Syeda Kashaf Kulsoom

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IoT, Embedded Systems & Automation Engineer | Technical PM | EdTech Innovator

Electronics engineer with hands-on experience in embedded systems, IoT architectures, digital logic design, and sensor-based automation. I have built and deployed real-time monitoring and control systems using microcontrollers, LoRaWAN, and machine learning, emphasizing practical implementation and system-level optimization. My background includes strong skills in Verilog, RISC V design, hardware-software integration, and computer architecture, with additional expertise in robotics and automation, power electronics, and advanced embedded systems. I aim to pursue a PhD focused on advancing efficient embedded and IoT systems, leveraging multidisciplinary approaches in electrical and computer engineering. Seeking opportunities to contribute to advanced research and innovation in these domains.

TECHNOLOGICAL SKILLS

- **Programming:** C/C++, Python, Embedded C, Arduino IDE
- **Embedded Systems & IoT:** Arduino, ESP32, STM32, Raspberry Pi, Sensors & Actuators (MQ, BH1750, DHT22, MHZ19), LoRaWAN, UART/SPI/I2C, PCB/Circuit Designing
- **Digital Logic & HDL:** Verilog, ModelSim, Digital Logic Design (FSMs, counters, adders, flip-flops), RISC-V single-cycle core design
- **Simulation & Analysis Tools:** MATLAB, Multisim, LabVIEW
- **Networking & Automation:** IoT protocols, home automation systems, Environmental monitoring systems, Wireless connectivity modules (Bluetooth, Wi-Fi)

EDUCATION

Bachelor of Electronic Engineering – CGPA: 3.716
NED University of Engineering and Technology, Pakistan | Oct 2020 – Aug 2024
Relevant Coursework: Embedded Systems, Control Systems, Digital Signal Processing, Microprocessors, Robotics

PROFESSIONAL EXPERIENCE

Chief Technology Officer **August 2024 – Present**
UTech Digital Education | Karachi, Pakistan

- Conduct technical research to stay informed about the latest advancements and trends in educational technology.
- Provide technical training and support for staff and students.
- Oversee technical tasks, including managing the student portal and content management system (CMS) of UTech.

Student Researcher **April 2024 – September 2024**
Sindh Research Support Programme (HEC)

- Development of an environmental monitoring system utilizing gas, temperature, and humidity sensors.
- Integrated multiple sensors including MH-Z19 (CO2 sensor) and DHT22 (temperature and humidity sensor) with STM32 WL55JC1 board.
- Successfully conducted experimental testing and obtained sensor data at the output.

Microcontroller, Circuit Designing and IoT Instructor **June 2023 – Present**
UTech Digital Education | Karachi, Pakistan

- Conducting sessions for the students aged 7-17 in circuit designing, Arduino coding, and automation.
- Teaching advanced techniques, including Internet of Things (IoT) concepts.
- Developing and delivering engaging lessons tailored to diverse age groups and skill levels.
- Facilitating hands-on projects to enhance practical understanding of electronic systems and control.

Intern **September 2023**
Pakistan Council of Scientific and Industrial Research Laboratories Complex | Karachi, Pakistan

- Designed and implemented an IoT based temperature and humidity monitoring system integrated with a user-friendly app for remote lab condition tracking.
- Developed an app to control LED lights, with potential expansion to manage various lab appliances remotely via relays.
- Explored and utilized BH1750 light sensors and MQ series gas sensors for innovative projects.
- Gained in-depth knowledge of networking and electronics concepts during the internship at PCSIR.

Intern **March 2023 – April 2023**
Peoples Steel Mills Limited | Karachi, Pakistan

- Visited multiple mills at Peoples Steel Mills to observe industrial processes.
- Gained hands-on knowledge of industrial sensors and actuators used in steel manufacturing.
- Learned about the practical applications of automation in an industrial setting.

Administrative Assistant **September 2022 – August 2024**
UTech Digital Education | Karachi, Pakistan

- Managed administrative tasks, including scheduling and coordinating sessions, monitoring students and instructors, and overseeing onsite classes.
- Handled meeting arrangements and maintained effective communication through email.
- Ensured smooth operations of daily administrative functions and supported overall office efficiency.
- Managed meeting arrangements and maintained effective communication through email, including handling documentation and sending relevant correspondence.

KEY PROJECTS

- **Digital Logic Design:**
  - Developed and verified 4-bit adder/subtractor, decoder, encoder, multiplexer, demultiplexer, and various logic gates circuits using Verilog.
  - Designed, implemented, and simulated D latch, D flip-flop, and T flip-flop circuits for sequential logic applications using Verilog on ModelSim.
  - Developed and simulated counter circuit for counting applications using Verilog on ModelSim.
  - Designed and implemented a state machine for traffic control, managing traffic light phases and transitions using digital logic principles and Verilog, with simulation and verification on ModelSim.

