Sambhav Satija

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Research interests: distributed systems, security, privacy

Education

Indraprastha Institute of Information Technology (IIIT-Delhi) *New Delhi, India*
Bachelor of Technology – Computer Science & Engineering *Aug. 2013 – Dec. 2017*

Research Experience

Microsoft Research *Bengaluru, India*
Research Fellow | Mentors: Satya Lokam & Muthian Sivathanu *July 2018 – current*

- Designed and implemented a novel lightweight and secure blockchain protocol.
  - Contributed to the protocol design – focusing on security & efficiency for low resource nodes.
  - Built the server*(C++, gRPC, C-Actor-Framework, nginx)* to ensure fair CPU utilization between network tasks (handling 500+ requests/sec) and compute-expensive protocol steps.
  - Created the CI/CD pipelines *(ansible, sh)* for 2200 VMs with barebone unix.
- Currently working on verifiable compution and zero knowledge proof systems.

Microsoft Research *Bengaluru, India*
Research Intern | Mentor: Jacki O'Neill *Jan. 2017 – July 2017*

- Developed technological interventions to improve loan adherence in low income communities.
  - Built a portal (*Spring, Hibernate, nginx, postgreSQL*) to manage the loan repayment schedule of more than 300 auto drivers in Bengaluru, India.
  - The system ingested data from various sources, including APIs, syncs, and documents; and tied in the workflow with client side apps (*Android, angularJS*).
  - The key challenges were a) feedback driven iterative development, b) storing sensitive PII and c) robustly analyzing financial data.
  - The system has been handling loan payments of ~300 auto drivers, with ~100 financial transactions/week since 2017. This is now a startup – ThreeWheelsUnited Fintech.

IIIT-Delhi *New Delhi, India*
Independent Project | Mentor: Sambuddho Chakravarty *Aug. 2016 – Dec. 2016*

- Worked on designing and prototyping an anonymous file sharing P2P protocol.
  - Worked on the protocol design, including establishing cryptographic private channels between peers and building an anonymous DHT.
  - Built a prototype (*Python*) which allowed Facebook users to anonymously host, search for and fetch files by simply installing a Chrome extension.

Publications

Blockchain work at Microsoft Research (title redacted)
Sambhav Satija*, Apurv Mehra, Sudheesh Singanamalla, Muthian Sivathanu, Nishanth Chandran, Divya Gupta, Satya Lokam.* **Currently under review at a top systems conference.**

Prayana: Intermediated Financial Management in Resource-Constrained Settings.
Apurv Mehra, Srihari Muralidhar, ***Sambhav Satija****, Anupama Dhareshwar, Jacki O'Neill.*
Published in the Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems **(CHI '18)**. 10 pages

Prayana: A Journey Towards Financial Inclusion
Apurv Mehra, ***Sambhav Satija****, Jacki O'Neill.*
Published in the Proceedings of the Ninth International Conference on Information and Communication Technologies and Development **(ICTD '17)**. 4 pages.

Patents

Blockchain work at Microsoft Research (title redacted)
Muthian Sivathanu, Nishanth Chandran, Divya Gupta, Apurv Mehra, Satyanarayana V. Lokam, ***Sambhav Satija****, Sudheesh Singanamalla.* USPTO – filed in 2019.

Industry Experience

Tower Research Capital *Gurgaon, India*
Core Engineering Software Developer | Manager: Rahul Balani *Jan. 2018 – July 2018*

- Responsible for refactoring a widely used internal build tool to a new version.
- We needed type-safety guarantees while refactoring the Python2 code. For this, I deployed a patch which collected traces of function calls whenever the library was invoked by users.
- Collected this data, and used *pyannotate* to automatically generate type hints, easing refactoring.

Google *Bengaluru, India*
Software Engineering Intern | Manager: Mansoor Alicherry *May 2016 – Jul. 2016*

- Built an API endpoint as a proof of concept easing operations for reseller partners.
- Improved the provided technical design document – making the architecture secure and extensible.
- Built a Java server(*AppEngine*) and a Chrome extension leveraging multiple Google frameworks (*Guice, Mockito, Bazel, Closure*) and tools (*Hibernate, GC PubSub, GCM, CloudSQL*).

Responsibilities & Misc.

2015	**Teaching Assistant** – Operating Systems	*IIIT-Delhi*
2016	**Teaching Assistant** – Data Structures and Algorithms	*IIIT-Delhi*
2015-16	**Problem Setter** – HackCon-CTF '15/'16, Scripting Challenges v1/v3/v5	*IIIT-Delhi*
2018	**Speaker** – Deployment strategies in the ever-changing cloud space	*Women TechMakers*
2015-18	**Admin** – Byld - development club @ IIIT-Delhi	*IIIT-Delhi*

Achievements & Honors

2017	**Grand Prize Winner** – AngelHack - Bangalore	*Bangalore*
2016	**Finalist** – 3rd in Indian leg of CSAW-CTF Finals organised by NYU.	*CSAW, NYU*
2015/6	**Finalist – 2015 & 2016** – Microsoft Build The Shield security CTF.	*Microsoft, India*
2016	**Second position** – Pentesting security CTF by ISGF-India	*ISGW 2016*
2015	**Winner** – Pentesting security CTF by PriceWaterhouseCooper	*IIIT-Delhi*
2015	**Winner - IBM** – AngelHack, New Delhi.	*New Delhi*
2015	**Winner - Pebble** – HackIndia.	*Bengaluru*

Skills

Languages:	C, C++, Python, Java
Frameworks:	Django (web frameworks et al.), Android, C-actor-framework
Tools:	GNU toolchain, Ansible, NGINX, Memcached

Selected Projects

Real time raytracer: (*CUDA*) Implemented BVH to achieve a 760X speedup. Implemented thread-safe worker queues to handle disproportionate workload and allow infinite ray bounces.

Community Work Portal – Developed and deployed a portal which has been handling a mandatory course's workflow for 200+ students/year since 2014. I reiterated on the code architecture multiple times finally shifting to an event driven approach for independently controlling API data and caches.

Geometric constraint solver in C++/Qt – This could convert scribbles to neat sketches. It understood tons of nested snapping techniques dealing with line segments and circles, like endpoint, center, tangent, parallel line and equal line length snapping.