Curriculum Vitae

Name	Mohammad Ishtiyaq Qureshi
Birth date	24 February 1990
Correspondence address	Flat no.202 B Block, Jeet homes Vrindavan Nagar, Ayodhya Bypass, Bhopal, Madhya Pradesh, Pin - 462022 Ph - +91 7807371088
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OBJECTIVE:

This is to apply for the Assistant Professor position at your esteemed institute. I defended my PhD thesis titled "On the Information Flow in Undirected Unicast Networks" on 28 January 2022 and obtained the PhD degree on 5 December 2022. I am extremely interested in contributing as a faculty member at your institute, where I aim to focus on engineering education, continue research in communications theory and technology, and contribute significantly to the institute's services and other professional activities.

PAPERS PUBLISHED

1. **M. I. Qureshi** and S. Thakor, "A Bound on Undirected Multiple-Unicast Network Information Flow," *IEEE Transactions on Information Theory*, vol. 68, no. 7, pp. 4453-4469, July 2022, DOI: 10.1109/TIT.2022.3157623, Print ISSN: 0018-9448, No. of Citations: NA (Web of Science).

2. **M. I. Qureshi** and S. Thakor, "On the Information Capacity of Layered Undirected Unicast Networks," *IEEE Communications Letters*, vol. 24, no. 12, pp. 2715−2718, December 2020, DOI: 10.1109/LCOMM.2020.3020511, Print ISSN: 1089-7798, No. of Citations: 0 (Web of Science).

3. **M. I. Qureshi** and S. Thakor, "On the Partition Bound for Undirected Unicast Network Information Capacity," in *IEEE International Symposium on Information Theory*, pp. 1623−1628, 2020, DOI: 10.1109/ISIT44484.2020.9174428, Print on Demand (PoD) ISSN: 2157-8095, No. of Citations: 1 (Web of Science).

4. S. Thakor and **M. I. Qureshi**, "Undirected Unicast Network Capacity: A Partition Bound," in *IEEE International Symposium on Information Theory*, pp. 196−200, 2019, DOI: 10.1109/ISIT.2019.8849499, Print on Demand (PoD) ISSN: 2157-8095, No. of Citations: 2 (Web of Science).

EDUCATIONAL QUALIFICATION

Programme	Institute	Specialization/ Subjects	University and/or Board of education	Year of Completion	CGPA and/or Percentage
PhD	Indian Institute of Technology, Mandi, H.P.	Communication Systems	Indian Institute of Technology, Mandi, H.P.	2022	8.43 CGPA
Master of Design	Indian Institute of Information Technology Design and Manufacturing, Kancheepuram, T.N.	Communication Systems	Indian Institute of Information Technology Design and Manufacturing, Kancheepuram, T.N.	2015	7.96 CGPA
Bachelor of Engineering	Technocrats Institute of Technology (Excellence), Bhopal, M.P.	Electronics and Communication Engineering	Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal, M.P.	2012	76.38 %
Higher Secondary School Certificate	C.B.S. Convent Higher Secondary School, Sagar, M.P.	English, Hindi, Physics, Chemistry, Mathematics	Madhya Pradesh Board of Secondary Education, Bhopal, M.P.	2008	73.33 %
High School Certificate	E.L.C. English Medium Higher Secondary School, Sagar, M.P. (PR)	Hindi, English, Urdu, Mathematics, Science, Social Science	Madhya Pradesh Board of Secondary Education, Bhopal, M.P.	2006	65.20 %

Indian Institute of Technology, Mandi [PhD, 2016-2022]

PhD Thesis

Title: On the Information Flow in Undirected Unicast Networks

Supervisor: Dr Satyajit Thakor

Description: In transporting information from one place to another, a natural question to ask

is: Does the maximum information flow in a network equal to maximum commodity flow? In 2004, it was conjectured that the routing capacity and the information capacity of undirected unicast networks are the same. This statement is referred to as the undirected unicast network coding conjecture. This conjecture has found applications even in theoretical computer science, for example, the solution to the conjecture would resolve an old open problem in Input-Output complexity. This seemingly simple statement of the conjecture has not been proved or disproved yet.

We characterized the first non-trivial information-theoretic bound, called partition bound, for symmetric rate in undirected unicast networks, and we show that the bound is achievable for two multipartite classes of networks, and one class of layered networks by a routing solution. In this way, we proved that the conjecture holds for these three classes of networks and we give closed-form expressions to compute the symmetric capacity for these classes of networks. We show that the decision version problem of computing the bound is NP-complete and designed an algorithmic procedure to compute an upper bound on the partition bound.

Recently, the conjecture was proved for a new class of networks and it was shown that all the network instances for which the conjecture is proved previously, and the cut-based bound is not achievable by commodity flow, are elements of this class. We established the existence of networks outside of the new class of networks such that the partition bound is attainable by routing.

