Saksham Bhushan

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Education

- **Indian Institute of Technology Bhilai** — Raipur, India
  *Bachelor of Technology (Honours) - Electrical Engineering; CGPA - **8.88*** — *2018 - 2022*
- **Lucknow Public College** — Lucknow, India
  *Central Board of Secondary Education (CBSE); Percentage - **93.6%*** — *2017*

Research & Development Experience

- **Evaluating Performance Improvements in RIS-aided Wireless Communications** — IIT Bhilai
  Honours - Dr. Arzad A. Kherani, Assoc. Prof. *& Dr. Sreejith T.V.,* Asst. Prof., Dept. EECS — *Aug'20-Present*
  - We study and showcase the extent of benefits in Wireless Communication systems in presence of Reconfigurable Intelligent Surfaces. We compare the system throughput for different configurations of Tx and Rx for indoor environments both with RIS and without RIS.
  - We also devise an approximation model for a RIS-assisted system. Accepted in IEEE ANTS.
- **Advanced Communication Technologies for 6G Wireless Systems** — EURECOM, France
  Research Intern - Prof. Marios Kountouris, Assoc. Prof., Communication Systems Dept. — *Jun 2021 - Present*
  - Currently working on Rate-Distortion-Perception theory as part of the recently proposed Semantic-aware communication paradigm.
  - Familiarizing myself with the theoretical concepts of Information Theory and Generative Adversarial Networks
- **Priority-Queue based Efficient Resource Allocation in Fog Computing** — NTU, Singapore
  Research Intern - Prof. Maode Ma, Assoc. Prof., School of EEE — *Jan 2021 - Aug 2021*
  - Leveraged a queueing theory framework into a Fog Computing architecture for efficient resource allocation and minimized system response time.
  - Also proposed an algorithm for dynamic scaling of fog resources based upon the system requirements. Submitted to Journal of Computer Networks.
- **Power Aberration Monitoring Module** — IIT Bombay
  Research Intern - Prof. Dipankar Saha, Professor, Dept. of EE — *May 2019 - Apr 2019*
  - Developed a device which could detect voltage fluctuations in power supply using ADC and then remotely send the data through 2G GSM mobile network to the server. Developed a scalable web-app in PHP to manage the devices, process and display the data received from the devices.
  - The module was finally deployed to about 100 cities, towns and villages of India and some modules were sent to South Korea and Italy for testing and deployment.

Publications

- **fybrrStream: A WebRTC based Efficient and Scalable P2P Live Streaming Platform**: Apr 2021, 30th International Conference on Computer Communications and Networks (ICCCN 2021) IEEE Xplore
- **Dimensioning an Indoor SISO RIS-system: Approximations and Equivalence Models (Accepted)**: May 2021, IEEE International Conference on Advanced Networks and Telecommunications Systems 2021. Preprint.
- **fybrrLink: Efficient QoS-aware Routing in SDN enabled Next-Gen Satellite Networks (in-review)**: Jun 2021, IEEE Transactions on Network and Service Management. Preprint
- **Priority-Queue based Dynamic Scaling for Efficient Resource Allocation in Fog Computing (in-review)**: Aug 2021, Journal of Computer Networks. Preprint

Projects

- **fybrrChat Lite: A Distributed Chat Application for Secure Messaging** — Jul'21-Aug'21
  fybrrchat-lite.web.app
  Proposed an IPFS and WebRTC based decentralized secure chat application, which avoids any organisation from accessing users' private data or messages. We also implement end-to-end encryption for secure transfer of messages between peers. Results show fybrrChat Lite works 97% faster than WhatsApp. Submitted to IEEE ComSoc Student Competition.
- **fybrrLink: Efficient QoS-aware Routing in SDN enabled Next-Gen Satellite Networks** — Jan'21-Jun'21
  Supervisor - *Dr. Anand M. Baswade,* Asst. Professor*, Dept. of EECS, IIT Bhilai*
  Proposed a novel and centralized QoS-aware routing algorithm for Non-Terrestrial Networks, called fybrrLink in which the global view of the network in SDN is utilized. We implement a modified Bresenham's algorithm and Dijkstra's algorithm to find the optimal path in a significantly reduced computation time. Also, taking advantage of the deterministic satellite constellation, we propose a flow rule transfer algorithm and a topology monitoring algorithm. Under minor-revision in IEEE TNSM.

- **Implementation of Standard-Compliant PDCP layer** Oct'20-Nov'20
  Supervisor - *Dr. Arzad A. Kherani,* Associate Professor*, Dept. of EECS, IIT Bhilai*
  github.com/saksham291/PDCP-layer-implementation
  Implemented Standard Complient PDCP layer from the 3GPP LTE protocol stack using Python. Features include header compression, in-order delivery and duplicate detection and also integrated it with UDP and RLC layer.

