

Makhdumabanu Saiyed

She/Her

Ph.D.

Electronic Systems Engineering

Faculty of Engineering and Applied Science

University of Regina, Canada

Security, IoT, Machine Learning



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PROFESSIONAL SUMMARY

Dedicated researcher and educator with over twelve years of experience in Cybersecurity, Software Engineering, Network, Communication, Internet of Things, and Artificial Intelligence. Teaching undergraduates, mentoring students in technology-driven projects, and research proposal writing.

EDUCATIONAL QUALIFICATION

- **Doctor of Philosophy, Electronic Systems Engineering, University of Regina, SK, Canada**
2025 - GPA 4.0
Thesis Title: Adaptive Systems for Distributed Denial of Service Attacks Detection and Mitigation in IoT Networks.
Supervisor: Dr. Irfan Al-Anbagi (Associate Professor, Electronic Systems Engineering, University of Regina)
- **Master of Engineering (Thesis-based), Computer Engineering, Gujarat Technological University, India**
2017 - GPA 3.98
Thesis Title: Multilevel Queue Model for Indian Region Broadcast Network over Satellite
Supervisor: Dr. Chirag Patel (Associate Professor, Information Technology, Gujarat Technological University)
Mr. Sudhir Agarwal (Head, Department of Communication, Indian Space Research Organization (ISRO))
- **Bachelor of Engineering, Computer Engineering, Gujarat University, India**
2008 - GPA 3.03

RESEARCH INTEREST

- Artificial Intelligence-based Cybersecurity Techniques
- Cyberattacks Detection and Mitigation in Internet of Things (IoT) Networks
- Machine Learning, Deep Learning
- Explainable Artificial Intelligence
- Cyberattacks Mitigation using Honeypots, Game Theory and Reinforcement Learnings

EXPERIENCE

Research Experience

Postdoctoral Fellow - University of Regina, Canada - 03/2025 – Present,

- Conducting research on cyber attacks defense, integrating federated learning, explainable AI, and game theory.
- Collaborating on grant proposals, including NSERC-DG and ADF funding applications.
- Mentoring graduate students in cybersecurity research.

■ Ph.D. Researcher - University of Regina, *Canada* - 04/2021 – 12/2024,

- Design and development of cyberattacks detection and mitigation system in Internet of Things (IoT) networks under the broad area of cyber security.
- Worked on a project entitled "Dynamic Network Management and Performance Optimization for Smart Talk Beacon's security architecture" in collaboration with University of Regina and Smart Talk Beacon Solutions Ltd., from January 2021 to April 2021 under Mitacs project.
 - ✓ Designed a network monitoring system for Smart Talk Beacon Solutions Ltd. actual network architecture.
 - ✓ The system detected cyberattacks specifically high- and low-volume Distributed Denial of Service (DDoS) attacks.
- Guided a master's student in their project on DDoS attack defense using multilayer honeypots.

Teaching Experience

■ Sessional Lecturer - University of Regina, *Canada* - 08/2021 - 12/2021,

- Taught Digital Communications (ENEL 442) course to undergraduate students of Electronics System Engineering.
- The course content topics like introduction, analog to digital conversion, line coding, probability in communication, random processes and bandpass random processes, optimum linear detector, spread spectrum technologies, error correction code and information theory.
- Prepared teaching materials for the course.
- Set question paper and take exam.
- Mark assignments and exams.

■ Graduate Teaching Assistant - University of Regina, *Canada* – 01- 08/2022, 01-04/2023, 08-12/2023, 01-04/2024

- Marking assignments and lab reports of courses Power and Energy (ENEL 371), Digital Communications (ENEL 442), Digital Electronics (ENEL 384), Design of Computer Networks (ENEL 443).
- Taught laboratory courses such as Design of Computer Networks (ENEL 443) and Communication Theory (ENEL 341) in Electronic Systems Engineering.
- Taking tutorial of course Digital Communications (ENEL 442) in Electronic Systems Engineering.

