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# Md Shakil Tanvir

**Passport:** B00176773 | **Date of birth:** 21/05/1997 | **Place of birth:** Dinajpur, Bangladesh |

**Nationality:** Bangladeshi | **Email address:** shakiltanvir99@gmail.com | **Website:** www.shakiltanvir.com | **LinkedIn:** https://www.linkedin.com/in/shakil-tanvir-4500731ba/ |

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## ABOUT ME

**Embedded Systems Engineer** and **Technical Lead** with 4+ years in power and energy systems, motion control, industrial communication protocols, and measurement. Led AMI smart metering development and firmware for a UN-deployed EOD robot. Founder of Creative Factory. Lead author of three conference papers (two IEEE); Best Technical Paper, ICCIT 2024.

## EDUCATION AND TRAINING

01/01/2012 – 17/05/2014 Nilphamari, Bangladesh

### SECONDARY SCHOOL CERTIFICATE Syedpur Govt. Technical School & College, Nilphamari

Achieved Golden A+ (GPA 5.00/5.00) in the SSC examination from SGTC studying under the Science group with a strong foundation in science.

01/06/2014 – 18/08/2016 Nilphamari, Bangladesh

### HIGHER SECONDARY CERTIFICATE Saidpur Govt. Technical College, Nilpamari

Achieved A+ (GPA 5.00/5.00) in the HSC examination from Saidpur Government Technical College, continuing the Science group with advanced studies in **Mathematics** and **Physics** that built a solid base for **engineering**

01/04/2017 – 03/01/2022 Dhaka, Bangladesh

### BACHELOR OF SCIENCE Ahsanullah University of Science & Technology

- Four-year full-time programme. CGPA 3.152 / 4.00 (German equivalent 2.4). Taught in English (Medium of Instruction certificate held).
- Coursework: power systems, electrical machines, power electronics, control systems, electrical service design, microcontrollers, communication engineering.
- Thesis "A clustering-based BESS deployment approach for fast post-fault voltage recovery in an industrial microgrid with high renewable energy penetration." Short-circuit-power clustering to site and rate battery energy storage for voltage recovery.

**Level in EQF** EQF level 6

## WORK EXPERIENCE

**TRAINEE ENGINEER – ADN TELECOM LTD** – 06/11/2022 – 13/03/2023 – DHAKA, BANGLADESH

- Developed IoT-based monitoring solutions for data centers using MQTT, TCP/IP, and SNMP.
- Supported monitoring, telemetry, and device integration in network operations environments.

**EMBEDDED SOFTWARE ENGINEER – THT SPACE ELECTRICAL COMPANY LTD** – 01/04/2023 – 07/12/2023 – NILPHAMARI, BANGLADESH

- Developed firmware for mass-produced thermal printers supporting USB, Bluetooth, BLE, and Wi-Fi connectivity under the Grozzi brand.
- Designed and optimized printer communication and control layers supporting ESC/POS and CPCL protocols.

- Maintained and improved bulk production firmware through bug fixing, feature enhancement, and validation support.

**EMBEDDED SYSTEM ENGINEER – SPECTRUM ENGINEERING CONSORTIUM LTD** – 17/12/2023 – 30/09/2024 – DHAKA, BANGLADESH

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• Designed and developed firmware and system architecture for a military-grade Remotely Operated Vehicle (ROV) for Explosive Ordnance Disposal (EOD).
• Architected hardware, firmware, and communication subsystems including RS485 and TCP/IP-based multi-node operation.
• Developed firmware and software for diagnostic and visualization tools for debugging, telemetry monitoring, and real-time control.
• Delivered 6 deployed units used in **United Nations operations**.

**LEAD EMBEDDED SYSTEM ENGINEER / TECHNICAL LEAD, ADVANCED METERING INFRASTRUCTURE – CYBERNETICS HI TECH SOLUTIONS LTD** – 01/10/2024 – Current – DHAKA, BANGLADESH

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• Leading the embedded systems engineering division and technical strategy across smart energy, robotics, industrial IoT, and embedded product development.
• Founded and scaled the embedded systems team; building internal capability in firmware, communication protocols, and system integration.
• System architect for Advanced Metering Infrastructure (AMI) solutions covering smart meters, Head-End System (HES), and Meter Data Management (MDM).
• Architecting multi-protocol systems: DLMS/COSEM, STS, Modbus, CAN, TCP/IP.
• Driving product strategy, engineering execution, team management, and deployment planning for utility-scale and industrial systems.

