

# SheharBano

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## Research Interests

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- Systems/Networks; Security; Measurement; Internet censorship; Blockchain Technology; Malware analysis

## Education

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### University of Cambridge

Cambridge, UK

PHD IN COMPUTER SCIENCE

2013-2016

Thesis: "Characterization of Internet Censorship from Multiple Perspectives". Supervisors: Jon Crowcroft. Co-Supervisors: Steven Murdoch (University College London), Vern Paxson (UC Berkeley), Ross Anderson

### National University of Science and Technology (NUST)

Islamabad, Pakistan

MASTERS IN COMPUTER AND COMMUNICATION SECURITY. CGPA: 3.95/4.0.

2010-2013

Thesis: "A Study of Botnets: Systemization of Knowledge and Correlation-based Detection". Supervisors: S. Ali Khayam, Fauzan Mirza.

### International Islamic University

Islamabad, Pakistan

BACHELORS IN COMPUTER SCIENCE. CGPA: 3.98/4.0

2005-2010

## Honors & Awards

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- **Mary Bradburn Scholarship**, The British Federation of Women Graduates (Aug'16); **Best Paper Nomination**, ACM Internet Measurement Conference (Nov'14); **Honorary Cambridge Trust Scholar**, University of Cambridge (Aug'13); **Recipient of President's Gold Medal**, NUST, Pakistan (Feb'13); **Merit Scholarship**, International Islamic University, Pakistan (2006-08), **National Talent Scholarship**, Board of Intermediate and Secondary Education Peshawar, Pakistan (Aug'04).

## Experience

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### University College London

London, UK

RESEARCH ASSOCIATE

Mar. 2017 - PRESENT

- DECODE platform—a distributed, privacy aware, and trusted architecture based on blockchain technology.
- Measuring spatio-temporal characteristics of the availability of IP addresses and Internet services in Internet-wide scans.
- Understanding emerging forms of censorship such as conspiracy theories and propaganda in online media.

### Computer Lab, Univ. of Cambridge

Cambridge, UK

RESEARCH ASSISTANT

Sep. 2014 - Feb. 2017

- Analyzed third-party objects shared across Alexa Top-5K to characterize the Web's detection and/or blocking of ad-block users.
- Conducted an Internet scale study to characterize differential treatment of Tor users.
- Developed a censor's capability model, and presented an evaluation framework to systematize over 70 censorship resistance systems.

### Computer Lab, Univ. of Cambridge

Cambridge, UK

RESEARCH ASSISTANT

Oct. 2013 - May 2014

- Measured the consequences of Internet censorship on end users, Internet service providers and content providers, by analyzing network logs captured at an ISP in Pakistan over a period of three years.

### Networking Group, International Computer Science Institute (ICSI)

Berkeley, U.S.A

SUMMER INTERN

Jul. 2013 - Sep. 2013

- Developed methodologies to establish censorship ground truth based on offline analysis of captured network data.

### Self-Employed

King's Lynn, UK

INDEPENDENT RESEARCHER

Nov. 2012 - May. 2013

- Designed and implemented BotFlex (<https://github.com/sheharbano/BotFlex>)—a domain-specific, flexible and extensible network-based tool for botnet detection—and evaluated it for accuracy and performance over 500 GB enterprise traffic collected from an ISP, with ground truth obtained from Team Cymru.
- Demonstrated that inference of the network analysis model of a censorship system can facilitate circumvention attempts by probing the Great Firewall of China to reverse-engineer its traffic analysis model.

### Networking Group, International Computer Science Institute (ICSI)

Berkeley, U.S.A

SUMMER INTERN

Aug. 2012 - Oct. 2012

- Conducted black box penetration testing of a network security monitor Bro's IPv6 implementation. I also wrote cluster-friendly scripts for detection of common DNS and ICMP attacks, and malicious scanning.

## SysNet Lab, Foundation for Advancement of Science and Technology (FAST)

Islamabad, Pakistan

RESEARCH ASSISTANT

Feb. 2012 - Jul. 2012

- Presented taxonomies of botnet behaviours, detection mechanisms and defense strategies.
- Employed Bayesian network to make evidence-based predictive and diagnostic inferences for botnet infection.

## WisNet Lab, National University of Science and Technology (NUST)

Islamabad, Pakistan

RESEARCH ASSISTANT

May. 2011 - Jan. 2012

- Investigated the effect of frequent power outages in Pakistan on botnet command and control communication (C&C).