■ Assistant Professor – Parul University, *India* – 06/2017 - 04/2021

Lecturer – Parul University, *India* – 06/2011 - 05/2015

- Teaching undergraduate students of Computer Science and Engineering
- Courses taught like Network Security, Information Security, Software Engineering, Object Oriented Programming and Concepts, C Programming, Parallel and Distributed Computing, Computer Networks, Wireless Communications and Mobile Networking, Digital Communications, Enterprise Resource Planning, Operating Systems, Computer Graphics.
- Guiding final year students in their projects.
 - ✓ Guided students in projects related to the field of Internet of Things, Security, Machine Learning, and Communication.
 - ✓ Did weekly meetings with students regarding project status. Projects were related to computer engineering and general engineering related design and development of software, hardware, or website.
 - ✓ Filed a copy right under the Government of India for the project titled "Farmer's Helpdesk." This software is designed to empower farmers, allowing them to directly sell their produce to the government without intermediaries. Many farmers, facing literacy challenges in India, often fall prey to agents who exploit them by charging higher commissions and offering lower prices. To address this issue, we developed user-friendly software in C# with Structured Query Language (SQL) as the database. The interface prioritizes ease of use with simple click options, catering to the literacy levels of farmers.
 - ✓ Filed a patent under the Government of India for the project titled "Forestalling of Imprudent Drivers."

- Developed curriculum, syllabus and prepare teaching materials for the course.
 - ✓ Developed curriculum of courses like Software Engineering, Network Security, Parallel and Distributed computing, and Wireless Communications and Mobile Networking
- Coordinator of National Board of Accreditation in Computer Science and Engineering.
 - ✓ Directed the integration of Outcome-Based Education (OBE). Facilitated workshops to help faculty understand OBE principles and supported a culture of continuous improvement.
- Assessment of semester papers and evaluating student performance.
 - ✓ Creation of semester question papers. Additionally, evaluated student performance, ensuring fair and consistent marking, and provided constructive feedback to facilitate academic growth.
- Institute coordinator of International Relations Cell of Parul University from 2017 to 2021.
 - ✓ Led international collaborative sessions on cybersecurity and data science at Carleton University in 2019, Ottawa.
 - ✓ Conducted a hands-on workshop on website development for visiting Ghent University, Belgium students in, covering technologies such as HTML, CSS, JavaScript, and backend frameworks, fostering cross-cultural technical knowledge exchange.
 - ✓ Participated in international tech conferences and seminars, in Canada and Poland encouraging faculty and students to present research papers and innovations in areas like cloud computing, artificial intelligence, machine learning, and cybersecurity.
- Computer Science and Engineering department Alumni Coordinator from 2017 to 2021.
 - ✓ Orchestrated technical sessions featuring esteemed alumni from prominent companies such as Tata Consultancy Services, Cognizant, Google, and other IT firms.
 - ✓ Organized and facilitated discussions on the latest and emerging technologies such as Docker and Container, cybersecurity, Machine Learning, Cloud computing, Privacy preserving and Entrepreneurship development, providing valuable insights for students and fostering connections between academia and industry.

■ Lecturer - Sigma Polytechnic Institute, *India 08/2008 - 11/2010*

- Developed and delivered engaging lectures and practical sessions within the Information Technology curriculum.
- Provided academic guidance and mentorship, supporting students in studies, career goals, and personal development to create a positive learning environment.
- Designed and administered assessments, examinations, and projects with fair and transparent grading practices to evaluate student understanding and performance.
- Actively participated in departmental meetings and academic committees, contributing to discussions on curriculum enhancement and policy development.
- Implemented innovative teaching methods, integrating technology and real-world examples for an enhanced learning experience and better comprehension of complex concepts.

