasudevan, *Analyzing Large DDoS Attacks using Multiple Data Sources*, *ACM SIGCOMM Workshop on Large-Scale Attack Defense (LSAD) 2006*.

72. [**SIGMETRICS**] Ashwin Lall, **Vyas Sekar**, Jim Xu, Mitsu Ogihara, and Hui Zhang, *Data Streaming Algorithms for Estimating Entropy of Network Traffic*, *ACM SIGMETRICS/IFIP Performance 2006*.

73. [**IMC**] William Aiello, Anna Gilbert, Brian Rexroad, and **Vyas Sekar**, *Sparse Approximations for High Fidelity Compression of Network Traffic Data*, *Internet Measurement Conference 2005*.

74. [**IEEE S&P**] Yinglian Xie, **Vyas Sekar**, David A Maltz, Michael K Reiter, and Hui Zhang, *Worm Origin Identification Using Random Moonwalks*, *IEEE Symposium on Security and Privacy 2005*.

75. [**HotNets**] **Vyas Sekar**, Yinglian Xie, David A Maltz, Michael K Reiter, and Hui Zhang, *Toward a Framework for Internet Forensic Analysis*, *ACM Hotnets III 2004*.

76. [**ICC**] **Vyas Sekar**, B. S. Manoj, and C. Siva Ram Murthy, *Routing for a Single Interface MCN Architecture and Pricing Schemes for Data Traffic in Multihop Cellular Networks*, *Proc. of IEEE ICC 2003*.

Journal Publications

1. [**ToN**] Ashok Anand, Athula Balachandran, **Vyas Sekar**, Aditya Akella, and Srinivasan Seshan, *Enhancing Video Availability and Accessibility Using Information-Bound References*, *in IEEE Transactions on Networking* 20 24(2), pages 1223-1236, 2016

2. [**ToN**] Michael Butkiewicz, Harsha Madhyastha, and **Vyas Sekar**, *Understanding Website Complexity: Measurements, Metrics, and Implications*, *in IEEE Transactions on Networking* 22(3), pages 943956, 2014

3. [**ToN**] Junchen Jiang, **Vyas Sekar**, Hui Zhang, *Improving Fairness, Efficiency, and Stability of HTTP Video Adaptive Streaming using FESTIVE*, *Fast tracked to IEEE Transactions on Networking* 2014
4. [**CACM**] Florin Dobrian, **Vyas Sekar**, Asad Awan, Dilip Joseph, Aditya Ganjam, Jibin Zhan, Ion Stoica, and Hui Zhang, *Understanding the Impact of Video Quality on User Engagement*, *Communications of the ACM, Mar 2013*
5. [**TOMCCAP**] Hao Yin, Xuening Liu, Tongyu Zhan, **Vyas Sekar**, and Hui Zhang, *Design and Deployment of a Hybrid CDN-P2P System for Live Video Streaming: Experiences with LiveSky*, *ACM Transactions on Multimedia 2010*

Technical Reports, Posters, Extended Abstracts

- *DDA: A Cross-Session Approach for Throughput Prediction with Applications to Video Bitrate Selection*, Junchen Jiang, Vyas Sekar, Yi Sun, Arxiv `http://arxiv.org/abs/1505.02056`
- *Analyzing TCP Throughput Stability and Predictability with Implications for Adaptive Video Streaming*, Yi Sun , Xiaoqi Yin, Nanshu Wang, Junchen Jiang, Vyas Sekar, Yun Jin, Bruno Sinopoli, Arxiv `http://arxiv.org/abs/1506.05541`
- *Managing Virtualized Middlebox Deployments with Stratos* Aaron Gember, Robert Grandl, Ashok Anand, Theo Benson, Aditya Akella, **Vyas Sekar**, Arxiv `http://arxiv.org/abs/1305.0209`
- *Evolving DDoS Attacks and Defenses*, Min Suk Kang, Virgil Gligor and Vyas Sekar. International Workshop on Security Protocols 2016
- *In-Situ Quality of Experience Monitoring: The Case for Prioritizing Coverage Over Fidelity*, Aditya Ganjam, Vyas Sekar, Hui Zhang NSF/FCC Internet QoE Workshop, Fall 2015
- *Understanding Throughput Stability and Predictability to Enable Better Video Quality of Experience*, Xiaoqi Yin, Junchen Jiang, Vyas Sekar, Bruno Sinopoli NSF/FCC Internet QoE Workshop, Fall 2015
- *A Longitudinal and Cross-Dataset Study of Internet Latency and Path Stability*, Mosharaf Chowdhury, Rachit Agarwal, **Vyas Sekar**, Ion Stoica Tech Report, `http://www.eecs.berkeley.edu/Pubs/TechRpts/2014/EECS-2014-172.html`
- Zafar Qazi, Vyas Sekar, Samir Das, A Framework to Quantify the Benefits of Network Functions Virtualization in Cellular Networks `http://arxiv.org/abs/1406.5634`
- Seyed Kaveh Fayazbakhsh, Luis Chiang, **Vyas Sekar**, Minlan Yu, Jeffrey C. Mogul, Extending SDN to Handle Dynamic Middlebox Actions using FlowTags presentation at the Open Networking Summit 2014
- Zafar Qazi, Cheng-chun Tu, Rui Miao, Luis Chiang, **Vyas Sekar**, Minlan Yu Practical and Incremental Convergence between SDN and Middleboxes presentation at the Open Networking Summit 2013
- **Vyas Sekar**, Norbert Egi, Sylvia Ratnasamy, Michael K Reiter, Guangyu Shi Design and Implementation of a Consolidated Middlebox Architecture poster at the Open Networking Summit 2013
- Ashok Ananad, **Vyas Sekar**, Aditya Akella A System for Coordinated NEtwork-wide Redundancy Elimination in NSDI 2009 (poster)
- **Vyas Sekar**, Yinglian Xie, Michael K. Reiter, and Hui Zhang, *Is Host-based Anomaly Detection + Temporal Correlation = Worm Causality?*, Technical Report, CMU-CS-07-112

