# Tejasvi G. Kashi

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## Education

**University of Waterloo** — **Waterloo, Canada**
*MMath in Computer Science: Thesis-based* — *2021–Present*

- Working on transaction durability in databases under the supervision of Prof. Ken Salem[1]
- Courses taken so far - Advanced Distributed Systems, Computer Security and Privacy, Software Analytics for release Pipelines

**School of Engineering and Technology, Christ University** — **Bangalore, India**
*B.Tech in Computer Science and Engineering , CGPA - 3.93/4* — *2014–2018*
**Graduated first rank with a Gold Medal.**

- Enjoyed taking courses such as Cryptography, Databases, System Software, Networks and Automata Theory
- Final-year project titled "Intrusion Detection and Prevention System for smart city middlewares" was done at the Indian Institute of Science[2]
- Received an "Outstanding Academic Achiever" award for academic accomplishments
- Recipient of Merit Scholarship for two consecutive years 2016-17
- Served on the University Student Council, representing the School of Engineering and Technology, for two consecutive years

**St. Paul's English School** — **Bangalore, India**
*Indian School Certificate (ISC), 92.2%* — *2012–2014*

- Received a "Consistent Performer" award for consistent academic achievements

**Carmel School** — **Bangalore, India**
*Council for the Indian School Certificate Examinations (ICSE), 90%* — *1999–2012*

- Received an award for scoring a perfect 100 in Computer Science

## Work Experience

**AI, Robotics and Technology Park (ARTPark)** — **Bangalore**
*Senior Software Engineer* — *November 2020–July 2021*

- In the core team that developed XRaySetu[3] - a free, WhatsApp based service that can identify Covid-19 and related maladies of lungs from chest X-Ray images. This was featured in NDTV[4], CNBC-TV18[5], India Today[6] and other major Indian news networks.
- Part of the team that was building and maintaining a large-scale data collection and analytics platform using confidential computing. This company is a joint venture by the Indian Institute of Science and Aifoundry. The project was funded by the central and state governments[7]

**Indian Institute of Science** **Bangalore**
*Technical Associate* *June 2018–November 2020*

- Was one of the lead developers of an app[8] developed for BBMP (the Bangalore municipality) which helped in tracing high-risk COVID-19 suspects using Aarogya Setu (contact tracing app of India) [9] data. Worked under Dr Vivek Raghavan (chief of biometrics at Aadhar[10]), Dr Lalitesh Katragadda (co-founder of Google India) and Dr V. Kamakoti (present director of IIT Madras)
- Developed an anonymisation framework for Aarogya Setu data. It was capable of anonymising names, phone numbers and adaptively gridding coordinates to protect privacy. Developed an algorithm to bring down the execution time from several hours to under three minutes. Used GoLang, Amazon S3, Redshift and Redash in the development of this tool. The anonymised data was used by data scientists to predict future covid hotspots.
- Was part of the core team which developed the technical specifications, architectural design and the reference implementation of "Indian Urban Data Exchange", a data exchange platform for smart cities. The Government of India funded this project. We used Vertx, Ansible, RabbitMQ, Python, PostgreSQL and MongoDB for the project.
- Was a leading developer in the team which architected, developed and deployed many flavours of an IoT middleware. A version of this middleware is deployed in Pune and Varanasi. We used tools and languages such as Java, Python, Golang, Lua, RabbitMQ, LDAP, Docker, Ansible, Elasticsearch, Kong and Tomcat.

## Internships

**Indian Institute of Science** **Bangalore**
*Intern - Middleware Security* *November 2017–May 2018*

- Developed an "Intrusion Detection and Prevention System" for an IoT middleware platform. It was capable of preventing DoS attacks and some kinds of exploits. Built using Fail2ban, Python, Ansible, GoLang and Lua

**Indian Institute of Science** **Bangalore**
*Intern - Database Systems* *April 2017–May 2017*

- Thoroughly evaluated various NoSQL databases for the persistence layer of an IoT middleware.[11]

**Lion's Club, Bangalore** **Bangalore**
*Intern - Android Development (part time)* *July 2016–March 2017*

- Developed an Android app which helped people locate and contact eligible blood donors quickly.