Industry Experience

■ Software Developer-Virtua Private Solution, *India 12/2010 - 05/2011,*

- Developed an inventory management system, which increased operational efficiency by 20% by streamlining product monitoring, order fulfillment, and inventory control.
 - Contributed to the user experience and engagement through the incorporation of interactive features and user-friendly interfaces into the design and implementation of an e-content website.
 - Led the software development for Human Resources Management System for the Steel Plant. By automating HR processes including payroll, employee records, and performance evaluations, contributed to the optimization and organization of the human resources operation.
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RESEARCH PUBLICATIONS

Journal Papers

- M. F. Saiyed, I. Al-Anbagi, and M. Shamim Hossain, "**Interactive and Explainable Optimized Learning for DDoS Detection in Consumer IoT Networks**", in IEEE Transactions on Consumer Electronics, doi: 10.1109/TCE.2024.3482092.
- M. F. Saiyed and I. Al-Anbagi, "**Deep Ensemble Learning with Pruning for DDoS Attack Detection in IoT Networks**", in IEEE Transactions on Machine Learning in Communications and Networking, vol. 2, pp. 596-616, 2024, doi: 10.1109/TMLCN.2024.3395419.
- M. F. Saiyed and I. Al-Anbagi, "**A Genetic Algorithm- and t-Test-Based System for DDoS Attack Detection in IoT Networks**", in IEEE Access, vol. 12, pp. 25623-25641, 2024, doi: 10.1109/ACCESS.2024.3367357.
- M. F. Saiyed and I. Al-Anbagi, "**Flow and unified information-based DDoS attack detection system for multi- topology IoT networks**". Internet of Things. 2023 Dec 1; 24:100976.
- M. F. Saiyed and I. Al-Anbagi, "**SHAP-Based Explanation and Lightweight DDoS Attack Detection System in IoT Networks**," in Elsevier-Internet of Things [Submitted].
- M. F. Saiyed and I. Al-Anbagi, "**A Game Theoretic Model for Strategic Defense Selection against DDoS Attacks in IoMT Networks**," in IEEE Transactions on Network and Service Management [Submitted].
- Avneet Kaur, M. F. Saiyed, I. Al-Anbagi and M. Shamim Hossain "**A QoS-Aware Adaptive Cross-layer Cyber-attack Detection Algorithm for Vehicular Networks**" in Elsevier-Vehicular Communications [Submitted].

Conference Papers

- M. Saiyed and I. Al Anbagi, "**A Genetic Algorithm and Game-Theoretic Model for DDoS Defense in IoT Networks**," 2025 IEEE International Conference on Communications (ICC), Montreal, Canada, [Accepted]
 - M. Saiyed and I. Al Anbagi, "**A Lightweight and Optimal Defense System for DDoS Attacks in IoMT Networks**," 2024 IEEE Global Communications Conference (Globecom), Cape Town, South Africa, Accepted 30 July 2024.
 - M. F. Saiyed and I. Al-Anbagi, "**Optimized Ensemble Model with Genetic Algorithm for DDoS Attack Detection in IoT Networks**", 2024 IEEE International Conference on Communications Workshops (ICC Workshops), Denver, CO, USA, 2024, pp. 433-438, doi: 10.1109/ICCWorkshops59551.2024.10615607
 - M. F. Saiyed and I. Al-Anbagi, "**Entropy and Divergence-based DDoS Attack Detection System in IoT Networks**". In 2023 19th International Conference on Wireless and Mobile Computing, Networking and Communications (WiMob) 2023 Jun 21 (pp. 224-230). IEEE.
 - Rathor AS, Modi K, Saiyad M. "**A comprehensive survey on emotion-based health prediction using internet of things and machine learning**". In Proceedings of the Second International Conference on Information Management and Machine Intelligence: ICIMMI 2020 2021 (pp. 173-182). Springer Singapore.
 - Patel J, Vala B, Saiyad M. "**LSTM-RNN Combined Approach for Crop Yield Prediction on Climatic Constraints**". In 2021 5th International Conference on Computing Methodologies and Communication (ICCMC) 2021 Apr 8 (pp. 1477-1483). IEEE.
 - chouhan, A. kumari and M. Saiyad, "**Secure Multiparty Computation and Privacy Preserving scheme using Homomorphic Elliptic Curve Cryptography**," 2019 International Conference on Intelligent Computing and Control Systems (ICCS), Madurai, India, 2019, pp. 776-780, doi: 10.1109/ICCS45141.2019.9065645.
 - F. S. Makhduma, S. Agrawal and C. A. Patel, "**Multilevel queue model for Indian Region Broadcast Network (IRBN) over satellite**," 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2017, pp. 145-148, doi: 10.1109/ICCONS.2017.8250698.
 - F. S. Makhduma, C. A. Patel and S. Agrawal, "**OUTERNET: Crossing over data gap using cubesats**," 2017 International Conference on Inventive Systems and Control (ICISC), Coimbatore, India, 2017, pp. 1-4, doi: 10.1109/ICISC.2017.8068587.
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Grant Writing and Proposal Development