Patents

- *Method and apparatus for large-scale automated distributed denial of service attack detection*, US8001601 (Issue date Aug 16, 2011)
- *System and Method for Profiling Resource Constraints of Web Servers*, US7933745 (Issue date Apr 26, 2011)
- *Architecture and System for Coordinated Network-wide Redundancy Elimination*, US 8509237, (Issue date Aug 13, 2013)

Service Activities

- Organization:
  - Chair of SIGCOMM Test-of-Time Award Committee 2016
  - Organizer of DIMACS Workshop on Algorithms for SDN 2016
  - CoNext 2016 TPC co-chair
  - CoNext 2015 Workshops chair
  - HotMiddlebox Steering Committee
  - SIGCOMM 2015 Travel Grant chair
  - CoNext 2013 Travel Grant chair
  - HotMiddlebox 2013 chair
  - CoNext 2012 Student Workshop chair
- Technical Program Committees:
  - 2017: NDSS
  - 2016: NSDI, IEEE Symposium on Security and Privacy, SIGCOMM, CoNext (chair)
  - 2015: SIGCOMM, IEEE Symposium on Security and Privacy, CoNext, IMC, SOSR, COMSNETS
  - 2014: SIGCOMM, NSDI, CoNext, NDSS, HotSDN, ANCS, SIGCOMM Posters/Demos, Open Networking Summit Research Track
  - 2013: SIGCOMM, CCS, CoNext, ANCS, IWQoS, NSDI Poster/Demos, IFIP Networking, IFIP Performance, ICPADS, CoSN (external PC)
  - 2012: CoNext, IMC, PAM, COMSNETS, CoNext Student Workshop (co-chair) (co-chair)
  - 2011: SIGCOMM Posters/Demos, IMC, ICCCN
- Proposal review panels
  - NSF CISE 2016
  - NSF SaTC 2014
  - NSF NeTS 2014
  - NSF NeTS 2014
- Other
  - SIGCOMM 2014 Student Research Competition Judge
  - SIGCOMM 2015 Student Research Competition Judge
  - Panelist at Conext 2013 Student Workshop
- Invited journal reviewer: ACM Computer Communications Review, IEEE Transactions on Networking, IEEE Transactions on Network and Service Management, IEEE Transactions on Multimedia, IEEE Transactions on Internet Technology, IEEE Communication Letters, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Web, and IEEE Journal on Selected Areas in Communication.

- Graduate admissions committee ECE (2015-present)
- External reviewer for conferences: IWQoS 2004, Infocom 2005, SIGCOMM 2006, ASIACCS 2006, Infocom 2007, SIGCOMM 2007, Infocom 2008, USENIX ATC 2009, NSDI 2009.
- Graduate admissions committee at Stony Brook Fall 2012, Spring 2013
- Department Colloquium Organizer, Stony Brook
- Graduate admissions committee at CMU (2005-2006)

PhD Advisees

- Seyed Kaveh Fayazbaksh, Ph.D, ECE CMU
- Junchen Jiang, Ph.D, CS CMU
- Soo Jin Moon, Ph.D, ECE CMU
- Antonis Manousis, Ph. D, ECE CMU
- Tianlong Yu, Ph.D, CSD CMU

