

# Ryyan Safar

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Education	Institute/School	Year	CGPA
B.Tech., Electronics and Communication	Rajagiri School of Engineering and Technology, Kochi	2024-27	8.77
CS50 Introduction to Computer Science	HarvardX	2024	Verified
Class 12, CBSE	Naipunnya Public School, Thrikkakara	2020-22	88%
Class 10, CBSE	Rajagiri Public School, Kalamassery	2019-20	95%

## CAREER OBJECTIVE

Aspiring Electronics and Communication Engineer with a passion for building automation systems and intelligent machines. Seeking opportunities to apply technical knowledge in robotics, embedded systems, chip design, and motion control while driving impactful innovations. Eager to contribute to collaborative projects, optimize real-world solutions, and grow as a tech leader at the intersection of hardware and software.

## PROFESSIONAL EXPERIENCE

- Research Intern | AugsenseLab** May 2025 – June 2025
  - Researched and compared weather prediction values from NWP (Numerical Weather Prediction) models with real-time observed values for accuracy benchmarking.
  - Implemented sensor fusion algorithms integrating IMU (BNO055) and GNSS (ZED-F9P) data on a Raspberry Pi platform.
- Technical Coordinator | TeamApt Ltd.** August 2024 – Present
  - Designed and deployed the company website **teamapt.in** using Flask and MySQL backend.
  - Provided comprehensive technical support to faculty and students across multiple events.
- Vice President | SOCIAL - Student Open Collaboration for Innovative Applications** November 2023 – January 2025
  - Organized and hosted a workshop on social entrepreneurship.
  - Contributed as a part-time content writer for the newsletter “Chronicles.”

## TECHNICAL SKILLS

- Hardware:** 8051 Microcontroller, ESP32, Arduino Uno, NodeMCU, Raspberry Pi
- Operating Systems:** Linux OS, Ubuntu, Raspberry Pi OS, and GPIO-based sensors (digital and analog)
- Programming & Scripting Languages:** ROS2, Verilog HDL, C, Python, C++, MATLAB, Java, Assembly Language, Embedded C, JavaScript, HTML5, CSS
- Tools & Libraries:** OpenCV, NumPy, SciPy, TensorFlow, Flask, MySQL, MongoDB, MATLAB, Arduino, Raspberry Pi, Linux, Conda, wrf-python, xarray, matplotlib (+ cartopy), wrapt, netCDF4-python
- Tech Domain:** Data Structures and Algorithms, Embedded Systems, Web Development, AutoCrat, Software Development, Object-Oriented Programming

## POSITIONS OF RESPONSIBILITY

- LINK Representative | IEEE RSET Student Branch** January 2025 – Present
  - Facilitating communication and collaboration between LINK and IEEE RSET Student Branch.
- Technical Coordinator | IEEE RSET Student Branch** March 2024 – January 2025
  - Planned the redesign of the IEEE Office on Wheels Bus with integrated piezoelectric sensors to enhance engagement.
  - Automated certificate generation for multiple events using AutoCrat.

- Coordinated technical events and provided technical assistance.
- **Technical and Professional Development Team Lead** | *IEEE India Council*      *February 2024 – December 2024*
  - Coordinated and planned the R10 Codeathon for students across the R10 Region.
  - Coordinated AISWYLC'24 (All India Student and Young Professional Congress and Leadership Congress).
- **Co-Student Representative** | *IEEE Kerala Section*      *January 2025 – Present*
  - Selected as Co-Student Representative for IEEE LINK program.
- **Future Directions Committee Project Group Coordinator** | *IEEE Kerala Section*      *February 2024 – January 2025*
  - Researched multiple Future Directions initiatives and planned events, conferences, and workshops in Kerala.
- **Millennium Fellow** | *United Nations*      *January 2025 – Present*
  - Developing a plastic disposal smart bin system titled "Overflow ends with us."