Indian Institute of Information Technology Design and Manufacturing, Kancheepuram [Master of Design, 2013-2015]

Major Project

Title: Waveform Synthesis for MIMO Radar Systems

Supervisor: Dr Mandha D. Selvaraj

Description: In this project, an attempt has been made to implement cyclic algorithms, CAN (Cyclic Algorithm New) and WeCAN (Weighted Cyclic Algorithm New), which are used to generate orthogonal sequences for MIMO radar systems. These algorithms exploit the properties of FFT (Fast Fourier Transform) which, as we know, computes very fast. These cyclic algorithms improve the performance of MIMO radar systems. Improving the performance of the system means reducing the sidelobes of the correlation metric which is directly related to the ISL (Integrated Sidelobe Level) metric. The reduction in ISL (Integrated Sidelobe Level) metric should be in the manner that even the sidelobe with maximum power should remain as low as possible compared to the main lobe, which is desirable. By doing this, the ability of the MIMO radar receiver to detect the target will increase: therefore the MIMO radar system will then be able to detect the target with high clarity.

Mini project

Title: Locating a Cellular Network base station in IIITDM Campus

Supervisor: Dr Mandha D. Selvaraj

Description: The mini-project aimed to locate a suitable spot to build a cellular network base station for the campus, based on the Free Space Path Loss Model, in such a way that all the

important and high-density areas receive sufficient power for the cellular system to work.

Technocrats Institute of Technology (Excellence), Bhopal [Graduation, 2008-2012]

Major Project

Title: Automatic Braking Systems

Supervisor: Mr Rahul Tiwari

Description: In this project, an attempt has been made to develop a technique called an Automatic Braking System, which can be used as a safety feedback-control-system device to avoid an accident when a vehicle takes a sharp turn on any turning track keeping high speed. This can be done by a feedback-control system that controls the supply of brake oil to the wheels of the vehicle.

AWARDS AND ACHIEVEMENTS

- I was a Co-Winner of the Four-Minute Two-Techniques Contest, ISIT-2021 for my video presentation on Blockchain Technology (Link: https://69.5.195.213/Challenge.asp) with the prize money of USD 300 (around INR 23000 at the time). The award was given by The Student and Outreach Subcommittee of the IEEE IT Society.
- I received special recognition from the IIT Mandi on its 12th Foundation Day, 24 February 2021, for my teaching assistant work.
- I won the Best Poster Presentation Award 2018, IIT Mandi.
- I won the Best Teaching Assistant Award 2018-2019, IIT Mandi.
- I delivered a Young Researcher Talk at JTG/IEEE ITSoc Summer School in Information Theory, Signal Processing, Telecommunication, and Networking @ IIT Kanpur, held from 28 June 2021 to 1 July 2021 (Link: https://www.iitk.ac.in/jtg2021/).

PROFESSIONAL MEMBERSHIPS

- Graduate Student Member, IEEE
- Graduate Student Member, IEEE Young Professionals
- Graduate Student Member, IEEE Information Theory Society

EXPERIENCE

- I worked as a Project Associate at IIT Mandi from 20 July 2021 to 15 April 2023.
- I served as an intern at the IIT Mandi iHub and HCI Foundation from 01 April 2021 to 19 July 2021. The TIH at IIT Mandi is one of the 25 TIHs in all of India and is a Section-8 company.
- I gained teaching experience as an assistant professor at the NRI Institute of Information Science and Technology, Bhopal, from 24 August 2015 to 15 January 2016.

AREAS OF INTEREST

- Communication Theory.
- I am developing an interest in Machine Learning and Blockchain Technology recently.

LANGUAGE KNOWN

- English (Read, Write and Speak)
- Hindi (Read, Write and Speak)
- Urdu (Read, Write and Speak)

PERSONAL INFORMATION

Father's Name:	Late Abdul Aziz Qureshi
Mother's Name:	Zahida Begum Qureshi
Permanent Address:	Flat no.202 B Block, Jeet homes Vrindavan Nagar, Ayodhya Bypass, Bhopal, Madhya Pradesh, Pin - 462022 Ph - +91 7807371088

REFERENCES

Name	Designation	Affiliation	Email	Phone
Dr Satyajit Thakor	Associate Professor	IIT Mandi	satyajit@iitmandi.ac.in	8580994757
Dr Aditya Nigam	Assistant Professor	IIT Mandi	aditya@iitmandi.ac.in	8894607738
Dr Varun Dutt	Associate Professor	IIT Mandi	varun@iitmandi.ac.in	8627974036

DECLARATION

I hereby declare that the information furnished above is true to the best of my knowledge and belief and I bear the responsibility for the correctness of the above-mentioned information.

Date 29 April 2023



Place Mandi **Mohammad Ishtiyaq Qureshi**