Rumaisa Habib

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Education

Stanford University Sep 2023 - Present
PhD - Computer Science (*Advised by Zakir Durumeric*)
- Awarded Stanford Graduate Fellowship

Lahore University of Management Sciences, Pakistan Aug 2019 - June 2023
BS - Computer Science (*Senior Thesis: A Framework for Improving Web Affordability and Inclusiveness*)
- Graduated with High Distinction
- Placed on Dean's Honor List (2019-22)
- Recipient of Merit Scholarship (2020-23)

Publications

Blade: Scalable Source Code Debloating Framework SecDev '23
Muaz Ali (University of Arizona), Rumaisa Habib (LUMS), Ashish Gehani (SRI), Sazzadur Rahaman (University of Arizona), Zartash Afzal Uzmi (LUMS)

A Framework for Improving Web Affordability and Inclusiveness SIGCOMM '23
Rumaisa Habib*, Sarah Tanveer*, Aimen Inam, Haseeb Ahmed, Ayesha Ali, Zartash Afzal Uzmi, Zafar Ayyub Qazi, Ihsan Ayyub Qazi (LUMS) [**Joint first authors*]

A First Look at Public Service Websites from the Affordability Lens TheWebConf '23
Rumaisa Habib, Aimen Inam, Ayesha Ali, Ihsan Ayyub Qazi, Zafar Ayyub Qazi (LUMS)

Rethinking Web for Affordability and Inclusion HotNets '21
Ihsan Ayyub Qazi, Zafar Ayyub Qazi, Ayesha Ali, Muhammad Abdullah, Rumaisa Habib (LUMS)

Projects

Web Affordability June 2021 - Sep 2023
Advisors: Ihsan Ayyub Qazi, Zafar Ayyub Qazi, Zartash Afzal Uzmi, Ayesha Ali (LUMS)
- **Initial measurements** [Published in **HotNets '21**]
  - Collected and analyzed the page data of 100 webpages (using WebPageTest) to evaluate their affordability.
  - Created lightweight versions of popular webpages using Chrome Developer Tools.
  - Designed and conducted a small scale user study to evaluate the usability and feasibility of lightweight webpages.
  - Results showed that there is potential to improve the affordability of webpages and a willingness to use lightweight versions of webpages if it means users can save mobile data.
- **Public service sites affordability** [Published in **TheWebConf '23**]
  - Proposed this as a research direction.
  - Led the team working on this project.
  - Collected page data of over 3500 websites spanning 18 different countries.
  - Conducted the first large scale measurement study of governmental websites under the lens of affordability.
  - Conducted a quantitative analysis of the differences in affordability of public service websites in developed and developing countries.
  - Pointed out specific design flaws and changes that can be made to improve public service sites in developing countries.
  - Contributed heavily to writing the research paper (first author).
- **Design and implementation of a transcoding service** [Published in **SIGCOMM '23**, Students as Co-Researchers Grant Awarded]
  - Wrote the grant proposal for this project (which was accepted).
  - Led the team working on this project.
  - Conducted extensive literature review on existing transcoding services.
  - Systematically designed an algorithm to generate lightweight pages based on web developers' needs in a way that preserves user privacy and experience.
  - Developed a transcoding service in Python (using OpenCV and Selenium) based on the algorithm design.
  - Evaluated our algorithm using QSS and a small scale user study.
  - Results showed consistently high QSS scores (within 1% of the optimal) for a variety of webpages and transcoding levels.
  - Contributed heavily to writing the research paper (first author).

BLADE [Accepted to **SecDev '23**] April 2022 - Sep 2023
Advisors: Zartash Afzal Uzmi (LUMS), Sazzadur Rahaman (University of Arizona), Ashish Gehani (SRI)

- Designed a novel, time-efficient source-code debloating technique: BLADE.
- Implemented BLADE in Python (using Clang).
- Developed 20 configuration files in Bash to debloat 20 different programs for our evaluation.
- Quantified the reduction in Common Vulnerability Exposures (CVEs), ROP Gadget count, memory leaks, basic blocks, lines of code, and CPU usage using a variety of measurement techniques and tools (ROPGadget, Saber, Python scripts).
- Contributed heavily to writing the research paper.