**Twango Social Network Pvt. Ltd.** **Bangalore**
*Intern - Software Development* *April 2016–May 2016*

- The company offers matrimonial and dating services. Developed a windows application for the company to manage its massively growing user base. The software was also capable of making partner recommendations based on user preferences.

## Notable Projects

- ***Aarogya Setu Anonymisation***[12]: Developed an anonymisation framework to hide personally identifiable information from the Aarogya Setu self-assessment chat dataset. This framework, while preserving privacy, retained all the characteristics needed for predictive modelling of COVID-19 hotspots. Found a novel way to execute a theoretically $\mathcal{O}(n^2)$ algorithm in $\mathcal{O}(n)$. The tool was able to process several million records in under three minutes.
- ***Indian Urban Data Exchange (IUDX)***[13]: Was involved in the core team which was developing a common data exchange platform for smart cities in India. This project was funded by the Govt. of India. IUDX is deployed "in-production" in two Indian cities namely, Pune and Varanasi.[14]
- ***Vermillion***[15]: A scalable and highly-available IoT middleware for smart cities, built for speed and responsiveness. This middleware was the final and most mature implementation among the previous iterations of IoT middlewares that we had built. This is currently deployed as a part of the IUDX stack.
- ***Corinthian***[16]: Built a faster and more robust version of IDEAM using Kore, a fast and secure web platform written in C. This project also comprised of microservices deployed using Docker.
- ***IoT Data Exchange and Analytics Middleware (IDEAM)***[17]: This was an initial version of the smart city data exchange platform. This platform comprised various microservices which were developed using Undertow and deployed using Docker and Ansible.
- ***Intrusion Detection and Prevention System for Smart-city Middlewares***[18]: It was a security layer built for smart-city middlewares to prevent attacks by malicious users. It was capable of protecting against DoS attacks and some kinds of exploits by observing patterns from log files and using blockchain techniques

## Skills

- Good knowledge of backend systems, databases and microservices.
- Skilled in various development, automation and deployment tools like Docker, Docker Swarm, Ansible, Travis and Jenkins.
- Good understanding of large scale deployment needs in terms of architectural and programmatic design. Extensively worked on building high-performance reactive microservices using Java.
- Strong knowledge of the git version control system
- Experienced in Java, Python, SQL and shell scripting. Worked on numerous projects using languages like C, C++, Embedded C, VB.NET, C#.NET, Lua, and Go.

## Courses and Certifications

**Introduction to Cybersecurity**
*Indian Institute of Science*

**Introduction to Linux**
*The Linux Foundation*

**Linux Security**
*Red Hat and IIT Delhi*

**Design of Self-Driving Car**
*JED-I, Bangalore*

**Autonomous Robots**
*Atom Robotics*

## Teaching Experience

- Teaching Assistantships
  - CS350: Operating Systems, Winter 2022, UWaterloo
  - CS135: Designing Functional Programs using Racket, Fall 2021, UWaterloo
- Taught a module “Database Systems and Scaling Strategies for IoT middlewares" as a part of “Foundation Courses on Micro, Nano and Smart Systems" at the Indian Institute of Science[19]
- Held a three-day workshop on Android Application Development for high school students at a National Science Museum

## Volunteering Experience

**Vivekananda Balaka Sangha, Ramakrishna Math** — **Bangalore**
*Member* — *December 2007–Present*
A Sunday School for Children

- Developed a Windows application to manage student applications and summer camp materials.
- Helped organise soft-skill training programs and yearly two-week long summer camps for all-round development of children. Also taught sessions on analytical thinking and Vedic-hymn chanting[20]