## MAJOR PROJECTS

- **Mis-Communicationator: AI-to-AI Communication System**
  - Engineered an innovative AI communication system where two AI instances engage in continuous conversations, creating dynamic and entertaining interactions.
  - Built on Raspberry Pi 4 (4GB RAM) running Raspberry Pi OS 64-bit, implementing StableLM Zephyr 3B model via llama.cpp.
  - Designed dual model instances (bot1 and bot2) with LED indicators to show which AI is "speaking" during conversations.
  - Implemented secure model deployment over SSH with real-time model instantiation and Wi-Fi connectivity.
  - Created a system where AIs engage in discussions about user-input topics, generating dynamic responses through multiple conversation cycles.
  - Achieved system optimization under thermal constraints (82.3°C), demonstrating expertise in thermal management and hardware limitations.
  - Gained expertise in model quantization, networking protocols, system optimization, and pushing hardware boundaries.
  - **Tech Used:** Raspberry Pi 4, StableLM Zephyr 3B, llama.cpp, Python, Linux, GPIO, LED Control, SSH, Wi-Fi Configuration.
  - **Team:** IIT KKD Weapons Development (Allen Thomas, RIO MATHEW, Adriel Bobby)
  - **Showcase:** Presented at Maker Thursday at TinkerSpace (October 23rd)
- **FPGA-Based Kalman Filter Sensor Fusion System (Work in Progress)**
  - Developing a hardware-accelerated Kalman Filter implementation on an FPGA for fusing IMU (BNO055) and GNSS (ZED-F9P) data.
  - Writing custom Verilog modules for fixed-point arithmetic, matrix multiplication, and 2D state prediction.
  - Building a finite state machine (FSM) to manage pipeline execution and UART communication for real-time data streaming.
  - Targeting low-latency sensor fusion suitable for embedded autonomous navigation systems, specifically for LiDAR data processing in pothole detection for autonomous vehicles.
  - **Tech Used:** Verilog HDL, FPGA (Xilinx Series), UART, Fixed-Point Arithmetic, Kalman Filter, IMU-GPS Fusion, LiDAR Processing.
- **Smart Glass Mount for Visually Impaired**
  - Developed a Smart Glass mount that can be attached to user's own glasses for enhanced accessibility.
  - Built over a period of 36 hours for HackSus 4.0 hackathon.
  - Utilized ESP32-CAM, ESP32-WROOM, microphone, LM746 audio amplifier, speaker, and 3.7V battery.
  - Developed a custom algorithm for real-time obstacle detection with immediate audio feedback to the user.
  - Integrated YOLOv5 for object detection and wake-word detection with Hugging Face LLM models.
  - **Tech Used:** Python, OpenCV, ESP32-CAM, TensorFlow, C programming, YOLOv5
  - **Recognition:** Received Real World Impact Award for HackSus 4.0 with over 55+ teams
- **CNC Plotter Machine for PCB Design (Department Project)**
  - Designed and developed a compact CNC plotter from scratch using repurposed components including stepper motors salvaged from old printers and CD drives with partner, Joy.