VaulTor [Submitted to **PETS '24**] May 2022 - Sep 2023
Advisor: Zartash Afzal Uzmi (LUMS)

- Designed a novel architecture (VaulTor) for Tor to make Hidden Services more secure by utilizing SGX technology
- Created a novel Hidden Service protocol for Tor to support the VaulTor architecture
- Developed a Hidden Service using Gramine-SGX.
- Measured the performance degradation caused by SGX technology by sending requests to our SGX Hidden Service over the Tor network and measuring the delays.
- Contributed heavily to writing the research paper.

Other Projects

- **Blockchain course development:** Introduced blockchain technology to the CS undergraduate program at LUMS. Researched blockchain technology and significantly aided in designing a new course (CS-3812: Introduction to Blockchain: Technologies and Applications). (*Advised by Zartash Afzal Uzmi, Naveed ul Hasan, and Basit Shafiq*)
- **Raft consensus protocol:** Developed a Go implementation of the Raft consensus protocol in a distributed system. (*Course assignment in Distributed Systems*)
- **Kahani:** Developed a website (in React and Django) that uses natural language processing to generate subtitles for Urdu textbooks. (*Advised by Agha Ali Raza*)
- **Ghambeel:** Developed an app using Flutter with progress management tools such as Pomodoro timers, calendars and to-do lists. (*Semester project in Software Engineering*)

Experience

Lahore University of Management Sciences Jan 2023 - May 2023
Teaching Assistant, Topics in Internet Research Lahore, Pakistan

- Coordinating course management.
- Holding regular tutorials and office hours.
- Guiding and grading projects, quizzes and paper responses for 40+ students.

Lahore University of Management Sciences Aug 2022 - Dec 2022
Head Teaching Assistant, Principles & Techniques of Data Science Lahore, Pakistan

- Re-designed the course project to allow primary data collection.
- Coordinating course management.
- Holding regular tutorials and office hours.
- Guiding and grading quizzes, homework, and programming assignments for 110+ students.

Educative Feb 2022 - May 2022
Technical Content Engineer, Part-time Lahore, Pakistan

- Wrote short articles on technical concepts for their website.
- Helped develop a course on computer vision.

Lahore University of Management Sciences Jan 2022 - May 2022
Teaching Assistant, Introduction to Blockchain: Technology & Applications Lahore, Pakistan

- Developed 2 programming assignments (Python and Solidity).
- Developed a private blockchain system from scratch in Python to use in a programming assignment.
- Held regular tutorials and office hours.
- Guided and graded quizzes, homeworks, and programming assignments for 120+ students.

Lahore University of Management Sciences Aug 2021 - Dec 2021
Teaching Assistant, Computer Networks: Principles & Practices Lahore, Pakistan

- Developed 3 socket programming assignments in Python.
- Held regular tutorials and office hours.
- Guided and graded quizzes, homework, and programming assignments for 55+ students.

Self employed June 2019 - May 2020
Private Tutor Lahore, Pakistan

- Tutored 5+ students in the subjects Computer Science, Physics, Chemistry, and Mathematics (O and A-Level).

Technical Skills

Programming languages: C++, C, Python, Go, Haskell, Solidity **ML/AI:** Numpy, Pandas, Matplotlib, Scikit, OpenCV
Web/App development technologies: HTML, CSS, JavaScript, Django, React, Flutter
Miscellaneous: MySQL, Git, Bash, LaTeX, WebPageTest, WebPageReplay, Selenium, ChromeDevTools

Relevant Coursework

Note: *Italicised* are graduate level courses
Currently taking: *Topics in Network Security* (Stanford)
Taken: Algorithms, Data Structures, Databases, Software Engineering, Operating Systems, Network-centric Computing, Network Security, *Topics in Internet Research*, *Machine Learning*, Principles and Techniques of Data Science, Statistics and Data Analysis, *Distributed Systems*, Computer Vision (LUMS)

Talks

A Framework for Improving Web Affordability and Inclusiveness Sep 2023
The ACM Special Interest Group on Data Communication 2023 (SIGCOMM '23) Columbia University, NYC, NY, USA

A First Look at Public Service Websites from the Affordability Lens May 2023
The ACM Web Conference 2023 (TheWebConf '23) UT Austin, Austin, TX, USA

Positions of Responsibility

Research Assistant, Blockchain Research Group: June 2022 - Aug 2022
Guided and led a research group consisting of 10 students to conduct literature review and find potential areas of research within the domain of blockchain technology

IT & Design Director, LUMS Women in Computing (LWiC): Aug 2021 - June 2022
Created and managed LWiC's website (https://lwic.lums.edu.pk) and social media content (https://www.instagram.com/lwic.lums)

Last updated: October 6, 2023