

Ibrahim Hasan

Industrial IoT & OT Systems Engineer

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Summary

Industrial IoT & OT Systems Engineer with in-depth expertise in embedded firmware design and industrial operational systems integration. Experienced in developing gateway devices for multi-protocol conversion (Modbus, BACnet, Zigbee) to MQTT, alongside real-time data integration with enterprise backend systems. Certified in PLC, HMI, and Modbus, backed by extensive experience in field troubleshooting and microcontroller-based R&D. Dedicated to delivering reliable, efficient, and standardized automation solutions for industrial requirements.

Skills & Tools

- **Industrial Automation & Protocols:** PLC (Programmable Logic Controller), HMI, Modbus (RTU/TCP), BACnet, Zigbee, Industrial Gateway Development.
- **Embedded Systems & Firmware:** Embedded system, Firmware engineer, Development and programming with Arduino and ESP-IDF, PCB Designer, Real-time Data Acquisition, FreeRTOS, OTA Update, IoT System Architecture.
- **Programming, Backend & Analysis:** Python, C, C++, JavaScript (Node.js), PHP, HTML, CSS, Database Management (Firebase), Data Analysis (MATLAB, Simulink, NumPy, Pandas).
- **Tools & Creative:** Arduino, Sensors, Actuators, Microsoft Excel, Microsoft Word, TensorFlow, Kivy, PyGame, Adobe Photoshop, Adobe Illustrator, Capcut, Davinci Resolve.
- **Soft Skills:** Problem Solving, Team Collaboration, Leadership, Adaptive Learning.

Education

Universitas Al-Azhar Indonesia

Sarjana Teknik Elektro

DKJ Jakarta, Jakarta Selatan

September 2022 - Present

- **Field of Study:** Electrical Engineering (Electronic)
- **Key Courses:** Fundamentals of Programming, Electrical Circuits 1 & 2 (including labs), Digital Circuits (including labs), Microprocessor Systems, Basic Electronics, Calculus 1 & 2, etc.
- **Current GPA:** 3.33/4.00
- **Academic Projects:** Developed Smart farming IoT with website monitoring and controlling, robotic hand, Tesla coil, and DIY prototypes including an electric generator, among other projects.
- **Bachelor's Thesis:** *IoT-Based Smart Climate Control System for Optimizing Energy Consumption Efficiency in ATM Rooms*. This project focused on engineering design and achieved approximately 41.31% improvement in energy efficiency.

Professional Experience

PT Ferbos Kreasi Digital

R&D Engineering - Intern

DKJ Jakarta, Jakarta Selatan

September 2025 - Present

- **Role:** R&D Engineering Intern focusing on the development of IoT and industrial control systems, with a strong emphasis on PCB design and embedded firmware development.
- **Projects:**
 - **Climate Control ATM Device:** Engineered the PCB and optimized firmware for production, ensuring stable control logic, IR AC control, and field reliability.
 - **Ferbos Gateway (Firmware Developer):** Developed industrial firmware for multi-protocol gateways (Modbus, BACnet, Zigbee) to MQTT, supporting Ferbos' proprietary 'Continuum' communication standard to ensure standardized data transmission.
- **Field Experience:** Conducted on-site field investigation and troubleshooting team for Zigbee connectivity; authored technical SOPs to standardize repair and maintenance protocols.
- **Technologies:** PCB Design, Firmware Development, MQTT, Zigbee, Modbus, REST API, ESP32, Node.js.

Certificate

Training on PLC & HMI (Wecon Products)

- **Provider:** PT. BERKAT SOLUSINDO
- **Date:** 30 May 2026
- **Description:** Participated in training on Wecon PLC and HMI products, focusing on integration with sensors and various devices using Modbus communication.