- Currently contributing to the NSERC Discovery Grant (NSERC-DG) proposal on blockchain network security, assisting with proposal structuring, literature review, methodology design, and budgeting.
- Actively working on the Agricultural Development Fund (ADF) grant proposal for grain quality management using Edge-IoT and AI, supporting proposal structuring, literature review, methodology design, and budgeting.

FUNDING AND AWARDS

- FGSR Graduate Student Online Conference or Travel Award - 2024 Fall, University of Regina, Canada (\$1000).
- International Doctoral Student Award - 2024 Fall, University of Regina, Canada. (\$1400)
- Dean Honour Award - 2024 Spring/Summer, University of Regina, Canada.
- UR Graduate Scholarship - 2024 Spring/Summer, University of Regina, Canada. (\$2890)
- International Doctoral Student Award - 2024 Spring/Summer, University of Regina, Canada. (\$1400)
- Faculty of Graduate Studies and Research Thesis Only Scholarship - 2024 Spring/Summer, University of Regina, Canada. (\$8425)
- International Doctoral Student Award - 2024 Winter, University of Regina, Canada. (\$1400)
- Faculty of Graduate Studies and Research Thesis Only Scholarship - 2024 Winter, University of Regina, Canada. (\$675)
- URGSA Travel Awards - 2023 Fall, University of Regina, Canada. (\$750)
- Saskatchewan Innovation and Excellence Graduate Scholarship - 2023 Fall, University of Regina, Canada. (\$3000)
- Faculty of Graduate Studies and Research Thesis Only Scholarship - 2023 Fall, University of Regina, Canada. (\$3222)
- MITACS Accelerate, Dynamic Network Management and Performance Optimization for Smart Talk Beacon's security architecture – 2021 Fall, University of Regina, Canada (\$15,000)
- FGSR Women in STEM Scholarship - 2021 Spring/Summer, University of Regina, Canada. (\$5000)
- FGSR Women in STEM Entrance Scholarship - 2021 Fall, University of Regina, Canada. (\$5000)
- Travel grant, International Summer School Program at Wroclaw University of Science & Technology, Wroclaw, Poland - 2020, Winter, Parul University (INR 3,75,000)
- Travel grant, International Summer School Program at Carleton University, Canada - 2019, Winter, Parul University (INR 4,25,000)
- Best Faculty Award, Parul University - 2019 (INR 10,000)

RESEARCH/PROJECT

Individual Project/ Research

1. Dynamic Network Management and Performance Optimization for Smart Talk Beacon's security architecture

Research Area	Cybersecurity, Internet of Things (IoT) network, attack detection
Tools	Python (scripting), Zeek (network analysis), Wireshark (packet inspection)
Duration	4 Months
Organization	Smart Talk Beacon, Canada
Contributions	<ul style="list-style-type: none">• Developed a dynamic cybersecurity network management system to optimize Smart Talk Beacon's performance.• Implemented advanced cybersecurity measures for IoT network, focusing on attack detection.• Detected malicious network traffic, demonstrating the system's practical impact and efficacy in a live IoT environment.

