YASH SINHA

CONTACT INFORMATION

Malviya Extension Room. No. 4333,
Birla Institute of Technology and Science,
Pilani, 333031

+91 7737 463 220
mail.yash.sinha@gmail.com
http://yashsinha.com

RESEARCH INTERESTS

I am interested in Software Defined Networks, P2P Networks, Computer Vision and Data Science. My recent research has focused on Hybrid SDN Networks for smooth transition to SDN, leveraging WebRTC for P2P content distribution in web browsers and character recognition in natural scene images.

EDUCATION

Birla Institute of Technology and Science (BITS), Pilani, IN 2016 – 2018

Master of Engineering [M.E.] Computer Science

Relevant Courses: Advanced Compilers, Algorithms, Operating Systems, Networks

Birla Institute of Technology and Science (BITS), Pilani, IN 2012 – 2016

Master of Science Technology [M.Sc.(Tech.)] Information Systems

Cumulative GPA: 8.1 / 10

Relevant Courses: Advanced Data Mining, Machine Learning, Operating Systems, Computer Networks, Network Programming, Databases, Object Oriented Programming, Compilers, Design and Analysis of Algorithms, Programming Languages, Computer Graphics, Computer Organization, Digital Electronics Microprocessors

Bachelor's Thesis: **Realizing Hybridization in Software Defined Networks** The work attempts to realize implementation and assess performance of a *class based hybrid SDN model* in a IP network to enable a smooth transition to pure SDN deployment from traditional deployments to cater to budget constraints, organisational needs, disruption-free migration for the organisation and enable centralized network management and network programmability in network management. The design and deployment of a functional layered architecture for the controller that suits the Hybrid SDN design and environment is also achieved.

Advisor: Dr. K. Haribabu

FELLOWSHIPS & GRANTS

Kishore Vaigyanik Protsahan Yojana (KVPY) Fellowship 2012 – 2016
- fellowship by IISc. Bangalore and Department of Science and Technology, Government of India, awarded only to exceptional students from all over the country for pursuing research.

Merit Scholarship cum. 40% Fee Wavier, BITS Pilani Aug 2016
- both offered only to 5% of the higher degree students

GRADUATE RESEARCH EXPERIENCE

(major field indicated before, cross-referenced [] with publications, * indicates submission under review)

Centre for Excellence in Software Defined Networks (SDN Lab)

[Hybrid SDN] Enabling SDN Hybridization in campus networks Aug 2016 – Dec 2016
Mentor: Prof. K. Haribabu

- A study and comparison of the hybridization techniques SDN with a goal of introducing SDN in existing campus networks to cater to organisational budget constraints and smooth transition
- A new, robust, layer-wise mechanism for topology discovery in hybrid SDN that will solve interoperability issues among networking boxes of various vendors. Comprised of a study and comparison of the protocols and approaches for topology discovery that can be leveraged for a topology discovery service in a controller in both pure SDN and hybrid SDN

[Hybrid SDN] MPLS based Hybridization in Software Defined Networks Aug 2016 – Dec 2016
Mentor: Prof. V. S. Shekhawat

- Proposed an architecture for deployment of MPLS based class based hybrid SDN in an IP network. Implemented a prototype and evaluated its performance [6]

Dept. of CS/IS, Birla Institute of Technology and Science, Pilani, IN

[Compiler Arch.] LLVM IR Superoptimizer using GreenThumb Framework Aug 2016 – Dec 2016
Mentor: Prof. Sundar S. Balasubramaniam

- Implemented a superoptimiser for LLVM IR leveraging GreenThumb for generating peephole optimisations using DrRacket

Undergrad Research Experience

Centre for Excellence in Software Defined Networks (SDN Lab)
Mentor: Prof. K. Haribabu

[Hybrid SDN] Hybridization Techniques in Software Defined Networks — Jan 2016 – May 2016

- Came up with a novel idea for incremental deployment of class based hybrid SDN in an IP network. Implemented and evaluated its performance with the help of a prototype [4]
- Developed a testbed for hybrid SDN deployment, a step towards research test-bed for scalable and reconfigurable SDN that could provide an environment integrating campus and data center networking functions

[SDN] Minimizing effect of noise/raw-packets in Real Time Estimation of Packet Loss in SDN — May 2015 – Dec 2015