- Engineered the system to draw PCB layouts using a CD marker mounted on the plotting head, enabling cost-effective prototyping.
- Utilized copper-clad boards and ferric chloride etching process, where only the marker-drawn regions resisted the chemical, effectively creating custom PCB tracks.
- Built the frame and motion system using scrap materials, significantly reducing build cost while maintaining mechanical precision.
- Coordinated firmware and G-code integration to control X-Y axis movements, enabling accurate layout plotting for single-layer PCBs.
- **Tech Used:** Arduino UNO, GRBL Firmware, Stepper Drivers, G-code, Mechanical Design, Ferric Chloride Etching.
- **Autonomous Car Door Assembly Robot (Honors Project)**
  - Simulated a robotic system for automatic car door alignment and assembly using ROS 2 and Gazebo.
  - Designed a 5-DOF robotic arm mounted on a rotating arch using URDF/Xacro.
  - Built a Gazebo factory environment with car frames and door placements; used RViz 2 for real-time debugging and visualization.
  - Integrated TF broadcasting, joint publishers, and camera simulation for future computer vision integration with OpenCV.
  - **Tech Used:** ROS 2 Iron, Gazebo Classic, RViz 2, Python, URDF/Xacro, Ubuntu 22.04
  - **Submitted for:** S4 Honours (ROS-Based Modeling) Project
- **Sign Language to English Translator (Hardware Project)**
  - Developed an ID card-type prototype that translates Sign Language to English for a college hackathon as S1 students.
  - Utilized Teachable Machines for training the model on multiple signs performed by the signer.
  - Main components consisted of an Arduino Uno Module, an ESP32 module, and an LCD screen to display data in real-time.
  - The device connected to a server that reads sensor data, translates it accordingly, and sends the translated text to the LCD screen as output.
  - **Tech Used:** Python, Flask, Teachable Machines, OpenCV, TensorFlow, Arduino, ESP32.
  - **Recognition:** Shortlisted in the top 5; the only first-year team to have made it to the top 5.
- **Voting Machine (Hardware Project)**
  - Developed an electronic voting machine using an ESP32, integrating a JHD162A LCD display, SD card module, LEDs, and a buzzer for real-time vote recording and result display.
  - Implemented secure vote logging by storing results on an SD card, ensuring data integrity and allowing for future audits.
  - Designed an interactive user interface on the LCD to provide live voting feedback and display real-time election results.
  - Integrated debounce handling and debugging tools for precise button monitoring, overcoming erroneous triggers and ensuring accurate vote registration.
  - Engineered an LED indicator system, directly linked to voting buttons, to provide immediate visual confirmation upon casting a vote.
  - Conducted extensive debugging with real-time monitoring to fix button misfires, ensure reliable voting operations, and optimize system response.
  - **Tech Used:** C++, Arduino Framework, ESP32, SPI, SD Card Interface, LiquidCrystal Library.
- **Humidity Sensor and Alert System using ESP32**
  - Designed and implemented a humidity monitoring system using ESP32 and a DHT22 sensor.
  - Programmed the ESP32 to read real-time humidity data, display it on an LCD screen, and trigger a buzzer alert when the humidity exceeded a set threshold.
  - Integrated an adjustable potentiometer to modify alert thresholds dynamically.
  - Successfully tested the system for stable readings and reliable alert activation in varying environmental conditions.
  - **Tech Used:** ESP32, DHT22, LCD, Buzzer, Potentiometer, Arduino Framework, C++.
- **Dual Op-Amp Signal Generator (Analog Circuits Course Project)**
  - Designed and built a triangle wave and square wave generator using two IC741 op-amps.
  - Integrated both signals through an SPDT switch to allow waveform toggling.

