



Yuvraj Singh Malhi

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Education

Birla Institute of Technology & Science, Pilani (BITS Pilani)

Pilani, India

BACHELOR OF ENGINEERING (ELECTRONICS AND INSTRUMENTATION)

2018 - Present

- **Courses** — Computer programming, Network programming, Data structures, Cloud computing, Microprocessor programming.
- **Positions** — Teaching assistantship (01), Undergraduate research assistantships (04), Industry internships (02).

Central Board of Secondary Education

Bangalore, India

SENIOR SECONDARY

2018

- JEE percentile: **99.38%**. SAT Subject score in Mathematics: **800/800**
- Aggregate percentage in engineering subjects: **95.2%** – Class Rank: **3**

Central Board of Secondary Education

Bangalore, India

SECONDARY

2016

- Grade Point: **10/10** – Class Rank: 1. Received **Certificate of Merit**

Research

RESEARCH EXPERIENCE & FORMAL PROJECTS

IIT Kanpur, c3i Cybersecurity Division

Kanpur, India

RESEARCH INTERN

May 2021 - July 2021

- Among **top 5** students from India selected to be a part of the **Intrusion Detection Team** of IIT's cybersecurity division. Learnt about IDS roles, applications, working mechanisms, limitations, and future prospects.
- Surveyed and categorized IDS solutions for **non-encrypted and encrypted traffic analysis** based on application and detection mechanism.

Undergraduate Research Assistant, BITS Pilani

Pilani, India

PROJECT WITH PROFESSOR VIRENDRA SHEKHAWAT ON **INTRUSION DETECTION SYSTEMS FOR IoT USING ML** - 10/10

Spring 2021

- Designed and implemented **network IDS for IoT devices** to overcome design flaws of existing intrusion detection systems. This IDS can detect 22 types of attacks with help of three ML based modules using **Random Forest, ANN, Decision Tree, and XGBoost** algorithms.
- Central Module used for attack detection & classification with F1 Score **94.41%**. One among two edge modules used for only attack detection at IoT edge with F1 scores of **99.98%** and **99.87%**.

PROJECT WITH PROFESSOR HARI BABU ON **MITIGATING DoS/DDoS ATTACKS IN SDN DATA PLANES** - 10/10

Spring 2021

- Surveyed and analyzed methods used to **detect and mitigate** Denial-of-Service (**DoS**) and Distributed Denial-of-Service (**DDoS**) attacks at **Data Plane** level in Software Defined Networks (SDN) using P4 language.
- Identified **limitations of P4** for attack detection and mitigation such as: No support for loops and for complex functions, and minimal support for mathematical analysis. This project is further being used by students to develop a defense solution at data plane level.

PROJECT WITH PROFESSOR RAHUL SINGHAL ON **NOVEL OPTIMIZATION TECHNIQUE OF LOW LOSS ANTENNA** - 10/10

Fall 2020

- Designed a simple and efficient **regression optimization** technique for designing antennas with low return loss (< -15 dB).
- Used the designed technique on **MATLAB** to optimized a 2.4 GHz Patch antenna **4X faster**.

PROJECT WITH PROFESSOR NAVNEET GUPTA ON **COMPARISON OF ANN SOFT COMPUTING TECHNIQUES FOR ANTENNA DESIGN** - 10/10

Spring 2020

- Worked on soft-computing, artificial neural network, and their combined use for **low cost calculations**.
- Compared performance of **22** combinations of networks and optimization algorithms for designing a rectangular patch of a Microstrip antenna. This test was carried out for different use-case frequencies of **WiFi** (5 GHz), **Bluetooth** (2.48 GHz) & **3G** (1.8 GHz).
- Achieved highest accuracy of **99.938%** with Reduced Radial Basis Network and quickest training time of **0.001s** with Generalized Regression.

PAPERS & PUBLICATIONS

Accepted - Two-Level Machine Learning Driven Intrusion Detection Model for IoT Environments

Switzerland | Online Soon

Y.S. Malhi, V.S. Shekhawat, INTERNATIONAL JOURNAL OF INFORMATION AND COMPUTER SECURITY (IJICS)

TBD

Accepted - Comparison of ANN based Soft Computing Techniques for Electromagnetic Modeling of a Microstrip Patch Antenna [Pre-print]

India | Read Pre-print

Y.S. Malhi, N. Gupta, 6TH INTERNATIONAL CONFERENCE ON SOFT COMPUTING: THEORIES AND APPLICATIONS (2021)

TBD

A Comparative Study on Industrial Multiphase Flow Measurement Techniques

India | Read Paper

Y.S. Malhi, P. Grover, R.N. Ponnalagu, 8TH INTERNATIONAL AND 47TH NATIONAL CONFERENCE ON FLUID MECHANICS AND FLUID POWER (2020)

Dec 2020

Work Experience

Samsung Research & Development Institute

Bangalore, India

NETWORK AND SYSTEMS INTERN

July 2021 - Present

- Working on **ML-based log analysis** for **system fault detection** and post-mortem **root cause analysis**.
- Working on **anomaly detection** by monitoring system background information in order to take preventive action before hard failure occurs.