- Proposed a new algorithm to estimate the fraction of the network traffic that consists of raw packets (non-user generated packets meant for network management) so as to minimize noise in network statistics collected by the SDN controller, thereby improve calculation of QoS metrics, bandwidth management etc. Estimation accuracy is within 3% experimental error rate
- Designed a new approach for monitoring and measuring online per-flow as well as per-port packet loss statistics in SDN that takes into account the effect of raw packets (control, non-user generated packets) which makes packet loss estimation 8% more accurate than other implementations. [5]

Dept. of CS/IS, Birla Institute of Technology and Science, Pilani, IN
[P2P Networks] Browser based P2P framework for content distribution — Jan 2015 – Apr 2015
Mentor: Prof. K. Haribabu

- Designed, implemented and deployed a new P2P framework leveraging the Chord protocol using WebRTC for content distribution using Web browsers. Proposed and compared different strategies for querying the network [3]
- Addressed challenges of a browser based P2P architecture such as lack of full-fledged threading/concurrency support in the JavaScript language, reliance on synchronous loading etc. by providing a mechanism to exchange messages asynchronously and facilitating network operations while reducing the dependency on bootstrap server [2]
- Evaluated the framework on global scale using Amazon Web Services and Google STUN servers.

[Computer Vision] Identify characters from Google Street View images [1] — Sep 2014 – Dec 2014
Mentor: Prof. Navneet Goyal

- Proposed a new technique that comprised of a pipeline of image processing and machine learning algorithms to recognize characters segmented out from the natural scene images.
- Addressed challenges due to the occlusion, color and noise in the natural images that included binarization of the image using Otsu thresholding, noise filters and morphological filters.
- Used HOG to extract features and extra tree classifier for classification. The solution was able to achieve the then state of the art accuracy of 73%, placed among top 3 at Kaggle.com, a platform for predictive modelling and analytics competitions

Sterlite Tech. Elitecore, Ahmedabad, IN
Mentor: Brijesh Mirstry, Technology Lead, Elitecore
[Big Data] Applicability of Hadoop (and other computing frameworks) in Bioinformatics — May 2014 – Jul 2014

- For shotgun mass spectrometry based proteomics, the most computationally expensive step is in matching the spectra against a large database of sequences and their post-translational modifications with known masses. The *size of database increases steeply because each mass spectrometer can generate data at an alarming rate*, and the scope of search continually increases. Therefore, we deployed Hydra, a sequence database search engine for Hadoop to perform these searches.

[Windows Phone] EasyConnect: A Windows Phone App for Wi-Fi Monetization — May 2014 – Jul 2014

- Developed EasyConnect WP App on Windows Phone platform to search and connect seamlessly to Wi-Fi networks. Enabled Wi-Fi Sense (sharing Wi-Fi settings trusted contacts without any passwords) and Hotspot 2.0 (seamless authentication to hotspots)

Swathanthra Malayalam Computing, IN
[NLP] Indic Transliteration Module — Jun 2013 – Jul 2013
Mentors: Vasudev Kamath, Debian & Santhosh Thottingal, Wikimedia Foundation

- Improved cross language transliteration system of LIBINDIC, Indic language processing applications library by employing the CMU Pronouncing Dictionary for adding support of Hindi.

Dept. of Biological Science, Birla Institute of Technology and Science, Pilani, IN
[Structural analysis] Protein structure prediction using HHPred Jun 2013 – Jul 2013
Mentor: Prof. Ashish Runthala

- Analyzed protein sequences from a database for quaternary protein structures using HHPred (Homology detection and structure prediction by HMM-HMM comparison) from primary protein sequences

WORK EXPERIENCE

Academic Research and Counselling Division, BITS, Pilani Aug 2016 – Present
Graduate Teaching Assistant
- automation of maintenance of students' academic history, the usage of various academic flexibilities available to the students.such as registration, addition, substitution, withdrawal etc.

Clickcounselor Oct 2013 – Dec 2014
Co-Founder cum. Tech. Lead
- Founded a technology company focused on psychological counselling, attracted 26 psychologists to join on-board
- Adjudged as the best effort at New Venture Creation course, an innovative course at BITS Pilani, conceptualized & coordinated by BITS Spark Connect, BITSAA in association with Center for Entrepreneurial Leadership, CEL
- Developed a browser based video conferencing software using WebRTC. An effort to bring the ecosystem of counsellors and counselees online and conduct online counselling via video conferencing.

