Siratul Islam

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Shahjalal University of Science and Technology, Sylhet - 3114, Sylhet, Bangladesh

Research Focus

I am passionate about advancing embedded systems and IoT technologies through Real-Time Operating Systems & Embedded Linux, RISC-V Architecture & Processor Design, Smart Grid Communication Protocols, and Power Electronics. My work centers on open-source hardware and software development, and I am actively seeking undergraduate research opportunities and collaborations in these fields while preparing for graduate studies.

Education

Shahjalal University of Science and Technology Sylhet, Bangladesh
Bachelor of Science (Hons) in Physics *Aug. 2023 – Aug 2027*

- Relevant Coursework: Basic & Digital Electronics, C Language, Electricity & Magnetism, Mathematical Methods in Physics, Computational Physics
- Academic Achievement: Bronze Medal, (International) University Physics Competition 2024

Research Experience

Shahjalal University of Science and Technology Sylhet, Bangladesh
Undergraduate Research Assistant - Department of Electrical and Electronic Engineering *Mar 2025 – Present*

- Developing smart relay control systems for government cost optimization in collaboration with EE faculty
- Research focuses on IoT-enabled power management systems using STM32 and ESP32 microcontrollers
- Implementing MQTT-based data acquisition systems for real-time monitoring and control
- Conducting radar-based occupancy detection research for automated energy optimization in government buildings
- Developing RFID-based attendance management systems for rural educational institutions in Bangladesh
- Technologies: STM32, ESP32, embedded C, MQTT, power electronics, smart relays, IoT protocols, RD-03D radar, RFID modules

Publications & Presentations

Radar-based Occupancy Detection and Automated Relay System for Energy Saving 2025
Ongoing Research - Government Office Buildings Energy Management *In Progress*

- Developing intelligent occupancy detection system using RD-03D mmWave radar sensor for automated lighting and HVAC control
- Implementing ESP32-based relay control with Google Sheets data logging for energy consumption analysis
- Research focuses on reducing energy waste in government buildings through presence-based automation
- Technologies: ESP32, RD-03D radar sensor, relay modules, Google Sheets API, ESP-IDF

RFID-based Attendance Management System for Rural Educational Institutions 2025
Ongoing Research - Educational Technology for Remote Communities in Bangladesh *In Progress*

- Developing low-cost RFID attendance system specifically designed for remote schools, villages, and universities in Bangladesh
- Creating offline-capable solution with synchronization features for areas with limited internet connectivity
- Research addresses educational infrastructure challenges in rural Bangladesh through accessible technology
- Technologies: RFID modules, ESP32, offline data storage, web-based dashboard, database synchronization

Air Evacuation Time for Holes of Variable Diameters in a Space Station Nov 2024
ResearchGate Publication – University Physics Competition 2024 (Team 750, Problem A) *Published*

- **Authors**: Siratul Islam, Ibrahim Hossain, Rimon Acharjee Sumon
- **Abstract**: A micrometeorite impact caused an air leak in a space station. Using Poiseuille's law and the Ideal Gas Law, we derived an equation to model air mass flow rate under the pressure difference and calculated evacuation time. For a 1 cm-diameter hole, pressure drop from 1 atm to 0.3 atm requires approximately 27,168 s (≈ 7.597 h).
- **Methodology**: Developed a mathematical model incorporating fluid flow and thermodynamic principles (Poiseuille's law and Ideal Gas Law), and visualized relationships between hole diameter and evacuation time through graphical analysis.
- **Recognition**: Awarded Bronze Medal for mathematical solution and presentation quality among international undergraduate physics teams.
- **Access**: Full-text available open access on ResearchGate.

Professional Experience

Hackules Inc. Remote

Software Engineer *Jun. 2024 – Jun. 2025*

- Led full-stack development for educational platforms including Teachers Today (Next.js + Express.js)
- Developed Opedemy learning platform with 200+ API integrations and optimized SSR for 50% faster load times
- Conducted technical interviews for engineering positions
- Technologies: SvelteKit, Next.js, Django, TypeScript, MongoDB, SMS/Email APIs

Software Engineer, Intern *Feb. 2024 – Jun. 2024*

- Built AI-powered marketing analytics tool with Facebook Graph API integration
- Developed Flutter CRM mobile application serving 1000+ active users
- Technologies: SvelteKit, Flutter, Facebook Graph API, LinkedIn API, Firebase

Copernicus Astronomical Memorial of SUST Sylhet, Bangladesh

IT Secretary *Nov. 2024 – Present*

- Built the new official website from ground up using modern technologies like NextJS + Typescript
- IT coordinator and Scientific Organizing Committee member of CAM-SUST Summer School on Astronomy 2025
- Organized in-person recruitment events and coordinated technical workshops