2. Multilevel Queue Model for Indian Region Broadcast Network (IRBN) over satellite.

Research Area	Satellite communication, Broadcasting, Queue scheduling,
Tools	Java, Wireshark (traffic analysis), SQL (database management)
Duration	9 Months
Organization	Indian Space Research Organization (ISRO), India
Contributions	<ul style="list-style-type: none">Developed a system for broadcasting data over satellite networks to support reliable communication in remote areas.Implemented a multilevel queue model to efficiently manage scheduling and data transmissions, improving broadcast consistency by 40%.Successfully broadcasted educational content to geographically challenging regions in India where cellular networks are unavailable, earning recognition from ISRO for advancing educational access.

3. Enterprise Resource Management System

Project Area	Enterprise Resource Planning (ERP), Automation
Tools	C# (software development), SQL (database integration)
Duration	10 Months
Organization	ScubeTech Solution, India
Contributions	<ul style="list-style-type: none">Developed comprehensive, user-friendly ERP software, integrating key organizational functions including inventory, purchasing, finance, and employee management, leading to a 25% increase in operational efficiency.Ensured seamless project completion, meeting all functional requirements and receiving client recognition for delivering a robust ERP solution that optimized their enterprise operations.

SUPERVISORY EXPERIENCE

M. Eng Thesis

1. Kishan Patel, University of Regina, Canada Project: The Two-Layer Defense Mechanism in IoT Network	2024, Mentor
2. Jignasha Patel, Parul University, India Thesis: Crop Yield Prediction.	2021, Co-supervisor
3. Rathod Aarti, Parul University, India Thesis: Social Energy Routing for Mobile Social in Delay Tolerant Networks	2020, Co-supervisor
4. Anupama Kumari, Parul University, India Thesis: Computation and Privacy Preserving scheme using Homomorphic Elliptic Curve Cryptography	2019, Co-supervisor

B. Eng Project

1. Vrunda Patel, Aum Thakkar, Kush Pandya, Aayush Patel, Parul University, India
Textbook GPT: Revolutionizing Learning Through Interactive Chatbot Integration

2024, **Mentor**
2. Sahu Srihari, Kori Devang, Sajjan Joseph, Mistry Daxesh, Parul University, India
Quixify: An AI-Driven Platform for Optimized Household Services Delivery

2024, **Mentor**

3. Vrunda Fadadu, Princy Bhuva, Jainny Patni, Yash Ranpariya, Parul University, India, 2024, **Mentor**
Smart Crop-Field Monitoring and Automation Irrigation System
4. Sonia Mirani, Pavan Patel, Hardika Jadeja, Sandeep Sharma, Parul University, India, 2019, **Principal Supervisor**
Forestalling of Imprudent Drivers
5. Gadhavi Jay, Chauhan Rahul, Matwa Fazal, Parul University, India, 2018, **Principal Supervisor**
NGO Face
6. Dhruv Patel, Preyesh Patel, Vicky Patel, Naeem Tai, Parul University, India, 2018, **Principal Supervisor**
Neoteric Home
7. Megha Singh, Shreya Gupta, Shruti Pamnoor, Monika Yadav, Parul University, India, 2018, **Principal Supervisor**
Cars with Automatic Braking and Driver Awakening System
8. Patel Anis, Shah Prakshali, Shah Krishna, Parmar Sanjay, Parul University, India, 2017, **Principal Supervisor**
Smart Irrigation System
9. Parth Pandya, Banti Parsaniya, Manish Motiyani, Deepali Shah, Parul University, India, 2017, **Principal Supervisor**
Quick Shopping and Food Ordering
10. Jahnvi Bhavsar, Yash Shah, Chandni Balsara, Nimit Patel, Parul University, India, 2017, **Principal Supervisor**
Coin Bank- A cryptocurrency
11. Dhorajiya Jeet, Dobariya Deep, Parul University, India, 2016, **Principal Supervisor**
Indoor Navigation
12. Patel Mitra, Ahmedi Kashif, PIET, India, 2014, **Principal Supervisor**
Farmer's Helpdesk
13. Pathan Tashfiya, Vaja Bhavika, PIET, India, 2014, **Principal Supervisor**
Market Analyzer with Lead Management System