Dept. of Visual Media, BITS, Pilani Aug 2012 – Jun 2015
Head, Web Design & Development Team
- Responsible for online presence of the college festivals drawing participation from over 140 colleges and a combined budget in excess of $200k
- Designed, developed and deployed APOGEE'14, OASIS'13, BOSM'13 websites using Django, three.js and Webstack, one of which was acclaimed to be the *first 3D website of any college fest in India.*

KEY PROJECTS

Ear Biometrics: A Convolutional Neural Network Approach Oct 2016
Ear localization with a HOG+SVM framework and ear recognition using a CNN approach with Adagrad Optimization. The experiments have been performed on USTB III dataset to yield accuracy of 92.3%

Cost-effective Deployment of Software Defined Networking Solutions on the Existing Network Infrastructure with the help of a middleware: *Is there a feasibility of deploying SDN-like control on top of existing Layer2 and Layer3 switches/routers without changing the existing hardware and without introducing SDN-compatible switches?* Jan 2016

Springleaf Marketing Response Oct 2015
Deployed XGBoost to predict which customers will respond to a direct mail, AUC: 0.79, placed in top 16% at Kaggle.com among 2500 international participants

Capture of Carbon Dioxide from Ambient Air Sep 2011 – Nov 2011
Implemented a method of CO_2 Sequestration which involved adsorption of carbon dioxide on ammonia based resins

SCHOLARLY PRESENTATIONS

"A Browser Based Distributed Framework for Content Sharing", 4th International Conference on Advanced Computing, Networking, and Informatics (ICACNI), NIT, Rourkela, India, 22nd - 24th Sept 2016.

"Character recognition of natural scene images", IEEE SPS-ASPIPA Winter School on Machine Intelligence and Signal Processing (MISP), IIITD, New Delhi, India, 20th - 23rd Dec 2014.

"Capture of CO_2 from ambient air", Invited at All India CBSE Science Exhibition Finalists' Presentation, Modern School, New Delhi, India, 21st - 22nd Oct 2011.

PUBLICATIONS

(acceptance rates, if available, are marked in brackets; cross-referenced [] with research experience)

[6] MPLS based Hybridisation in SDN Y Sinha, S Bhatia, GSS Chalapati, VS Shekhawat Proceedings of 4th IEEE International Symposium on Software Defined Systems, Spain, 2017

[5] **Meticulous Measurement of Control Packets in SDN** Y Sinha, S Vashishth, K Haribabu SOSR '17: Proceedings of the 3rd ACM SIGCOMM Symposium

[4] Yash Sinha **Realizing Hybridization in Software Defined Networks**, Bachelor's Thesis, Birla Institute of Technology and Science, Pilani, India, 2016.

[3] S. Vashishth, Yash Sinha, K. Haribabu **A Browser-based Distributed Framework for Content Sharing and Student Collaboration**
Progress in Intelligent Computing Techniques: Theory, Practice, and Applications. Vol. 1 & 2. Ed. by Pankaj Kumar Sa, Manmath Narayan Sahoo, M. Murugappan, Yulei Wu & Banshidhar Majhi. Vol. 518 & 519 of Advances in Intelligent Systems and Computing. Springer Singapore, 2017.

[2] S. Vashishth, Yash Sinha, K. Haribabu **Addressing Challenges in Browser Based P2P Content Sharing Framework Using WebRTC**
IEEE 30th International Conference on Advanced Information Networking and Applications (IEEE-AINA) pp. 850 – 857., Le Regent Congress Centre, Crans-Montana, Switzerland (CH), 23rd - 25th Mar 2016. Co-organised by HES-SO University & Icare Research Institute. (29.13%)

[1] Yash Sinha, P. Jain, N. Kasliwal **Comparative study of preprocessing and classification methods in character recognition of natural scene images**
Machine Intelligence and Signal Processing. Ed. by Richa Singh, Mayank Vatsa, Angshul Majumdar, & Ajay Kumar. Vol. 390. Advances in Intelligent Systems and Computing. Springer India, 2016. pp. 119 – 129.