- Powered circuit using a dual  $\pm 9V$  supply setup with two 9V batteries and decoupling capacitors.
  - Gained hands-on experience in soldering, breadboarding, and analog circuit debugging.
  - **Hardware Used:** IC741, ADALM1000, Oscilloscope logic, Signal Processing
- **Digital Stopwatch using Logic Gates**
  - Designed and built a digital stopwatch using 7433 IC, 555 IC timer, reset button, start/stop switch, AND gate logic, and 7-segment displays.
  - Implemented complete circuit design from scratch, understanding digital logic principles, timing circuits, and display multiplexing.
  - Gained hands-on experience in circuit design, component selection, PCB layout, soldering techniques, and display interfacing.
  - Successfully demonstrated precise timing control and user interface functionality through hardware switches with real-time display output.
  - **Components Used:** 7433 IC, 555 Timer IC, Reset Button, Start/Stop Switch, AND Gate, 7-Segment Displays, Resistors, Capacitors, DOT PCB.
  - **Submitted for:** Course Project - Digital Logic Design
- **IR Communication System**
  - Developed a simple IR transmitter-receiver system to control outputs using frequency-based signals with an astable multivibrator-based transmitter and a receiver circuit with an IR module.
  - Soldered all components in two parts - one receiver end and one transmitter end, demonstrating successful signal transmission.
  - Achieved successful wireless communication over 1–2 meters, demonstrating real-time frequency-based control.
  - **Components Used:** 2N2222 Transistors, DPDT Switches, Receiver module, Transmitter Module, Resistors, LED, DOT PCB.
  - **Submitted for:** Analog Circuits Duo Project with teammate.
- **Password Manager**
  - Developed an effective password manager website as final project for CS50.
  - Included multiple features within the website with a secure login screen and effective JavaScript prompts for added security.
  - Features included: Creating a new password per website/app, Generating a Strong Password, Updating Password, and Deleting Password (with extra JavaScript prompt for user reassurance).
  - **Tech Used:** Python, Flask, MySQL, JavaScript, HTML5, CSS, Werkzeug.security.
- **Automatic Street Light Prototype**
  - Developed a simple Automatic Street Light Prototype that turns on the lights when ambient light is below the desired threshold.
  - **Components Used:** 555 Timer IC, Resistors, LDR, Potentiometer, Dot PCB.
  - **Recognition:** Third Position for a Circuit Designing Competition with team.
- **Hospital Booking Agent/Finder**
  - Developed a simple hospital finder/booking assistant for 12th-grade final project using Python and MySQL.
  - Implemented extensive MySQL database integration with real-time user entry functionality.
  - Gathered details about 5 hospitals with 5 specialists per hospital to assist in booking procedures.
  - **Tech Used:** Python, MySQL.

## IDEATHON SUBMISSIONS

- **Wildfire SAIfty**
  - Proposed a solution for the early detection of wildfires.
  - Our solution included:
    - \* **Wildfire Detection Method:** Combining computer vision and satellite imagery for improved accuracy.
    - \* **Wildfire Confirmation:** Drones deployed to confirm wildfire sightings.
    - \* **Wildfire Suppression:** Water spraying used until resources arrive.
    - \* **Satellite Functionality:** Satellites determine location and send alerts to nearby network-connected phones.
  - **Recognition:** Shortlisted to penultimate round of TalenTime - Idea Pitching Competition
- **KSEB Smart Meter Alternative**

- Proposed a plan with team to develop Smart Meter Alternatives.
- Plan highlighted the usage of an OCR Camera Module (with a black and white filter to easily read the values) with Bluetooth Connection. The meter box transmits the number of units used by the house to the POS machine with the meter reader.
- Using GIS, mapped the number of houses visited and to visit in the newly updated POS Machine.
- **Recognition:** Among the Top 10 with other startups and colleges across the whole country.
- **Down Syndrome Friendly App**
  - Proposed a plan to create an app for people with Down Syndrome to make them feel included.
  - The approach consisted of having a social media network for people with Down Syndrome, real-time assistance, games, a reward system, and education for basic life needs.
  - Main feature was using Emotion Detection with Amazon's Rekognition System and GPT-4o model to analyze the user's current mood and provide them with appropriate music or mood-based recommendations.
  - **Submitted for:** SlashKey 3.0 and IIC Ideathon.
- **Safe Sight**
  - Proposed a solution to promote women's safety worldwide.
  - Our solution included:
    - \* **Real-Time Monitoring:** Uses CCTV for monitoring public spaces, focusing on gender ratio and suspicious activities.
    - \* **Immediate Alerts:** Sends alerts to the nearest police station if crime or suspicious behavior is detected.
    - \* **Feedback Loop:** Police can validate or dismiss alerts, improving system accuracy.
    - \* **Priority Alerts:** Categorizes alerts into Yellow, Orange, and Red based on severity.
  - **Technical Approach:** Python, MySQL, JavaScript, HTML5, CSS, OpenCV, YOLO, Mediapipe, Flask/Django.

## REFERENCES

- **Academic Reference:**  
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## SELF DECLARATION

- I hereby declare that all the information provided above is true and correct to the best of my knowledge and belief.

*As of 26 October 2025*