MS advisees

- Dipayan Bhattacharya, ECE
- Rahul Muthoo, INI
- Tushar Sharma, ECE

Undergrad advisees

- Emma Zhong, ECE

High-school students

- Matthew Zhou
- Nancy Lu

Past Advisees

- Athula Balachandran, Ph.D, CMU, Now at Netflix
- Yoshiaki Tobioka, MS, CMU, Now at NTT
- Luis Chiang, MS Stony Brook, Now at Telconet Ecuador
- Zafar Qazi, Ph.D, Stony Brook
- Undergrads: Suyash Bhat, ECE; Abhishek Jindal, ECE; Ashwin Raghavachari, ECE; Ridhi Surana, ECE; Ram Verma, ECE

Student Committees

- Ph.D Thesis Committee
  - Bruno Vavala, CMU CSD/FCUL
  - Victor Heorhiadi, UNC
  - David Naylor, CMU CSD
  - Xiaoqi Yin, CMU ECE
  - Chen Chen, CMU ECE
  - Steve Matsumoto, CMU ECE
  - Min Suk Kang, CMU ECE
  - Sangkil Cha, CMU ECE
  - Giordano Fusco, Stony Brook
  - William Cheng-Chun Tu, Stony Brook
  - Navid Hamedazimi, Stony Brook
- Research Qualifiers
  - Antonio Rodrigues, ECE Qual committee 2016
  - Gihyuk Ko, ECE Qual committee 2015

- William Melicher, ECE Qual committee 2015
- Tiffany Bao, ECE Qual committee 2014
- Miao Yu, ECE Qual committee 2014
- Ayon Chakraborty, RPE committee, Stony Brook
- Seyed Kaveh Fayazbaksh, RPE committee, Stony Brook

Teaching

Instructor, ECE 18487 Introduction to Computer Security, Fall 2015
Carnegie Mellon University

Instructor, ECE 18731 Network Security, Spring 2015
Carnegie Mellon University

Instructor, ECE 18859 Software-Defined Networking and Network Functions Virtualization, Fall 2014
Carnegie Mellon University

Instructor, ECE 18739 Network Security and Management, Spring 2014
Carnegie Mellon University

Instructor, CSE 690: Software-Defined Networking, Fall 2013
Stony Brook University

Instructor, CSE 534: Fundamentals of Computer Networks, Spring 2013
Stony Brook University

Instructor, CSE 592: Recent Advances in Networking, Fall 2012
Stony Brook University

Teaching Assistant, 15744: Computer Networks, Spring 2009
Instructor: Hui Zhang, Carnegie Mellon University

Teaching Assistant, 15441: Computer Networks, Fall 2006
Instructors: David G. Andersen, Srinivasan Seshan, Carnegie Mellon University

Teaching Assistant, 15744: Computer Networks, Fall 2004
Instructor: Srinivasan Seshan, Carnegie Mellon University

Teaching Assistant, Introduction to Computing, Fall 2002 and Spring 2003
Department of Computer Science and Engineering, IIT Madras, India
Instructors: C. Siva Ram Murthy, S. Raman, Deepak Khemani

Organizer and Lecturer, Programming refersher for non-CS majors,
Student-run course at IIT Madras

Conference and Invited Talks

- *Software-defined Network Security for Next-Generation Networks*
  - Microsoft Research India, Jun 2016
  - TCS Research and Innovation Center, Jun 2016
- *Understanding Throughput Stability and Predictability to Enable Better Video QoE*
  - NSF/FCC QoE Workshop 2015

- *Rethinking network security with SDN/NFV*
  - Niksun, Jul 2015
  - Intel, May 2015
  - Cylab Industry Day, Fall 2015
  - Penn state distinguished seminar, Fall 2015
- *Toward Practical Convergence of Middleboxes and SDN*
  - MNIT Jaipur, Jan 2015
  - MSR India, Jan 2015
- *SNIPS: A Software-Defined Approach for Scaling Intrusion Prevention Systems via Offloading*
  - Keynote at ICISS, Dec 2014
- *Using Video Measurements to create a real-time network traffic map*
  - ACM SIGCOMM HotNets, Oct 2014
- *Enforcing and Testing Policies in Networks*
  - AT&T-Intel SDN Workshop, Oct 2014
- *Middlebox Manifesto*
  - Cylab Industry Day, Oct 2014
- *Simplifying Middlebox Policy Enforcement Using SDN*
  - Cylab Seminar, Sep 2014
- *Network function outsourcing*
  - NSF Silver Cloud Security Workshop, Sep 2014
- *Some control problems in "hot" networking topics*
  - Control Systems Seminar CMU
- *XIA-NP Video Deployment*
  - NSF Future Internet Architectures Meeting, Mar 2014
- *New challenges in verifiable cloud outsourcing*
  - DIMACS Cloud Security Workshop, Mar 2014
- *Toward Practical Convergence of Middleboxes and Software-Defined Networking*
  - ECE Graduate Seminar CMU, Jan 2014
- *Toward Practical Convergence of Middleboxes and SDN*
  - Stanford University NetSeminar, Feb 2014
  - Facebook Colloquium, Feb 2014
- *Enhancing Video Accessibility using Information-Bound References*
  - ACM CoNext 2013, Dec 2013
- *Advice to networking graduate students*
  - ACM CoNext 2013 Student Workshop Panel, Dec 2013
- *Verifiable Network Function outsourcing*