- **Round-Robin Arbiter:**
  - Developed a round-robin arbiter for efficient resource management in digital systems, focusing on scheduling and fairness, implemented and verified using Verilog on ModelSim.

- **RISC-V Single Cycle Core:**
  - Designed a single-cycle RISC-V processor using Verilog, including key components such as the ALU, instruction memory, and control unit (CU). Developed the complete data path and verified the design through simulation.

- **Automation and IoT:**
  - **Home Automation System:**
    - Developed a home automation system using a Bluetooth module and ESP8266 microcontroller for remote control of household devices.
    - Developed an IoT based home automation system using Raspberry Pi.
  - **Home Security System:** Developed a home security system using an ultrasonic and motion sensors with alarming component.
  - **Automatic Furnace Controller:** Designed a temperature controlling system using Arduino to automate furnace operation based on temperature readings.
  - **IoT-based Air Quality Monitoring and Control System:** Implemented an IoT solution using ESP32 and various gas sensors to monitor and control air quality.

CERTIFICATION AND ACHIEVEMENT

- Arduino and Circuit Designing Course | RoboStation
- Project Exhibition at the Innovation Fair 2023 organized by Generation's School
- Exhibited the FYDP (Final Year Design Project) at the 5th Pak Navy Industry Seminar and Exhibition 2024 held at Expo Centre Karachi
- Exhibited the FYDP (Final Year Design Project) at the 3rd Sindh Research Technology Showcase 2024 held at Expo Centre Karachi
- Contributed as a co-author of the abstract titled "**Development of a LoRaWAN-based mobile IoT system for real-time Climate Monitoring**" in the 2nd International Conference on Technology Driven Climate Action – 2025 (CLIMATECH 2025) held at NED University of Engineering and Technology

RESEARCH EXPERIENCE

- **IoT-Based Air Quality Monitoring and Control System (2023 – 2024)** | As part of my final year project at NED University, I designed a system that monitors air quality using an ESP32 along with MQ gas sensors, a DHT11, and a particulate matter sensor. The system measures gases such as CO and CO2, as well as temperature, humidity, and dust particles in the environment. It also activates control mechanisms, including LED indicators and other actuators, when any parameter exceeds safe limits. Additionally, the project incorporated machine learning techniques to enable future environmental trend prediction and enhance decision-making capabilities.

- **LoRaWAN-based mobile IoT system for real-time Climate Monitoring (2024)** | I co-authored an abstract titled "**Development of a LoRaWAN-based mobile IoT system for real-time Climate Monitoring**", which presents a low power, flexible, and cost-effective alternative to traditional fixed climate monitoring systems. The project integrates MH Z19 CO2 and DHT22 temperature and humidity sensors with the STM32 WL55JC1 board to enable long range environmental data collection via LoRaWAN. The abstract was accepted for presentation at the 2nd International Conference on Technology Driven Climate Action 2025 (CLIMATECH 2025).

- **IoT-enabled temperature and humidity monitoring system with a remote tracking app (2023)** – During my time at the Pakistan Council of Scientific and Industrial Research Laboratories Complex in Karachi, I developed an IoT based temperature and humidity monitoring system paired with a user-friendly mobile app for remote lab condition tracking. I also built an app to control LED lights, designed with the potential to expand toward managing additional lab appliances through relay-based control. In addition, I worked with BH1750 light sensors and MQ series gas sensors to explore and prototype innovative IoT and environmental monitoring solutions.

RESEARCHGATE PUBLICATIONS

- The Key Technologies Enabling the Metaverse
- Mechatronic Components and System Integration in a Humanoid Robot (Tesla Optimus)
- Internet of Things in Smart Agriculture: Transforming Traditional Farming

RESEARCH INTERESTS & PhD FOCUS

I am deeply focused on embedded systems, IoT technologies, sensors and actuators, real time data acquisition, automation, and control systems. I also have a strong interest in digital systems and computer architecture, aiming to improve the efficiency of embedded platforms through better hardware and software integration. Above all, I strive to move beyond theory by developing practical and scalable systems for industrial and environmental applications, and I hope to advance this work further through doctoral research.

EXTRA CURRICULAR ACTIVITIES

- Volunteered at 2nd Sindh Research & Technology Showcase 2023 held at Expo Centre Karachi

LANGUAGES: English (Fluent) | Urdu (Native) | Hindi (Conversational)