# Md. Rakibul Hassan

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## ACADEMIC SUMMARY

B.Sc. Computer Science graduate from BRAC University with a CGPA of 3.94/4.00, focused on AI-driven cybersecurity, reinforcement learning, and trustworthy adaptive security systems. Developed NASimEmu+, an IDS-aware dynamic network penetration-testing framework using deep hierarchical RL for robust policy learning in defended, noisy, and large-scale network environments. Interested in intelligent threat detection, adversarially robust cyber defense, and secure next-generation network systems.

## RESEARCH INTERESTS

AI Security, Automation of Security Systems, and Reinforcement Learning.

## ACADEMIC BACKGROUND

- **BRAC University**, Dhaka, Bangladesh — Sept 2022 – Jan 2026
  **B.Sc. in Computer Science (CGPA: 3.94/4.00)**
  *Relevant Coursework:* Algorithms, Computer Networks, Cryptography, AI, Operating Systems

## RESEARCH EXPERIENCE

- **Undergraduate Thesis (Defended)**, BRAC University — June 2025 – October 2025
  **Automated Network Penetration Testing Framework Using Reinforcement Learning**
  Supervisor: Dr. Muhammad Iqbal Hossain & Dr. Swakkhar Shatabda
  - Led the development of NASimEmu-enhanced, extending the NASimEmu simulator for more realistic and configurable penetration-testing environments.
  - Implemented dynamic v2 scenario generation with per-episode stochastic sampling, including variable subnet sizes and randomized host/service/process configurations.
  - Added host-state variability and controlled stochastic noise to reduce overfitting to static networks and improve policy robustness.
  - Refined the environment lifecycle and scenario-loading pipeline so each episode is regenerated consistently while preserving stable step-level simulation behavior.
  - Built reproducible experiment workflows for training, tracing, debugging, and evaluating agents across multiple scenario types in the NASimEmu-enhanced stack.
  - Developed comparison and analysis tooling to assess agent performance across static vs. dynamic network conditions.

## TEACHING & MENTORING

- **Undergraduate Teaching Assistant**, Discrete Mathematics, BRAC University — Feb 2025 – May 2025
  Supervisor: Mr. Sakib Anwar Rieyan
  - Mentored **80+** students, conducted problem-solving sessions.
  - Graded quizzes/exams covering **25%** of course grade.
  - Prepared quiz solutions and held office hours for student support.

## TECHNICAL SKILLS

- **Programming:** Python, JavaScript, R.

- **Machine Learning:** Scikit-learn, PyTorch (basic), Reinforcement Learning concepts
- **Network/Security Tools:** Wireshark, Kali, NS3, Packet Tracer
- **Web/Databases:** Flask, Laravel, React, MySQL, SQLite
- **Other:** Algorithms, Data Structures, Assembly (EMU8086), Cryptography, OpenGL

## PUBLICATIONS & PREPRINTS

- **M. R. Hassan**, M. Islam, M. A. Alam, M. I. Hossain, and S. Shatabda. "DYNAS: A Dynamic Network Penetration Testing Framework Using Deep Hierarchical Reinforcement Learning." *20th International Conference on Network and System Security (NSS 2026)*, Hangzhou, China, 30 October–1 November 2026. ***CORE Rank B. (PRESENTED; proceedings forthcoming.)*** arXiv:2610.40214. doi:10.48550/arXiv.2610.40214
  - Proposed an IDS-aware dynamic penetration testing framework using hierarchical reinforcement learning (Pen-DHRL), achieving approximately 64% and 24% higher reward per step on Bridge and Dynamic scenarios, and approximately 26% and 30% more captured hosts on VarA and VarB, compared with the next-best baseline.
- **M. R. Hassan** and M. I. Hossain. "BanglaVeilGuard: Cross-Script Safety Benchmarking and Lightweight Guardrails for Bangla Large Language Models." *4th International Conference on Computing Advancements (ICCA 2026)*, American International University-Bangladesh, Dhaka, 15–16 October 2026. ***(PRESENTED; proceedings forthcoming.)*** arXiv:2608.21880. doi:10.48550/arXiv.2608.21880
  - Developed a Bangla-focused benchmark for evaluating LLM safety across Bangla, Romanized Bangla, and code-mixed prompts, and proposed lightweight guardrails to detect and reduce unsafe outputs in low-resource Bangla LLM settings.

## SELECTED PROJECTS

- **Experimental Analysis of DAgger** — Conducted comparative experiments and ablation studies of Dataset Aggregation (DAgger), Behavior Cloning (BC), and SMILe on handwritten-word recognition and CartPole-v1 control. Evaluated aggregation rounds, expert-query budgets, data retention, expert mixing, policy architectures, and noisy or incomplete observations. Improved OCR accuracy from 76.16% to 79.45% and achieved a 92% CartPole success rate, compared with 47% for BC. (Python, Imitation Learning, Reinforcement Learning)
- **Understanding Privacy Risks and Information-Sharing Practices of Urdu-Speaking Bihari Communities in Bangladesh on Social Media** — Proposed a qualitative HCI study examining how linguistic stigma, camp life, contested citizenship, and historical marginalization shape social media privacy practices and digital identity management among Urdu-speaking Bihari communities. Focused on information-sharing behaviors, privacy concerns, and culturally grounded digital safety needs. (Human-Computer Interaction, Usable Privacy, Social Computing, Qualitative Research Proposal)
- **One Code, Many Voices: How Pretext Shapes OTP Disclosure in Bangladesh** - Investigating how different scam pretexts influence victim compliance through a survey and interview study, comparing event-based and fabricated scenarios, and identifying why users comply with or resist OTP disclosure attempts. (Usable Security & Privacy, Qualitative Research Proposal)
- **CipherScope** — Developed a cryptography learning workbench implementing classical, symmetric, and public-key algorithms, including AES, DES, RSA, and ECC, with brute-force and factorization attack demonstrations, frequency analysis, and performance comparisons. (Python, HTML, CSS, JavaScript)
- **Share-Notes** — Developed a full-stack academic note-sharing platform with user, course, note, search, payment, and messaging modules. (Python, Flask, React, MySQL)
- **PhD-Application-System** — Developed a Laravel-based academic application management platform with database-backed records and web-based filtering workflows. (PHP, Laravel, SQLite)
- **Hire-Wizard** — Built a job portal supporting recruiter and job-seeker roles, job postings, applications, profiles, skill records, and JWT-based authentication. (Node.js, Express.js, React, MySQL)

- **Prediction of Obesity Levels** — Developed a machine learning classification model to predict obesity categories from eating habits, physical conditions, and lifestyle features. (Python, scikit-learn)
- **Space-Station-Siege** — Developed a 3D computer graphics game featuring player movement, shooting mechanics, and real-time game logic. (Python, OpenGL)

## AWARDS & SCHOLARSHIPS

- **Merit Scholarship** — Awarded **9 consecutive semesters** (BRAC University)
- **Dean's & VC's List** — Qualified with GPA $\geq$ **3.7**

## REFERENCES

**Dr. Swakkhar Shatabda**
Professor, Department of Computer Science and Engineering, BRAC University
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**Dr. Muhammad Iqbal Hossain**
Associate Professor, Department of Computer Science and Engineering, BRAC University
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