Rajdeep Das

PERSONAL INFORMATION

PhD Student
Computer Science and Engineering
UC San Diego

webpage: http://www.sysnet.ucsd.edu/~r4das
e-mail: r4das@ucsd.edu

RESEARCH INTERESTS

Programmable Networks, P4, Network Virtualization, User-Defined Networking, (Real-Time) Streaming, Network Operating Systems, Intelligent Systems

EDUCATION

PhD / Computer Science and Engineering
University of California San Diego 2017 - present

M.Tech / Computer Science and Engineering
Indian Institute of Technology Kanpur 2013 - 2015

B.Tech / Information Technology
West Bengal University of Technology 2009 - 2013

High School / Indian School Certificate
Council for the Indian School Certificate Examinations 2009

CURRENT RESEARCH

Enabling user-defined network behavior using programmable switches and active networking. Building a runtime for executing user-defined programs such as in-network key-value stores, load balancers and firewalls. Work includes a language for writing programs, a memory allocator for stateful memory on the switch, and an environment for program execution. This work is published at HotNets'20 and SIGCOMM'23 (where it received the best paper award). This project also received a hardware grant from **Intel Fast Forward Initiative 2022**.

SELECTED PUBLICATIONS

Rajdeep Das and Alex C. Snoeren. "Memory Management in ActiveRMT: Towards Runtime-programmable Switches". ACM SIGCOMM, 2023 (**Best Paper**)

Rajdeep Das and Alex C. Snoeren. "Enabling Active Networking on RMT Hardware". ACM Hotnets, 2020

William M. Mellette, Rajdeep Das, Yibo Guo, Rob McGuinness, Alex C. Snoeren, George Porter. "Expanding across time to deliver bandwidth efficiency and low latency". Usenix NSDI, 2020

Arjun Roy, Rajdeep Das, Hongyi Zeng, Jasmeet Bagga, Alex C. Snoeren. "Understanding the Limits of Passive Realtime Datacenter Fault Detection and Localization". IEEE/ACM Transactions on Networking, 2020

Rajdeep Das, Nimantha Baranasuriya, Venkat Padmanabhan, Christoffer Rodbro, Seth Gilbert. "Informed Bandwidth Adaptation in Wi-Fi Networks using Ping-Pair". ACM CoNext, 2017

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". ACM SIGCOMM, 2016

Patents

Philip Andrew Chou, Venkata N Padmanabhan, Rajdeep Das, Ganesh Ananthanarayanan, Junchen Jiang. "Data-driven network path selection". US Patent App. 15/169,429, 2017

Awards & Achievements

Best Paper Award 2023
ACM SIGCOMM 2023

Best Software Award 2015
Indian Institute of Technology Kanpur

Academic Services

Journal article review, IEEE/ACM Transactions on Networking, 2021

Artifact evaluation, ACM SIGCOMM, 2022

Conferences Attended

SIGCOMM 2023 New York City, USA

SIGCOMM 2022 Virtual

HotNets 2020 Virtual

NSDI 2020 Santa Clara, CA, USA

OSDI 2018 Carlsbad, CA, USA

CoNext 2017 Seoul/Incheon, Republic of Korea

COMSNETS 2017 Bangalore, India

Teaching

Teaching Assistant / Computer Communication Networks (CSE 222A) Winter 2019
University of California San Diego: Reviewed, mentored and graded course projects.

Teaching Assistant / Computer Networks (CSE 123) Spring 2023
University of California San Diego: Reviewed and graded course projects. Developed an autograder for course projects.

Teaching Assistant / Fundamentals of Computing (ESC101) August 2013 - July 2015
Indian Institute of Technology Kanpur: Assisted students with learning introductory programming and graded assignments. Evaluated a system for automated data collection and feedback generation built as a part of Master's thesis.

Professional Experience

Microsoft Research India / Research Fellow Bangalore (India), August 2015 - August 2017
Mobility, Networks and Systems Research Group

Via - Mapping the network performance between a cluster of network endpoints (such as autonomous systems) using data collected from Skype calls. This was then used to predict the quality of future calls or alternative paths that could lead to better call quality. Ran simulations and built a real-world prototype. Also built a web-based 3D visualization tool to aid in the understanding of this approach.