## SKILLS

Embedded C | SQL | ADC

**Energy systems and metering**

IEC 62055 Prepayment standard | IEC 62056 | automatic meter reading | Meter Data Management System | Tarrif Management

**Embedded systems and firmware**

operating systems | Serial Communication protocols | GSM, GPS, Bluetooth & BLE , Proximity Sensors, RTC, EEPROM, Shift registers, MOSFET | RTOS (FreeRTOS, Zephyr) or Bare-Metal Architecture | Computer networks & IoT (Cryptography, POSIX/unix sockets, MQTT) | Programming: C, C++, C#, Python | GIT version control, Linux Command | DMA | Firmware, Software Development, Testing and Validation

**Programming and Tools**

Operation Systems Windows, Linux | Field Oriented Control | Good knowledge of COMSOL Multiphysics | STM32CubeIDE | PID control | Matlab, Simulink, Targetlink, PID | VS/VS Code

**Power electronics and power systems**

MPPT controller design | DC-DC Converter

**Communication protocols**

Communication protocols: I2C, SPI, UART, USB, CAN, GPIO,RS232, RS485, Ethernet, Modbus. | MODBUS RTU/ TCP | DLMS/COSEM | CAN bus / CANopenSPI / I2C / UART

**Motion Control**

Tuning PID Controller Using Genethic Algorithm | PMSM motor control | Kinematics & Dynamics Modeling | Field Oriented Control (FOC) | Trapezoidal & Sinusoidal Commutation | Sensorless Estimation

## LANGUAGE SKILLS

Other language(s):

| | UNDERSTANDING | | SPEAKING | | WRITING |
|---|---|---|---|---|---|
| | Listening | Reading | Spoken production | Spoken interaction | |
| **ENGLISH** | B2 | B2 | B2 | B2 | B2 |

*Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user*

## PUBLICATIONS

2024

### Optimizing Master-Slave Broadcast Communication in Multi-Node Networks Using RS485 Standard

A comprehensive study on implementing master-slave broadcast communication over the RS-485 differential signalling standard, focusing on the design and timing analysis of a system using multiple STM32 microcontrollers in a daisy-chain configuration. The master broadcasts commands to slave nodes, which return feedback to the master and other slaves, using DMA for efficient data transfer, CRC for error detection, and precise timing control. A key feature is the feedback mechanism where all nodes execute commands but only the addressed node provides feedback. Validated on a 6-DOF ROV with differential drive. Awarded Best Technical Paper and Best Paper Presenter at ICCIT 2024.

Md S. Tanvir et al., "Optimizing Master-Slave Broadcast Communication in Multi-Node Network Using RS485 Standard," 2024 27th Int. Conf. on Computer and Information Technology (ICCIT), Cox's Bazar, Bangladesh, 2024.

**Authors**: Md Shakil Tanvir, Fiaz Ahmed, Md Monirul Islam, Mainul Islam, Mahamudul Hasan, Raihan Ur Rashid | **Journal Name**: 2024 27th Int. Conf. on Computer and Information Technology (ICCIT), Cox's Bazar, Bangladesh | **Volume, Issue and Pages**: pp. 1–6 | **Publisher**: IEEE

**Link** https://www.researchgate.net/publication/392564490

2023

### ESP32-based IoT Architecture for Multi-Data Center Monitoring with MQTT Protocol and Node-RED Analytics

Presents an ESP32-based IoT architecture for real-time monitoring of multiple data centers, using the MQTT protocol for lightweight messaging and Node-RED for analytics and dashboard visualization. Targets environmental/infrastructure monitoring (e.g., temperature, humidity) across distributed data center sites with a scalable, modular pipeline.

S. Tanvir et al., "ESP32-based IoT Architecture for Multi-Data Center Monitoring with MQTT Protocol and Node-RED Analytics," BIM 2023.

**Authors**: Shakil Tanvir, Reduan Ahmed Tanim, Md. Soyed Ahmed | **Journal Name**: BIM 2023 | **Volume, Issue and Pages**: pp. 1–6 | **Publisher**: Taylor and Francis

**Link** https://www.researchgate.net/publication/395312634

2021

### Extremely Ultra Flattened Negative Dispersion SPAH-PCF for the Employing of RDC

Proposes and numerically investigates a new square pattern air holes photonic crystal fiber (SPAH-PCF) using silica as the base material. The design achieves extremely ultra-flattened negative dispersion (EUFND) across the 2nd and 3rd optical windows, covering all bands from O to U in the infrared region. Analyzed via the finite element method (FEM) with a perfectly matched layer (PML) boundary, the fiber achieves dispersion of approximately –(85.1±0.5) ps·nm$^{-1}$·km$^{-1}$ (Y) and –(96±1.3) ps·nm$^{-1}$·km$^{-1}$ (X) over 1.2–1.7 μm, making it well suited for residual dispersion compensation (RDC).