Achievements

Gold Award – Pekan Inovasi Nasional 2025

Universitas Mercu Buana

- Received the highest recognition for the Digital Fence innovation, a system designed to protect National Conservation Forests. The system utilizes GSM modules and 2G BTS networks to transmit environmental data

in real time, enabling remote monitoring even in low-signal areas

Instructional & Academic Experience

Timedoor Academy

Programming Teacher - Part time

Mampang Prapatan, Kemang

October 2025 - Present

- **Subjects Taught:** Programming (Visual Block, JavaScript, HTML, CSS), Robotics, VR/AR Design, Game Development.
- **Teaching Methods:** Interactive sessions, adaptive learning monitoring, and individual tutoring.
- **Tools and Technologies:** Code.org, Tynker, CoSpaces, Scratch, Construct, Microbit, Dash robot, etc.
- **Student Engagement:** Developed and assessed assignments, quizzes, and projects, and provided feedback to enhance learning

Coder Academy

Programming Teacher - Part time

DKJ Jakarta, Jakarta Selatan

December 2024 - November 2025

- **Subjects Taught:** Programming (Visual Block, JavaScript, HTML, CSS, Python), Arduino, Game Development, Web Development
- **Teaching Methods:** Online individual tutoring, and Interactive sessions.
- **Tools and Technologies:** Code.org, Scratch, EduBlock, Arduino, Roblox Studio, PyGame, etc.
- **Student Engagement:** Teaching, mentoring, quizzes, projects, and providing feedback to enhance learning.

Physics laboratory, UAI

Physics 1 & 2 lab assistant

West Jakarta, Kebayoran Lama

October 2023 - September 2025

- **Subjects Taught:** Physics 1 (Classical) and Physics 2 (Modern)
- **Teaching Methods:** Pre-test sessions, practical experiment guidance, and lab report.
- **Tools and Technologies:** Physics laboratory equipment (Newton's module, Archimedes' module, pendulum, resistors, capacitors, transformers).
- **Student Engagement:** Provided guidance on experiments and data analysis, and assessed results from practical sessions and lab reports.

Electrical and Microcontroller laboratory, UAI

Microprocessor system lab assistant

West Jakarta, Kebayoran Lama

April 2025 - September 2025

- **Subjects Taught:** Microprocessor system (Z80) and Microcontroller (Arduino)
- **Teaching Methods:** Pre-test sessions, practical experiment guidance, and lab report.
- **Tools and Technologies:** Z80 Microprocessor Trainer, Proteus, Arduino.
- **Student Engagement:** Provided guidance on experiments and data analysis, and assessed results from practical sessions and lab reports.

Timedoor Academy

Programming Teacher - Part time

Tangerang, Green Lake City

June 2024 - February 2025

- **Subjects Taught:** Programming (Visual Block, JavaScript, HTML, CSS), Robotics, VR/AR Design, Game Development.
- **Teaching Methods:** Interactive sessions, adaptive learning monitoring, and individual tutoring.
- **Tools and Technologies:** Code.org, Tynker, CoSpaces, Scratch, Construct, Microbit, Dash robot, etc.
- **Student Engagement:** Developed and assessed assignments, quizzes, and projects, and provided feedback to enhance learning.

Student Organization Leadership

BPH, UKKM Science and Robotic (Scibot), UAI

Leader

West Jakarta, Kebayoran Lama

March 2025 - March 2026

- **Competition Management:** Created a platform for members to participate in robotics competitions, math science competition and other events. Sourced competition information, led competition teams, and assisted with innovations during competitions.
- **Training Programs:** Organized and conducted training sessions in robotics, mathematics, and Science for members.
- **Program Innovation:** create a research team to prepare for the upcoming competition for all students from various study programs, and create easy-to-learn training for students outside of engineering study programs.

Dept. of RISTEK, Electrical Engineering

Student Association, UAI

Head of Department

West Jakarta, Kebayoran Lama

March 2024 - February 2025

- **Training Programs:** Organized and conducted training mathematics, and English for electrical engineering students.
- **Program Innovation:** Enhanced departmental programs by transforming the existing bulletin magazine into a more engaging and visually appealing feed instagram format.
- **Flagship Program:** Initiated and led the Elektro Company Visit program to PT Garuda Maintenance Facility Aero Asia in Tangerang City, Banten.