Kwikr - Improving bandwidth adaptation for real-time streaming applications such as Skype running over Wi-Fi networks. Built detectors for congestion, handoffs and link-strength-change at the WiFi access point. The congestion detector involved our novel ping-pair technique which estimates

the queueing delay at the wireless access point. Integrated Kwikr into Skype for Android consumer production clients which we used to evaluate our approach on millions of Skype consumers. This project received the **Best Corporate Demo** Award at COMSNETS 2017.

Multipath in Real-Time Streaming - Evaluating the benefits of using multipath in real-time streaming applications. Built a WebRTC based experimental framework which we used to collect data from users located at different parts of the world. Analyzed data to understand cause of call drops and simulated potential benefits of using multipath.

PriceWaterhouseCoopers / Intern Kolkata (India), June 2012 - August 2012
Assessing web applications for security vulnerabilities and recommending fixes for them. Vulnerabilities tested for include attacks such as cross-site-scripting, injection, session hijacking, sensitive data leakage, cross-site-request-forgery, insecure direct object references and unvalidated forwards/redirects.

Master's Thesis

A Tutoring System for Introductory Programming
Developed a software system for teaching introductory programming (Prutor). Prutor is a distributed system for managing a programming course. It exports a web interface that students can use to solve programming problems and receive feedback on syntactic/semantic errors. Prutor can trace the evolution of student programs to aid in understanding of the student's approach while solving the programming problem. The system helps improve interactivity between students and tutors/TAs. Data collected using Prutor has been used to develop a lot of tools which aid in computer science education and has led to publications in major conferences. Prutor is now the standard for teaching introductory programming at IIT Kanpur and has also been deployed at IIT Bombay and IIT Goa to conduct introductory programming courses. This project received the **Best Software Award** at IIT Kanpur.

Selected Academic Projects

Handwritten Alphanumeric Character Recognition
For partial fulfillment of a Machine Learning course
Project involved recognizing handwritten characters. We had a large dataset of tagged handwritten characters which was used to train and test. We used features such as zoning, number of intersections with horizontal/vertical lines, stroke angles, contours and straightness index. The classifiers used included Neural Networks, SVMs and Random Forests.

Similar Category Differentiation of Objects
For partial fulfillment of a Computer Vision course
Project involved differentiating between similar categories of images such as flowers and birds. Features used include dense SIFT with Fisher kernel for each individual colour channel. The features were tested on classifiers AdaBoost and SVM.

DoS/DDoS Mitigation System for Web Applications
For partial fulfillment of a Software Architecture course
Project involved architecting and implementing a solution to mitigate DoS/DDoS attacks up to the transport layer. The solution involved rate limiting and limiting the number of concurrent connections using Firewall and Reverse Proxy. Improved the architecture with respect to availability of the system by usage of application server clusters and a load balancer.

Digital Image Compression using Haar Wavelet Transform
BTech Project
Project involved compressing images by first encoding them using the Haar wavelet transform, followed by compressing them. Wrote a file format for storing the encoded images.

Student Competitions

Google Dev Fest / Runner Up September 2013

WishEmAll: Created an app that automatically wishes Facebook friends on their birthdays.

Yahoo! Hack U / Honourable Mention August 2013
Gyaanometer: Our hack was a user rating system for Yahoo answers, where every user would be given a rating according to her past activity. Our hack was ranked in the top 7 hacks.

Microsoft Code.Fun.Do / Participated January 2013
Botomatic: We created an app which would connect to Facebook on behalf of a user and chat with her friends. The app used Pandorabots AI to converse with the users' friends.

National Science Olympiad / School Topper 2003, 2007, 2008
High School, National Level: was among top 500 (2007) and top 1000 (2008) in nationals.

National Cyber Olympiad / Participated 2004
High School

Activities

Cultural Festival Organization
Institute of Engineering and Management Kolkata