S. Tanvir, R. Amin, S. Mahbub, I. Jahangir, N. J. Alin, S. I. Nabil, and R. R. Mahmud, "Extremely Ultra Flattened Negative Dispersion SPAH-PCF for the Employing of RDC," in 2021 International Conference on Science & Contemporary Technologies (ICSCT)

**Authors**: S. Tanvir, R. Amin, S. Mahbub, I. Jahangir, N. J. Alin, S. I. Nabil, R. R. Mahmud | **Journal Name**: 2021 International Conference on Science & Contemporary Technologies (ICSCT-2021) | **Volume, Issue and Pages**: pp. 1–6 | **Publisher**: IEEE

**Link** https://doi.org/10.1109/ICSCT53883.2021.9642573

2026

### Techno-economic assessment of residential rooftop solar under Bangladesh's 2025–2026 net metering regime: architecture choice, the battery paradox and settlement design

Hourly 25-year model coupling a component-level pvlib generation chain to a monthly billing and settlement ledger encoding the Net Metering Guideline 2025. The ledger reproduces all four of the regulator's published worked billing examples. Derives analytically that storage cannot raise prosumer bill savings under monthly kWh netting, and the surplus price at which it would. Decomposes the value of each policy instrument, quantifies exposure to the post-2030 export regime, and reports Monte Carlo analysis over 10,000 draws.

**Authors**: Md Shakil Tanvir*, Md Monirul Islam, Mainul Islam, Mahamudul Hasan | **Journal Name**: Manuscript in preparation | **Publisher**: Manustript in preparation

2026

### Supplying solar charging stations for electric three-wheelers in Bangladesh: grid, off-grid and hybrid options compared at equal reliability

Reliability-matched comparison of grid, off-grid and hybrid supply for a five-port 48 V LFP charging station, simulated hourly over 20 years of NASA POWER weather with LFP capacity fade, grid outages and exhaustive sizing search at a 2% unserved-energy limit. Links the supply choice to a blended-finance viability-gap analysis. PV model cross-validated against PVGIS 5.3.

**Authors**: Md Shakil Tanvir*, Md Monirul Islam, Mainul Islam, Mahamudul Hasan | **Journal Name**: Manuscript in preparation

## RECOMMENDATIONS

**Rashed Mujib Noman** Managing Director, Cybernetics Hi Tech Ltd

Direct supervisor, where I lead embedded R&D across Advanced Metering Infrastructure, energy systems, robotics and IoT. Can speak to my technical leadership, delivery of complex projects, and the design of smart meter firmware and metering system architecture.

**Email** noman@cyberneticsbd.com | **Phone** (+880) 1730496861

**Russel Reza Mahmud, PhD** Professor, EEE, Ahsanullah University of Science and Technology

Supervised my undergraduate research on photonic crystal fibre design and co-authored the resulting SPAH-PCF / RDC publication (ICSCT 2021, IEEE). Taught me across core electronic engineering courses. Can speak to my academic ability, research rigour and technical foundation.

**Email** r.r.mahmud.eee@aust.edu | **Phone** (+880) 1734986129

**Michael Ebabutzkey** Technical Manager, EBabutzky GmbH, Germany

Client and technical counterpart on contract firmware development through Creative Factory: an STM32 industrial motor controller with Modbus RTU/TCP and closed-loop stepper control with encoder feedback. Can speak to my independent engineering delivery, requirements handling and professional communication with a European client.

**Email** info@ebabutzkey.de | **Phone** (+49) 1736835918

## HONOURS AND AWARDS

31/12/2024

### Best Technical Paper Award & Best Paper Presenter – 27th International Conference on Computer and Information Technology (ICCIT 2024), IEEE

Received the Best Technical Paper Award and Best Paper Presenter recognition at ICCIT 2024 for the paper "Optimizing Master-Slave Broadcast Communication in Multi-Node Network Using RS485 Standard," for its technical contribution and presentation quality.

## HOBBIES AND INTERESTS

### Embedded Insider — YouTube Channel (Creator)

Founder and creator of Embedded Insider, a YouTube channel producing tutorials and educational content on robotics, embedded systems, and firmware development. Covers hands-on topics like Embedded C with STM32,

microcontroller programming, and real-world IoT projects, aimed at helping students and aspiring engineers build practical skills.

**Link** https://www.youtube.com/@stech-ei

## CONFERENCES AND SEMINARS

20/12/2024 – 22/12/2024 Cox's Bazar, Bangladesh

### ICCIT 2024 — 27th International Conference on Computer and Information Technology

Presented the paper "Optimizing Master-Slave Broadcast Communication in Multi-Node Network Using RS485 Standard" at ICCIT 2024 (Cox's Bazar, Bangladesh, IEEE). Received the Best Technnical Paper Award and Best Paper Presenter recognition.

06/09/2023 – 08/09/2023 Daffodil International University, Ashulia, Dhaka

### BIM 2023

Presented the paper "ESP32-based IoT Architecture for Multi-Data Center Monitoring with MQTT Protocol and Node-RED Analytics," covering a scalable IoT system for real-time monitoring of distributed data centers using MQTT and Node-RED.