Assistant IT Secretary *Apr. 2024 – Oct. 2024*

- Managed and maintained the old Wordpress website, configuring packages for various functionalities
- Developed educational content and Python programming tutorials for 200+ students
- Handled content publishing on the website including blogs, and magazine

Open Source Contributions & Technical Leadership

Zephyr RTOS Project Remote

Official Contributor *Jun 2025 – Present*

- Official contributor to Zephyr RTOS with board support for WeAct STM32F446RET6 (PR #91886)
- Implemented device tree configurations, GPIO mappings, and peripheral initialization for ARM Cortex-M4
- Earned Linux Foundation Zephyr contributor badge, enabling global developer adoption
- Contribution impact: 1000+ developers can now use WeAct STM32F446RE with Zephyr RTOS

svelte-cloudinary Remote

Official Contributor *Apr 2024 – Present*

- Official contributor to Svelte Cloudinary library by fixing video player aspect ratio bug (PR #108/#109)
- Contribution impact: 1000+ developers can now use this library with one less bug

Selected Projects

Embedded Systems & IoT Projects

STM32 Zephyr RTOS Board Support | *C, STM32, Zephyr RTOS, Device Tree, ARM Cortex-M4* live url

- Official board support for WeAct STM32F446 in Zephyr RTOS, now part of upstream project
- Complete board bring-up: device tree, KConfig, C sources, pinmux, and documentation
- Official Linux Foundation contributor badge earned
- Hardware: STM32F446

STM32 BME280 HAL Driver | *C, STM32, HAL* source code

- Custom HAL driver implementation for Bosch BME280 environmental sensor
- Provides temperature, humidity, and pressure readings with I2C communication
- Hardware: STM32, BME280 sensor, I2C interface

ESP32-S3 Weather Station | *C++, ESP32-S3, MQTT, Raspberry Pi 5* source code

- Comprehensive weather monitoring system with multi-sensor environmental data collection
- Features OLED display, MQTT connectivity for real-time data streaming
- Measures temperature, humidity, pressure, light intensity, and magnetic field with compass heading
- Hardware: BME280, BH1750, QMC5883L, SSD1306 OLED, WiFi connectivity

ESP32-S3 Biometric Attendance System | *C++, ESP32-S3, BLE* source code

- Portable biometric attendance tracking solution using fingerprint recognition
- Features offline storage with SPIFFS, Google Sheets integration for data sync
- BLE control interface and RGB LED feedback for secure attendance management
- Hardware: AS608 Fingerprint sensor, NeoPixel LEDs, WiFi/BLE connectivity

ESP32 Radar Smart Switch | *C, ESP32, ESP-IDF, Google Sheets API* source code

- Smart presence-detection switch built with ESP-IDF and RD-03D 24GHz mmWave radar
- Detects human presence to automate appliances using relay control
- Synchronizes data with Google Sheets using API
- Hardware: RD-03D radar sensor, relay modules, ESP32 DevKit

ESP-IDF RD-03D Component | *C, ESP-IDF, UART, Component* live url

- ESP-IDF component for AI-Thinker RD-03D mmWave radar sensor
- Published on ESP Component Registry with comprehensive API for target detection and tracking
- Features intelligent retention filtering, position descriptions, and real-time coordinate tracking
- Hardware: AI-Thinker RD-03D radar, UART communication, ESP32 platform

Educational Technology & Web Platforms

CAM-SUST Official Website | *NextJS, TypeScript, API Integration* live url

- Built the full-stack website for CAM-SUST from ground up replacing the old Wordpress website
- Moved modern technologies and implemented SSR/static rendering, reducing load times by 80%
- Redesigned from scratch for a more appropriate space-themed look, attracting more users

Opedemy Learning Platform | *SvelteKit, TypeScript, API Integration* live url

- Led frontend development for educational platform with 200+ API integrations (auth, payments)
- Optimized SSR/static rendering, reducing load times by 50% and improving SEO performance
- Designed responsive UI with Tailwind CSS, ensuring seamless cross-device usability

Teachers Today Recruitment Platform | *Next.js, Express.js, MongoDB* live url

- Full-stack teacher recruitment platform with advanced filtering and matching algorithms
- Integrated MongoDB for CRUD operations, SMS and Email API for notifications and updates
- Role-based dashboards for tutors, students, and administrators

HIAR Research Collaboration Platform | *SvelteKit, TypeScript, API Integration* live url