COURSEWORK

MOOCS: Coursera & edX

Regression Models, John Hopkins University, Coursera	Jul 2014 – Aug 2014
Reproducible Research, John Hopkins University, Coursera	Jul 2014 – Aug 2014
Practical Machine Learning, John Hopkins University, Coursera	Jul 2014 – Aug 2014
Statistical Inference, John Hopkins University, Coursera	Jul 2014 – Aug 2014
R Programming, John Hopkins University, Coursera	Jun 2014 – Jul 2014
Exploratory Data Analysis, John Hopkins University, Coursera	Jun 2014 – Jul 2014
Getting and Cleaning Data, John Hopkins University, Coursera	Jun 2014 – Jul 2014
The Data Scientistś Toolbox, John Hopkins University, Coursera	Jun 2014 – Jul 2014
Machine Learning, Stanford University, Coursera	Oct 2013 – Jan 2014
Algorithms: Design and Analysis, Part 1, Stanford University, Coursera	Jul 2013 – Aug 2013
CS184.1x: Foundations of Computer Graphics, UC Berkeley, edX	Mar 2013 – May 2013
6.00x: Introduction to Computer Science and Programming, MIT, edX	Sept 2012 – Jan 2013

HONORS & AWARDS

Startup ClickCounselor selected for implementation at Pilani Campus, BITS Pilani. Finalists at All India Business Planning competitions: Vishisth, IIT Delhi & Ventura, NIT Trichy — Dec 2014

Finalist at APOGEE'14, BITS Pilani's tech. fest's technical presentation — Mar 2014

Selected to attend *Look Inwards*, a NASSCOM 10,000 Startups **invite-only**, in-conversation session with Mr. Vinod Khosla, co-founder, Sun Micro. & Mr. Nandan Nilekani, Chairman, UIDAI — Sept 2013

N. D. Grover Memorial Super Performers' Award as an honour for academic excellence for entire schooling period. — Jul 2012

N. D. Grover Memorial Super Performers' Award for exceptional performance in International Assessments for Indian Schools, UNSW, Australia. — Jul 2012

National Finalist at All India CBSE Science Exhibition amongst 18,000 schools in India, Adjudged the best exhibit at the State (CBSE Patna Zone, 1200 schools) and District Levels. — Oct 2011

Highest International Grade cum. State Topper in Science, International Assessments for Indian Schools by the University of New South Wales, Australia. — Dec 2009

Qualified for Second Level National Talent Search Examination (NTSE) conducted by NCERT. — 2008

Secured Rank 1 in Jharkhand state in 35th U. P. U. Letter Writing Competition organized by Universal Postal Union, the United Nations. — 2006

TECHNICAL SKILLS

• Languages and Libraries: Python, JavaScript, C, Java, MySQL familiar with C++, Prolog, Scheme, x86 assembly language, Verilog, OpenGL, C#
• Web Stack: HTML5, CSS3, Nodejs, Flask, Jinja, django, JavaScript, jQuery, WebRTC, CoffeeScript, Bootstrap, three.js, scrollr.js, Ampps, Octopress, FileZilla
• Computing & Statistical packages: R, Matlab, Numpy, Scikit-Learn, Scikit-Image, Matplotlib
• Version Control: Git
• Type Setting: LaTeX, Open Office, Microsoft Office
• Technologies: Eclipse, Netbeans, Visual Studio, RStudio and basic familiarity with Hadoop, Adobe Premier Pro CS6 and Adobe Photoshop CS6.
• Operating Systems: Linux (Ubuntu), Windows.

PROFESSIONAL SOCIETIES

Student Member, IEEE — Dec 2014 – present

EXTRA-CURRICULAR ACTIVITIES

Sangeet Prabhakar, Prayag Sangeet Samiti, Allahabad, IN — 2004 – 2011
Degree for recognition in instrumental percussion, 74%
2011: 6th Year, 1st Div. Sangeet Prabhakar, B.A. equivalent
2008: 5th Year, 1st Div. Distinction
2007: 4th Year, 1st Div. Distinction, Senior Diploma
2006: 3rd Year, 1st Div. Distinction
2005: 2nd Year, 1st Div. Distinction, Junior Diploma
2004: 1st Year, 1st Div. Distinction

Featured on TV Show: *Jharkhand Ke Sitare* as **National Level Percussionist** at Naxatra News, popular Hindi news channel in the Jharkhand state — Jul 2012

National Level Championship in All India Youth Festival — Nov 2011
Awarded by D. A. V. College Management Committee
- Represented and won for East Zone (Ranchi) of D A V schools at All India Mahatma Hanraj Aryan Youth Festival for 7 yrs consecutively in multifarious competitions involving vocals, percussion and dance.
- Overall Champion for 7 years consecutively at Cluster and State levels for D A V, Hazaribag.
- Percussion: Gr. Instrumental Performance
- Vocals: Gr.: Qawwali, Patriotic, Solo: Ghazal, Bhajan, Classical
- Dance: Folk (Rajasthani, Koli, Gidda, Chhau etc.) , Ved Mantras Recitation cum Dance

Last updated: 28th Nov. 2016