## Publications

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[C = CONFERENCE] [J = JOURNAL] [W = WORKSHOP] [P = POSTER] [M = MISCELLANEOUS]

- **[W]** Rishab Nithyanand, **Sheharbano Khattak**, Mobin Javed, Narseo Vallina-Rodriguez, Marjan Falahrestegar, Julia E. Powles, Emiliano De Cristofaro, Hamed Haddadi and Steven J. Murdoch. "Ad-Blocking and Counter Blocking: A Slice of the Arms Race". Proceedings of the 6th USENIX Workshop on Free and Open Communications on the Internet (**FOCI**), 2016. *Note: A version also appeared in USENIX ;login: Magazine, Vol. 41, No. 4, Winter 2016.*
- **[C]** **Sheharbano Khattak**, Tariq Elahi, Laurent Simon, Colleen Swanson, Steven J. Murdoch, Ian Goldberg. "SoK: Making Sense of Censorship Resistance Systems". Proceedings on Privacy Enhancing Technologies (**PETS**), Vol. 2016, No. 4, 2016.
- **[C]** **Sheharbano Khattak**, David Fifield, Sadia Afroz, Mobin Javed, Srikanth Sundaresan, Vern Paxson, Steven J. Murdoch, and Damon McCoy. "Do You See What I See? Differential Treatment of Anonymous Users". Proceedings of the 23rd Network and Distributed System Security Symposium (**NDSS**), 2016.
- **[J]** **Sheharbano Khattak**, Zaafar Ahmed, Affan A. Syed and Syed Ali Khayam. "BotFlex: A community-driven tool for botnet detection", *Elsevier Journal of Network and Computer Applications*, Volume 58, Dec'15, Pages 144-154.
- **[M]** **Sheharbano Khattak**, Laurent Simon, and Steven J. Murdoch. "Systemization of Pluggable Transports for Censorship Resistance". arXiv preprint, Dec'14.
- **[C]** **Sheharbano Khattak**, Mobin Javed, Syed Ali Khayam, Zartash Afzal Uzmi and Vern Paxson. "A Look at the Consequences of Internet Censorship Through an ISP Lens". Proceedings of the 14th ACM SIGCOMM conference on Internet measurement (**IMC**), 2014.
- **[P]** **Sheharbano Khattak**, Zaafar Ahmed, Affan A. Syed and Syed Ali Khayam. "POSTER: BotFlex: A Community-driven Tool for Botnet Detection", ACM International Conference on Computer and Communication Security (**CCS**), 2013.
- **[J]** **Sheharbano Khattak**, Naurin Rasheed Ramay, Kamran Riaz Khan, Affan A. Syed and Syed Ali Khayam. "A Taxonomy of Botnet Behavior, Detection and Defense", *IEEE Journal of Communications Surveys & Tutorials*, Vol. PP, Issue 99, Oct'13, pp. 1 - 27.
- **[W]** **Sheharbano Khattak**, Mobin Javed, Philip D. Anderson and Vern Paxson. "Towards Illuminating a Censorship Monitor's Model to Facilitate Evasion", in proceedings of the 3rd USENIX Workshop on Free and Open Communications on the Internet (**FOCI**), 2013.
- **[P]** Naurin Rasheed Ramay, **Sheharbano Khattak**, Affan A. Syed and Syed Ali Khayam. "POSTER: Bottleneck: A Generalized, Flexible, and Extensible Framework for Botnet Defense", IEEE Symposium on Security and Privacy (**S&P**), 2012.

## Selected Talks

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- **Do You See What I See? Differential Treatment of Anonymous Users.** Constructive Security Group Seminar, Microsoft Research Cambridge, Apr'16, [Cambridge UK](#). The Network and Distributed System Security Symposium (NDSS), Feb'16, [San Diego US](#). InfoSec Seminar, University College London, Feb'16, [London UK](#). Security Seminar, University of Cambridge, Feb'16, [Cambridge UK](#).
- **A Look at the Consequences of Internet Censorship Through an ISP Lens.** IRTF Workshop on Global Access to the Internet for All (GAIA), Nov'15, [London UK](#). 14th ACM SIGCOMM Conference on Internet Measurement (IMC), Nov'14, [Vancouver Canada](#).

## Service/Teaching

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- PC member: Privacy Enhancing Technologies Symposium (**PETS**) 2017,2018. External reviewer: Financial Cryptography (**FC**) 2016, The ACM Conference on Computer and Communications Security (**CCS**) 2016, The Network and Distributed System Security Symposium (**NDSS**) 2017
- Computerphile speaker on "Botnets" and "Internet Censorship Explained". Apr'16.
- Session Convener for "Censorship Resistance" track, part of Master's level course "Computer Security: Current Applications and Research", University of Cambridge. Feb'15. Feb'16. Mar'17.
- Supervised "Operating Systems", University of Cambridge (2013), Various guest presentations (2012-2016), and co-supervised projects of three BS final year students at FAST Pakistan (2012-2013).

## Technologies

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- Proficient: Unix, C++, Python, C, Latex, ZMap, ZGrab, Bro, Wireshark, tcpdump. Prior Experience: C#, Visual C++, Java, R, gnuplot, HTML, JavaScript, ASP.NET, Snort, Scapy, MATLAB.

## References

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- Available on request.