BPH, UKKM Science and Robotic (Scibot), UAI

Vice Leader

West Jakarta, Kebayoran Lama

March 2024 - February 2025

- **Competition Management:** Created a platform for members to participate in robotics competitions, math science competition and other events. Sourced competition information, led competition teams, and assisted with innovations during competitions.

- **Training Programs:** Organized and conducted training sessions in robotics, mathematics, and Science for members.
- **Program Innovation:** create easy-to-learn training for students outside of engineering study programs.

**Dept. of Infokom, Electrical Engineering
Student Association, UAI**

West Jakarta, Kebayoran Lama
March 2023 - February 2024

Member of Department

- **Responsibilities:** Managed the association's social media platforms, documented departmental events through photography, videography, and archiving, and assisted in designing visual content for various publications.
- **Innovations:** Designed the official logo for the cabinet.

BPH, UKKM Science and Robotic (Scibot), UAI

West Jakarta, Kebayoran Lama
March 2023 - February 2024

Secretary 2

- **Responsibilities:** Assisted Secretary 1 in proposal writing, member data organization, and administrative tasks. Supported member participation in robotics, math, and science competitions, including sourcing events and assisting project development.

Sosial Peduli Elektro (Sospetro), UAI

West Jakarta, Kebayoran Lama
October 2022

Secretary

- **Responsibilities:** Served as Secretary in the event organizing committee. Prepared the official event proposal and compiled the accountability report (laporan pertanggungjawaban) post-event. Ensured clear documentation and administrative support throughout the program.

Social Empowerment, DKA UAI

West Jakarta, Kebayoran Lama
December 2022 - February 2023

Secretary

- **Responsibilities:** Served as Secretary in the event organizing committee. Prepared the official event proposal and compiled the accountability report (laporan pertanggungjawaban) post-event.

Projects

Climate Control ATM Device

- **Skills:** Embedded Systems, Control Systems, ESP32 (Arduino & ESP-IDF Framework), ZigBee, MQTT, BLE, REST API, FreeRTOS, Sensor Integration, OTA Update, IoT System Architecture
- **Description:** Developed a compact embedded climate control system for ATM booths. Features include PCB v1 design, firmware, and control logic. Integrated internal SHT20 and mmWave sensors for environmental data, IR remote control for AC automation, and a Zigbee coordinator for peripheral device management. Enabled real-time remote monitoring and control via MQTT and REST API.

Ferbos Gateway

- **Skills:** Firmware Development, Industrial Automation, Modbus, Zigbee, MQTT, FreeRTOS, Protocol Conversion, OTA Update, IoT System Architecture
- **Description:** Developed firmware for a proprietary industrial gateway acting as a central automation hub. Implemented multi-protocol conversion (Modbus, Zigbee) to MQTT to support Ferbos' standard 'Continuum' communication protocol, ensuring standardized data transmission for all sensors and connected devices.

Novagate Smart Door Lock Integration

- **Skills:** Embedded Systems, ESP32, RFID, IoT, Web Development, REST API, PHP, Access Control Systems
- **Description:** Developed a smart door lock access control and monitoring system for the Electrical Engineering Final Project Lab at UAI. The system utilizes ESP32 with RFID authentication and Magnetic Door Lock to manage and track student access. Integrated with a custom web monitoring dashboard via REST API, allowing for centralized management and easy integration of multiple Smart Door Lock devices with configurable settings.

IoT Oscilloscope for Heart Rate

- **Skills:** IoT, Software Developer, Front End, Microcontroller
- **Description:** Developed a heart rate monitoring system using an Arduino microcontroller integrated with an oscillator and pulse sensor. The real-time data was transmitted to a computer via serial communication and visualized as a waveform on screen, simulating an oscilloscope. Additionally, the data was published through the MQTT protocol, enabling remote access. A responsive web application was built to receive MQTT data and display it in real time, accessible via Android devices.

