

EMAD

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PROFESSIONAL SUMMARY

Final-year Computer Science and Engineering student (CGPA 4.00/4.00) with first-author research in AIoT, computer vision and post-quantum IoT security. Experienced in developing end-to-end systems spanning embedded hardware, machine learning, software applications and secure network infrastructure.

EDUCATION

American International University-Bangladesh (AIUB)

B.Sc. in Computer Science & Engineering

Expected May 2027

CGPA: 4.00 / 4.00

- Dean's List / Honorable Mention, three times; merit-based academic scholarship awarded on CGPA
- **Relevant coursework (all A+):** Artificial Intelligence and Expert Systems, Introduction to Data Science, Algorithms, Data Structures, Computational Statistics and Probability, Computer Networks, Network Security, Microprocessor and Embedded Systems, Advanced Database Management Systems, Operating Systems
- **In progress:** Computer Vision and Pattern Recognition, Data Warehousing and Data Mining; undergraduate thesis in AI/ML

S.F.X. GreenHerald International School

A-Levels: Physics (A*), Chemistry (A), Mathematics (A)

2023

London Grace International School

O-Levels: Physics (A*), Chemistry (A), Biology (A*), Mathematics (A*), Additional Mathematics (A*), English (A*)

2021

CERTIFICATIONS

IT Essentials

Cisco Networking Academy

Nov 2023

RESEARCH AND PUBLICATIONS

SmartAir: AIoT-Based Indoor Air Quality and Occupancy-Aware Ventilation System for Good Health and Well-Being

2026 IEEE 2nd Int. Conf. on Quantum Photonics, Artificial Intelligence & Networking (QPAIN) · **Published**, first author

- Designed and built an ESP32-based sensor node (temperature, humidity, light, eCO₂/TVOC) that controls a ventilation fan through a relay, based on air quality and room occupancy.
- Trained two compact decision-tree models and deployed them on the ESP32 with TinyML, so inference runs on the device without cloud dependency; the occupancy model reached 97.8–99.3% accuracy on two public test sets.
- Built the real-time monitoring pipeline (MQTT, InfluxDB, Grafana) and validated the full system in a 60-minute test in a residential kitchen.
- Kept the bill of materials to about Tk. 3,015 per node, making the design affordable to replicate across rooms.
- [IEEE Xplore: ieeexplore.ieee.org/abstract/document/11545920](https://ieeexplore.ieee.org/abstract/document/11545920)

Class-Balanced Margin Classifiers for Long-Tail Fine-Grained Insect Pest Recognition on IP102

29th Int. Conf. on Computer and Information Technology (ICCIT) · **Under review**, first author

- Proposed CB-Margin, a cosine-similarity classifier head whose per-class margins scale with the inverse effective number of samples, to handle the long-tailed IP102 dataset (75,222 images, 102 pest species).
- Fine-tuned EVA-02 Base and Large vision transformers at 448 px and combined them with multi-scale test-time augmentation.
- Reported new state-of-the-art results on the standard IP102 split: 79.94% top-1 accuracy and 73.16% macro-F1, with a 6.82-point tail-class F1 gain over the linear baseline.

Measuring the NIST Migration Cost: Standards-Conformant Post-Quantum Hybrid Encryption for IoT Telemetry

29th Int. Conf. on Computer and Information Technology (ICCIT) · **Under review**, first author

- Implemented a hybrid scheme pairing ML-KEM-512 (FIPS 203) for key establishment with Ascon-AEAD128 (SP 800-232) for payload encryption, deployed end-to-end over MQTT through an untrusted broker on an ESP32 (Xtensa) and an ESP32-C3 (RISC-V).
- Measured cost with hardware cycle counters: key establishment completes in 232 ms using 13.2 kB of RAM (at most 3.3% of on-chip SRAM), showing the hardware can absorb the migration without replacement; standardisation cuts Ascon's per-byte cost by 2.5% on the ESP32 and 8.4% on the ESP32-C3.

PROJECTS

FoodRush: Food Delivery Web Application

HTML, CSS, JavaScript, PHP, MySQL, Apache (XAMPP)

Team of 4

[GitHub](#)

- Built a FoodPanda-style food delivery web application as part of a four-person team.
- Designed the database and its connections; implemented authentication, password management, the customer side and the ordering flow.
- Implemented instant status updates, so each action in the interface updates the database immediately.
- Led integration of all team members' modules into one project, and handled testing.

Self-Hosted Home Network and Server

OPNsense, IPFire, Debian, Docker Compose, Tailscale

Personal project

- Built my home network from the ground up, starting with my own OPNsense and IPFire routers, VPN tunnels and firewall rules.
- Run a Debian server 24/7 with containerised services in Docker Compose, including AdGuard Home for network-wide DNS filtering, Uptime Kuma for service monitoring, and an hourly Ookla speed test to track internet performance.
- Use Tailscale for secure remote access to the home network from anywhere.

DESCO Prepaid Meter Tracker

Python, SQLite

Personal project

Private repository

- Wrote a Python script that regularly fetches data from DESCO's web dashboard, stores daily electricity usage and that day's per-unit rate in an SQLite database, and sends Telegram alerts when the prepaid meter balance runs low.

3D-Printed WLED Lamp and 16×16 LED Matrix

SolidWorks, 3D printing, ESP8266, ESP32, WLED

Personal project

- Built a cylindrical lamp with a 16-LED ARGB ring on an ESP8266, and a 16×16 ARGB matrix (256 LEDs) on an ESP32; both run WLED and are controlled wirelessly over Wi-Fi.
- Configured WLED current limits and powered the LEDs directly from USB-C supplies instead of through the microcontroller's power pins, since they draw far more current than the board can supply.
- Designed all enclosures in SolidWorks, including the matrix's multi-part frame, body, diffuser and grid, and printed them on my 3D printer, swapping filament mid-print to get multi-colour parts on a single-colour printer.

TECHNICAL SKILLS

Programming Languages

Python, Java, C++, C#, PHP, JavaScript, C, Assembly, R, MATLAB

Databases

MySQL, PL/SQL, SQLite

Web

HTML5, CSS3

ML / Deep Learning

PyTorch, TensorFlow, scikit-learn, timm

Hardware and Embedded

ESP32, ESP8266, ESP-IDF, Arduino, Raspberry Pi, sensor interfacing

Systems and Networking

Linux (Debian), Docker, Docker Compose, OPNsense, IPFire, WireGuard, Tailscale, Nginx Proxy Manager, AdGuard Home, Wireshark, Nmap, VirtualBox

Development Tools

Git, Arduino IDE, DBeaver, Overleaf, $\text{\LaTeX}$

Prototyping

SolidWorks (basic), 3D printing