APPRECIATION

- **Coordinator, ERASMUS+ Teaching Staff Mobility:** Recognized for coordinating the ERASMUS+ program, facilitating international teaching exchanges for foreign professors under the International Relations Cell of Parul University.
- **Program Coordinator, International Summer School Program:** Organized and led the 2019 International Summer School Program at Carleton University, Canada, fostering global academic exchange.
- **Internship Program Coordinator, Ghent University:** Designated as Program Coordinator for the 2019 Internship Program, hosting students from Ghent University, Belgium, through Parul University's International Relations Cell.
- **Coordinator, International Summer School Program:** Led the 2020 International Summer School Program at Wroclaw University of Science & Technology, Poland, enhancing cross-cultural learning and collaboration.
- **Student Alumni Coordinator:** Served as Student Alumni Coordinator at Parul University from 2018 to 2021, arranging multiple alumni talks to bridge academia and industry insights.
- **Coordinator, Entrepreneurship Development Cell:** Coordinated the Entrepreneurship Development Cell for Computer Science and Engineering from 2019 to 2021 at Parul University, supporting entrepreneurial initiatives and innovation among students.

PROFESSIONAL ACTIVITIES

- Reviewer, IEEE (Internet of Things, Access), Elsevier(Internet of Things, automatica), and Springer (Cloud Computing) journals
- Core Committee Member, Parul University International Conference on Engineering & Technology (PiCET), 2020.
- Technical Committee Member, Parul University International Conference on Engineering & Technology (PiCET), 2019.
- Hackathon Coordinator, GitHub Hackathon, Parul University, India, 2019.
- Technical Event Coordinator, Appifest, Parul University, India, 2019.

- Mentor, Vadodara Hackathons and Startup Events, Student Startup and Innovation Policy (SSIP) & Parul University, India, 2019.
- Hackathon Judge, Faculty of Science, Parul University, India, 2018.

PROFESSIONAL MEMBERSHIPS

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| • Engineer in Trainee (EIT), Saskatchewan | 2024-Present |
| • Women in Cybersecurity | 2024-Present |
| • IEEE Graduate Student Member | 2023-Present |
| • IEEE Women in Engineering | 2023-Present |
| • IEEE Young Professionals | 2023-Present |
| • IEEE Membership | 2022-Present |
| • IEEE Communications Society Membership | 2024-Present |
| • Member, Computer Society of India | 2017- Present |
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ADMINISTRATIVE ACTIVITIES

Committee Members (Parul University, India)

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| • Board of Studies for Computer Science & Engineering | 2020-2021 |
| • National Board of Accreditation for Computer Science & Engineering | 2017-2021 |
| • Curriculum Committee | 2017-2021 |
| • Awards Committee | 2012-2014, 2017-2021 |
| • International Relations Committee | 2019-2021 |
| • Exam and Assessment Committee | 2017-2021 |
| • Women Development Committee | 2012-2014, 2019-2021 |
| • Cultural Programs Committee | 2012-2014 |
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VOLUNTEER ACTIVITIES

IEEE Canadian Conference of Electrical and Computer Engineering (University of Regina - Fall 2023)

- Assisted as a Technical Session Helper, responsible for facilitating smooth remote presentations. This involved signing in to Zoom, projecting presentations onto the screen, and handling the transition of host responsibilities during sessions to ensure a seamless conference experience.

International Peer Advisor (University of Regina – Summer 2022 to Summer 2023)

- Organized weekly sessions for students facing challenges in computer science courses, English proficiency, or difficulties related to university courses.
- Served as a volunteer in international orientation of University of Regina Fall 2022 and international nights of university of Regina Summer 2023

Muslim Aid of Saskatchewan

- Prepared and distributed food for the homeless and those in need in Regina, supporting the local community through the initiatives of Muslim Aid of Saskatchewan.

Anchor in Parul University International Conference on Engineering and Technology

- Served as an Anchor in the Parul University International Conference on Engineering and Technology for the years 2014, 2015, and 2018.

Mental Health Advocate and Motivational Speaker

- Volunteered encouragement and speaker on mental health awareness, conducting sessions to provide support and encouragement, and promoting mental wellness within the Parul university community from 2012 to 2014.