## Achievements

- Co-authored four published Bureau of Indian Standards documents on smart city reference architecture and APIs - Unified Digital Infrastructure - ICT Reference Architecture (UDI-ICTRA) IS 18000 : 2020[21], Unified Digital Infrastructure - Data Layer Part 1 Reference Architecture IS 18002 (Part 1) : 2021[22], Unified Data Exchange Part 1 Architecture IS 18003 (Part 1) : 2020[23], Unified Data Exchange Part 2 API specifications IS 18003 (Part 2) : 2021[24]
- Invited for an online paid interview by researchers from the Software Analysis and Testing (SALT) lab of the Electrical and Computer Engineering Department, University of British Columbia, Vancouver to talk about bugs and failures in IoT systems.
- Won a paid trip to RabbitMQ Summit 2019 in London - sponsored by CloudAMQP[25] and the Indian Institute of Science. This was featured in the Cyber-Physical Systems website of IISc[26]
- Secured a national rank of 567 among tens of thousands of participants in a competitive coding contest conducted by Tata Consultancy Services (TCS)

## Conference Presentations

[1] N. Karanjkar, P. C. Tejasvi, and B. Amrutur, “A SimPy-based Simulation Testbed for Smart-city IoT Applications,” `https://dl.acm.org/doi/abs/10.1145/3302505.3312591`, ACM/IEEE Conference on Internet of Things Design and Implementation, Montreal, Canada, 2019.

## Manuscripts in Progress

[2] P. C. Tejasvi, V. Rajaraman, A. B. Puthuparambil, A. Pankaj, and B. Amrutur, “Vermillion: A High-Performance Scalable IoT Middleware for Smart Cities,” *arXiv preprint arXiv:2003.08361*, 2020, `https://arxiv.org/abs/2003.08361`.

# Links

[1] https://cs.uwaterloo.ca/~kmsalem/

[2] https://iisc.ac.in

[3] https://xraysetu.com/

[4] https://www.ndtv.com/business/a-platform-for-early-covid-detection-over-whatsapp-know-how-it-works-2454475

[5] https://www.cnbctv18.com/videos/startup/startup-street-elevation-capitals-investment-plans-covid-detection-using-xraysetu-9757181.htm

[6] https://www.indiatoday.in/technology/news/story/government-launches-x-ray-setu-on-whatsapp-to-detect-covid-19-cases-in-areas-with-no-rt-pcr-tests-1810348-2021-06-03

[7] https://artpark.in

[8] https://bangaloremirror.indiatimes.com/bangalore/others/six-global-firms-iisc-have-bbmps-back-in-covid-battle/articleshow/75856523.cms

[9] https://aarogyasetu.gov.in/

[10] https://www.uidai.gov.in/

[11] https://docs.google.com/document/d/1Eo5yPI9dYoPYQl5KmdR4W8Vcfevu4_QLt6eJI7rXSaQ/edit?usp=sharing

[12] https://github.com/pct960/anonymiser

[13] https://github.com/iudx

[14] https://smartcity.eletsonline.com/pune-becomes-first-smart-city-to-use-iudx-to-launch-its-pilot-urban-data-exchange/

[15] https://github.com/rbccps-iisc/vermillion/releases/tag/v0.2.0

[16] https://github.com/rbccps-iisc/corinthian

[17] https://github.com/rbccps-iisc/ideam

[18] https://github.com/rbccps-iisc/ideam/tree/bcc4bcd5447cf7923773f71a732dfdf0d75d53d4

[19] https://isssonline.in/foundation-courses/

[20] https://www.britannica.com/art/Vedic-chant

[21] https://www.services.bis.gov.in:8071/php/BIS_2.0/bisconnect/standard_review/Standard_review/Isdetails?ID=MjUwODU%3D

[22] https://www.services.bis.gov.in:8071/php/BIS_2.0/bisconnect/standard_review/Standard_review/Isdetails?ID=MjU4OTE%3D

[23] https://www.services.bis.gov.in:8071/php/BIS_2.0/bisconnect/standard_review/Standard_review/Isdetails?ID=MjUwOTk%3D

[24] https://www.services.bis.gov.in:8071/php/BIS_2.0/bisconnect/standard_review/Standard_review/Isdetails?ID=MjU4OTI%3D

[25] https://www.cloudamqp.com/

[26] https://cps.iisc.ac.in/rabbitmq/