Smart Rakaat Counter

- **Skills:** Embedded System, 3D Modeling, Sensor Calibration
- **Description:** Designed and developed a rakaat counter device specifically for elderly users, utilizing a custom-made pressure sensor consisting of two conductive plates that make contact when pressed. The sensor was embedded under a prayer mat with a compact and ultra-thin form factor, requiring custom PCB design and circuit integration. The system was built around the ATmega328P-AU microcontroller, with all components and layout manually designed to ensure usability, comfort, and reliability.

CEI Conference 2023 Website

- **Skills:** Website Designer
- **Description:** Designed and maintained the official website for the CEI 2023 international conference event

using GoDaddy's web editor platform. Collaborated with a team of web designers to create a user-friendly and informative interface that showcased event details, speaker profiles, and registration information. Also responsible for updating website content in real-time throughout the duration of the event to ensure accuracy and relevance.

Physics Laboratory Assistant Website

- **Skills:** Website Designer, Front End, Back End
- **Description:** Developed a full-stack website with an integrated database system to assist physics laboratory assistants in managing student data. The platform allows scheduling of practical sessions, input and tracking of student grades, and simplified data recaps by lab coordinators. Responsible for the entire development process—from UI/UX design to front-end implementation and back-end logic, ensuring a user-friendly and efficient workflow for academic lab administration

Smart Irrigation

- **Skills:** IoT, Microcontroller, Web Programming, Web API
- **Description:** Developed an IoT-based smart irrigation system capable of monitoring soil moisture, temperature, and pH levels in real time. The data is visualized through dynamic graphs on a responsive website accessible via mobile devices, allowing users to track plant conditions over time. The system features automated watering based on predefined moisture thresholds and can also be controlled manually through alarms. Communication between the ESP32 microcontroller and the web interface is handled via a custom-built API, enabling remote monitoring and control from anywhere.

Automatic Farming

- **Skills:** Mechanical, 3D Modeling, Assembly, Electrical
- **Description:** Designed and developed an automatic rice seed planting machine to improve the efficiency and speed of traditional farming processes. Responsible for creating the 3D mechanical design, simulating the system, and engineering the electrical circuitry to control the motors and movement. Also contributed to the physical assembly phase, ensuring proper integration of mechanical and electrical components for smooth operation in the field.

Health Monitor

- **Skills:** Android Developer, IoT, Embedded System
- **Description:** Developed a health monitoring device to detect stress levels using temperature and heart rate (BPM) sensors. The system processes the data using fuzzy logic to determine the user's stress level in real time. Sensor data is transmitted via Firebase and accessed by an Android application built with Kivy (Python), which displays the user's condition based on the processed data. This project integrates embedded sensing, real-time cloud communication, and cross-platform mobile interface.

Spider Robot for Department Exhibition

- **Skills:** Embedded System, Mechatronics, 3D Printing, Servo Control
- **Description:** Designed and built a six-legged spider robot for the Electrical Engineering Department exhibition at Universitas Al-Azhar Indonesia. The project involved the full development cycle, from 3D modeling and printing the mechanical frame to assembling components and programming servo motors for coordinated walking movements. The robot was controlled using a microcontroller and demonstrated basic locomotion inspired by biological movement, showcasing integration of mechanical design and embedded control systems.

Line Follower Robot for Competition

- **Skills:** Embedded System, Sensor Calibration, Algorithm Design, Motor Control
- **Description:** Designed and built a line follower robot optimized for speed and stability in competition settings. Utilized IR sensors for accurate line detection and PID control algorithms to maintain optimal path-following behavior. The robot was tested and refined for obstacle handling, acceleration control, and cornering, ensuring high performance in competitive race tracks.