  - Microsoft Networking Summit, Dec 2013

- *FlowTags: Enforcing Network-Wide Policies in the Presence of Dynamic Middlebox Actions*
  - SIGCOMM HotSDN 2013, Hong Kong
- *Less Pain Most of the Gain: Incrementally Deployable ICN*
  - SIGCOMM 2013, Hong Kong
- *The Middlebox Manifesto*
  - Cornell University Systems Seminar, Mar 2013
  - Brown University Colloqioum, Feb 2013
  - IBM Watson Research Center, Feb 2013
  - Carnegie Mellon Cylab Seminar, Apr 2013
  - Colloquium at Georgia Tech, Apr 2013
- *Practical and Incremental Convergence between Middleboxes and SDN*
  - Open Networking Summit Research Track, Apr 2013
  - Intel SDN Workshop, May 2013
- *Toward practical integration of SDN and middleboxes*
  - DIMACS workshop on software-defined networking, Dec 2012
- *The Middlebox Manifesto*
  - MSR Mini-Faculty Summit, Nov 2012
- *Abstractions for Middleboxes*
  - DIMACS workshop on network abstractions, May 2012
- *Enabling Innovation in Middlebox Deployment*
  - Johns Hopkins University, Feb 2012
  - Stony Brook University, Mar 2012
  - Dartmouth College, Mar 2012
  - Northeastern University, Mar 2012
  - University of British Columbia, Apr 2012
- *The Middlebox Manifesto: Enabling Innovation in Middlebox Deployment*,
  - ACM HotNets 2011, Nov 2011
  - Intel Systems and Architecture Lab, Santa Clara, CA, Nov 2011
- *Verifiable Resource Accounting for Cloud Computing Services*,
  - ACM CCSW 2011, Oct 2011
  - Intel Security Research Lab, Hillsboro, OR, Dec 2011
- *Understanding Website Complexity: Measurements, Metrics, and Implications*,
  - Invited colloquium talk at Palo Alto Research Center, Nov 2011
  - Invited talk at Intel Security Research Lab, Hillsboro, OR, Nov 2011
- *Effective Management through System-Wide Coordination and Optimization*,
  - IBM Research Almaden, March 2010

  - IBM Research Hawthorne, March 2010
  - University of Pittsburgh, School of Information Sciences, March 2010
  - University of Rochester, Computer Science Department, March 2010
  - University of California, Riverside, Computer Science Department, March 2010
  - AT&T Labs-Research, Florham Park, April 2010
  - Johns Hopkins University, Computer Science Department, April 2010
  - Microsoft Research Redmond, April 2010
  - NEC Research, Princeton, April 2010
  - Palo Alto Research Center, May 2010
  - Intel Labs Berkeley, May 2010
  - Rutgers University, Electrical and Computer Engineering Department, May 2010
  - Texas A&M, Computer Science Department, Apr 2011
- *Network-Wide Deployment of Intrusion Detection and Prevention Systems*, CoNEXT 2010, Dec 2010
- *Coordinated Sampling sans Origin-Destination Identifiers: Algorithms and Analysis*, COMSNETS 2010, Jan 2010
- *Making peer-assisted content distribution robust to collusion using bandwidth puzzles*, ICISS 2009, Dec 2009
- *SmartRE: An Architecture for Coordinated Network-Wide Redundancy Elimination*, SIGCOMM 2009, Aug 2009
- *Rethinking NetFlow: A Coordinated "RISC" Architecture for Flow Monitoring*
  - Max Planck Institute for Software Systems, Saarbruecken, Aug 2009,
  - Cisco Research, May 2009
  - Microsoft Research, Silicon Valley Research Center, May 2009
- *cSamp: A System for Network-Wide Flow Monitoring*,
  - Department of Computer Science and Engineering, IIT Madras, June 2008
  - DIMACS/DyDAn Workshop on Internet Tomography, May 2008
  - AT&T Labs-Research Florham Park, May 2008
  - NSDI 2008, April 2008
- *A Multi-Resolution Approach for Worm Detection and Containment*, DSN 2006, Dec 2006
- *LADS: Large-scale Automated DDoS detection System*, USENIX Annual Technical Conference 2006, Jun 2006
- *Sparse Approximations for High Fidelity Compression of Network Traffic Data*, IMC 2005, Oct 2005

CONTACT INFORMATION

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