- **fybrrChat: A P2P Video Conferencing Platform** Jul'20-Nov'20
  fybrrchat.herokuapp.com
  Made a Peer-to-Peer decentralized video calling service using WebRTC which could support upto 35 people on a group call (depending upon network bandwidth). Also proposed a distributed modified-mesh-topology approach suitable for live streaming. Selected in MHRD's IIC National Innovation Contest 2020 from IIT Bhilai.

- **Secure Sense and Control IoT Protocol (SSCIP)** Jan'19-Nov'19
  Supervisor - *Prof. Rajat Moona,* Director*, IIT Bhilai*
  github.com/Code-Blooded-Human/iitbh-relay
  Developed a light weight & secure communication protocol especially for IoT devices installed at IIT Bhilai. Also designed a PCB and hardware unit for controlling the power supply of lecture theatres based upon the time slot booked in the slot booking web-app in order to conserve energy using Relays and ESP8266 WiFi modules using the SSCP protocol.

- **Solar Power Generation Estimation in India (Data Science)** Oct'20-Nov'20
  Supervisor - *Dr. Gagan Raj Gupta,* Associate Professor*, Dept. of EECS, IIT Bhilai*
  github.com/milindkesar/Solar-Power-Potential-in-India
  Used various APIs to collect data for existing Solar Plants in India, solar radiation, weather conditions and Geo-location of the plants performed data cleaning. Performed Time-Series analysis on daily power generation by using ARIMA model to predict power generation of a solar power plant in Jagalur, Karnataka.

- **Covid vs India** Mar'20-Jul'20
  covidvsindia.in.net - Link inactive.
  Made a website covidvsindia.in.net to monitor the cases of coronavirus across the country state-wise and district-wise and present them in an interactive map and graphical forms. Used a volunteer-driven API for COVID-19 stats and patient tracing in India and web-scrapping for live up-to-date and accurate data. Reached 27k hits within 1 week.

Relevant Courses

- **Communications**: Information Theory (ongoing), Wireless MAC Modelling, Advanced Computer Networks, Introduction to Wireless and Cellular Communications, Mobile Communications System, Wireless Networks and Mobile Data Management, Communication Systems.
- **Systems**: Embedded Systems, Applied Digital Logic Design.
- **Others**: Algorithms-I, Data Analytics & Visualization.

Skills Summary

- **Languages**: C, C++, Python, Assembly Landuage (ARM), Verilog
- **Web Development**: HTML, CSS, JavaScript, PHP, NodeJS, React, MongoDB, Bootstrap, Material UI
- **Libraries**: Selenium, WebRTC, IPFS, NumPy, Pandas,
- **Miscellaneous**: MATLAB, Git, LaTeX, Java Modelling Tools, Fritzing, Wireshark, Arduino, Adobe XD, Illustrator.

Position of Responsibility

- *Co-Founder & Director*, **Axesdock Technologies LLP**.
- *Startup Coordinator*, **Institute Innovation Council**, IIT Bhilai.
- *Coordinator*, **The Pixel Snappers** (Photography Club), IIT Bhilai.
- *Founder & Coordinator*, **Film Production Society** (Film Making Club), IIT Bhilai.
- *Student Mentor*, **Student Mentorship Program**, IIT Bhilai.

Extra Curriculars & Achievements

- **Received grant of Rs 10,00,000 (US$13,820)** in "Support for Entrepreneurial and Managerial Development of MSMEs through Incubators" by Ministry of Micro, Small & Medium Enterprises (MSME), Government of India for building a prototype of our idea "Smart Access and Attendance Terminal".
- **Won the 1st Prize** in Bright Idea Competition by Chhattisgarh state Renewable Energy Development Agency (CREDA) for providing Energy Efficiency Solution for Corporate and Institutional Campuses.
- Offered **Summer Research Fellowship** from Indian Academy of Sciences, Bangalore in SRFP 2021.
- All India Rank **7530 (Top 0.7%)** in Joint Entrance Examination Advanced (**JEE adv**) 2018 among **11,35,084** total JEE aspirants.
- Participated in InterIIT Cultural Meet 2018 & 2019 – **Band Competition** & **Photography Competition**.
- As a **Core Member** in Developers Student Club by Google Developers, worked as a teaching assistant for students from different colleges for a workshop on Google Cloud Services.

(References available on request)

This version was compiled on October 14, 2021