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Pune, India | [See Project](#)

LINUX AUTOMATION INTERN

Dec 2019 - Jan 2020

- Automated** the process of notifying user on occurrence of a specific event.
- Created an **SMTP client** with CLI in **C++** to send TLS encrypted emails using **cURL** library.

Larsen & Turbo Chiyoda

Gujarat, India | [Read Paper](#)

SUMMER INTERN

May 2020 - July 2020

- Identified and documented state-of-the-art instrumentation techniques and devices used in **complex multiphase flow measurement**.
- Published 'A Comparative Study on Industrial Multiphase Flow Measurement Techniques' in FMFP 2020.

Student's Society of Mess Services (SSMS)

Pilani, India

MESS SECRETARY, SSMS GOVERNING COUNCIL MEMBER

Aug 2018 - July 2019

- Part of a 13 member governing council responsible managing day-to-day mess activities, quality assurance, infrastructure development, re-newing tenders, and resource allocation of over **200 employees** and having annual budget of more than **Rs 2 Crore**.

Additional Projects

Ultra Fast Trace-route

[See Project](#)

- A concurrent server runs traceroute on multiple domains and give results within **3 sec**, which is up to **10X faster** than standard traceroute.
- A TCP client runs on a separate window to find the **longest common routing path** among given set of domains.

Linux shell with added functionality

[See Project](#)

- A clean and verbose **command shell** built in **C** that can support output redirection and almost all **CLI commands** like ls, cat, grep etc.
- Additionally, this shell includes two new commands: **double pipe ||** and **triple pipe |||**.

Concurrent TFTP Servers

[See Projects](#)

- Created a TFTP single process server to handle multiple clients concurrently using **listen** call on multiple client FDs. Speed: **~25 Mbps**.
- Created a TFTP **multi process server** to handle multiple clients by creating a new child server for each client. Speed: **~50 Mbps**.
- These servers are incorporated with unresponsive client **timeouts** and can run in **verbose** mode.

Ultra-fast URL Port Scanner

[See Project](#)

- Scans URL open ports upto **10X faster** than traditional scanners by using upto 100 of child scanners **concurrently**.
- The scanner also **lists all IPv4 and IPv6 addresses** allotted to each URL.

Simple Hadoop Implementation

- Replicated a simpler version of **Google File Storage** by creating client, data server and meta-data server. Client uploads files in chunks and **distributed data servers** store 3 separate copies of each chunk to ensure **availability** in case any data server crashes.
- All IPC (Inter process communication) for download, upload, permission, and **security** of files is facilitated by the **meta-data server**.

Teaching

Teaching Assistant, BITS Pilani

Pilani, India

TA OF PROFESSOR HARI BABU FOR THE COURSE 'IS F462 NETWORK PROGRAMMING'

July 2021 - Present

- Selected as teaching assistant for a **graduate level course** to conduct **networking programming labs** and doubt clearing sessions.
- Responsible for correcting **lab assignments** and providing inputs for lesson plans.

Manzil (NGO)

Delhi, India

TEACHER

Aug 2020 - Present

- Part-time volunteer teacher of **English** and **C++** classes conducted for under privileged children.

Interests & Extracurricular Activities

DOMAINS	Present – ML/DL, Security of: Software, Networks, Systems. Past – Digital VLSI, Competitive coding
LANGUAGES	Proficient – C, C++, Python, MATLAB. Basics – Java, HTML, Assembly language, Spice
MOOC COURSES	Ethical hacking courses (02), Network security courses (01), Machine learning (02), Research paper writing (01)
EXTRACURRICULARS	Reading, Teaching, Hockey (University team), Running, Punjab Cultural Association
HONORS & AWARDS	Best all-rounder award (2018), School Pupil Leader (2018), 1st in National Astronomy Olympiad (2017)
SCHOLARSHIPS	Class 12 outstanding performance (2018), FIITJEE Scholarship (2017), AFSH Class 10 outstanding performance (2016)