- Led SvelteKit-based frontend for academic research platform
- Integrated 100+ API endpoints with real-time collaboration
- Reduced design debt by 30% using shadcn/ui components

Technical Skills

Embedded Systems Engineering:
Languages & Frameworks: Embedded C/C++, Rust, STM32 HAL, ESP-IDF, Embassy-rs, Embedded Linux
Microcontrollers & Processors: STM32 (H723VIT6, H523RET6, F446RET6), ESP32-S3, nRF52840, RISC-V
RTOS: Zephyr RTOS (official contributor), FreeRTOS, CMSIS-RTOS
Hardware Protocols: GPIO, I2C, SPI, UART, ADC, PWM, interrupt handling
Communication & IoT: MQTT, Wi-Fi, BLE, LoRa, IoT protocols, power electronics, smart relays
Development Tools: STM32CubeIDE, PlatformIO, ESP-IDF, KiCAD, OpenOCD, GDB, Device Tree
Full-Stack Web Development:
Languages & Frameworks: TypeScript, JavaScript, Python, C#, Dart, Kotlin
Frontend Technologies: SvelteKit, Next.js, Flutter, Tailwind CSS, shadcn/ui
Backend Technologies: .NET, Django, Express.js, SQL
Cloud & Databases: Google Cloud Platform, MongoDB, Firebase
APIs & Integrations: Google APIs (Maps, OAuth, Sheets), Facebook Graph API, LinkedIn API
Development Tools: Docker, Git, Linux, Vim, Bash

Certifications & Awards

Certifications: Harvard CS50x, HackerRank certifications in Angular, C#, JavaScript, Java, Python
Open Source Recognition: Linux Foundation Zephyr RTOS Contributor Badge
Academic Awards: Bronze Medal, University Physics Competition 2024
Pre-University Achievements: 1st place Inter Cantonment IT Fest, 1st NCPSC IT Fest, 3rd Notre Dame Science Fest

Teaching & Mentorship Experience

Student Organization Leadership: IT Secretary, Copernicus Astronomical Memorial (200+ members)
Technical Mentorship: Interviewed and mentored software engineering candidates at Hackules Inc.
Educational Content Creation: Developed Python programming tutorials for CAM-SUST
Workshop Organization: IT coordinator and Scientific Organizing Committee member of CAM-SUST Summer School on Astronomy 2025

Future Academic & Research Plans

Graduate Studies: Pursuing Master's/PhD in Embedded Systems Engineering, Computer Engineering, or Electrical Engineering with focus on Real-Time Operating Systems, RISC-V processor design, and embedded Linux for IoT applications
Research Interests: RISC-V architecture optimization for embedded systems, Real-Time OS kernel development, smart grid communication protocol implementation, power electronics integration in IoT devices, and open-source hardware/software ecosystem advancement
Career Objectives: Seeking research opportunities in embedded systems design, smart grid technologies, and RISC-V processor development while contributing to open-source RTOS projects and embedded Linux communities
Industry Focus: Targeting automotive embedded systems, medical device development, aerospace applications, smart grid infrastructure, industrial IoT systems, and renewable energy solutions

Language Proficiencies

Native Language: Bengali (Native speaker)
Academic & Professional: English (Fluent - Advanced academic and technical communication)
Basic Communication: Hindi/Urdu (Conversational level)

References

Dr. Md. Rasedujjaman Sylhet, Bangladesh
Associate Professor - Department of Electrical & Electronic Engineering *SUST*

- Current Research Supervisor and Co-author on smart relay control systems and RFID research projects
- Email: mrased-eee@sust.edu
- Phone: +8801714557885
- Office: Department of EEE, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh
- Research Areas: Nonlinear optics, Photonic materials, Quantum optics
- Relationship: Direct research supervisor, co-author, and faculty mentor (March 2025 - Present)

Dr. Md. Enamul Hoque Sylhet, Bangladesh
Associate Professor - Department of Physics *SUST*

- Academic supervisor familiar with physics coursework performance and academic development
- Email: mjonyh-phy@sust.edu, mjonyh@gmail.com
- Phone: +8801719277759
- Office: Department of Physics, Shahjalal University of Science and Technology, Sylhet-3114, Bangladesh
- Research Areas: Nonlinear Optics, Ph.D. in Nonlinear Optics from SUST
- Relationship: Physics faculty member, project mentor, and academic advisor

Additional References Available Upon Request
Professional and Academic References *Contact Information Available*

- Professional references from software engineering leadership positions at Hackules Inc.
- Faculty advisors from CAM-SUST student organization leadership and educational program coordination
- Additional physics faculty members familiar with academic performance and research interests
- Complete reference information including contact details and recommendation letters available during application processes