RAMAIAH
SKILL ACADEMY

Transform..Thrive..Transcend

ATTENTION : FINAL YEAR UG & PG ENGINEERING STUDENTS

Skill Enhancement
&
Internship Program

ASIC Emulation on FPGA

Embedded Systems Programming & Applications Development

Start Date: 04th Feb, 2025

ENGINEERING AND SCIENCE GRADUATES
CAN ALSO APPLY

www.ramaiahskillacademy.com

ASIC EMULATION ON FPGA

About the Program

Very-Large-Scale-Integration (VLSI) plays a pivotal role in the semiconductor industry. As the demand for more advanced, powerful, and energy-efficient devices continues to rise, the need for skilled professionals in VLSI Design also increases. The industry requires engineers who can effectively design, verify and optimize complex integrated circuits and systems that serve as the foundation for modern electronic devices. These designs integrate a wide range of functions, including processors, memory, and communication interfaces, into a single system, delivering significant benefits in terms of performance, power efficiency, size and cost.

The ASIC Emulation on FPGA Program covers the design, verification, and emulation of Application Specific Integrated Circuits (ASICs) using Field Programmable Gate Arrays (FPGAs). This Program is ideal for trainees in VLSI Design, Semiconductor Engineering, Embedded Systems, and Hardware Verification. The Program offers a comprehensive exploration of the techniques and tools involved in emulating ASIC designs for FPGA platforms. Trainees can learn to convert and ASIC design into a format compatible with FPGAs, perform emulation and testing, and validate the design in a hardware environment. The focus will be on both the theoretical and practical aspects of ASIC emulation, FPGA synthesis, verification, and debugging. At the end of the program, the trainees will present their hands-on projects, detailing the challenges encountered, solutions implemented, and their learning experience.

For VLSI

Indicative Program Content

- Introduction to ASIC and FPGA
- FPGA Basics and Architecture
- FPGA Design Flow and Tools
- ASIC Design Flow
- Specification and Architectural Design
- RTL Design and Verification
- Synthesis and Physical Design
- Fundamentals of ASIC Emulation and FPGA
- Setting Up the Emulation Environment
- Emulating Processor Cores
- Bus Interfaces and Interconnects
- Memory Module Emulation
- Peripheral and Subsystem Integration
- Advanced Topics in SoC Emulation
- Hands-on Project
  - RISC-V Based SoC with Custom Peripherals
  - ARM Cortex-M SoC with Secure Boot and Peripherals
  - Multi-Core SoC with Shared Memory
  - AI Accelerator-Based SoC with PCIe Data Transfer
  - FPGA-Based PCIe Endpoint with RISC-V SoC
  - High-Performance Data Acquisition System
  - High-Performance DDR-Based Video Processing System
- Working with Ramaiah Techno Centre for Real-Time Project Experience

Skills Acquired

- HDL Programming
- Debugging and Verification
- Industry-Relevant
  - Toolchain Mastery
  - Real-World Application Development
  - Collaboration and Documentation
- Analytical and Problem-Solving

Hands-On Expertise

- Hierarchical Design Approaches
- Performance Optimization Methods
- Hardware-Software Co-design Methods
- IP Selection and Integration Process
- AI Methods for Automation
- Reuse Oriented Design
- Agile Development Process
- Low Power Techniques
- Hardware Testing and Debugging Methods

Embedded Systems Programming & Applications Development

About the Program

Embedded Systems Programming and Application Development is a highly Specialized and evolving field that combines hardware and software expertise to design and create efficient, reliable systems. This discipline plays a pivotal role in the development of products and technologies across various sectors, including Consumer Electronics, Healthcare, Automotive, and Industrial Automation. Embedded Systems power essential devices and technologies, enabling them to perform tasks autonomously, reliably, and efficiently.

This four-month immersion program offers trainees an in-depth, hand-on learning experience that merges theoretical knowledge with practical application. The comprehensive program equips trainees with valuable expertise by working on industry-relevant projects and assignments, ensuring they are well prepared for the challenges and opportunities within the embedded systems field. By the end of the program, the trainees will have gained the skills and confidence needed to excel in practical embedded systems development. The focus will be on both the theoretical and practical aspects of Design, Programming, Debugging, System Application, Implementation and verification of design concepts in Embedded Systems. At the end of the program, the trainees will present their hands-on projects, detailing the challenges encountered, solutions implemented, and their learning experience.

For Embedded Systems

Indicative Program Content

- Introduction to Embedded Systems
  - Industrial, defence, automotive and medical
- Programming with C and Embedded C
- Microcontroller and register level programming
- Interrupt handling and programming GPIOs
- Memory management and optimization
- Communication Protocols
  - UART, I2C, SPI, CAN, Ethernet
- Debugging and Testing Embedded Systems
- Functional Safety and Security Control Systems
- Testing and Validation
- Introduction to AI in Embedded Systems
- Embedded Hardware for AI Applications
- AI Algorithms and Frameworks for Embedded Systems
- Real-time AI on Embedded Systems
- Embedded AI for Internet of Things (IoT)
- Hands-on Project
  - Vehicle Health Monitoring System
  - Electric Vehicle (EV) Battery Management System (BMS)
  - Advanced Driver Assistance System (ADAS) with Communication Protocols
  - Field-Oriented Control for PMSM in Electric Vehicles on an Embedded Platform
  - Real-Time State-of-Charge Monitoring and Energy Optimization
  - Multi-Node Communication System Using MQTT for Embedded Devices in Industrial Automation
  - Secure Communication Between Embedded Systems Using
  - AES Encryption for Industrial IoT
  - Embedded AI-Based Gesture Recognition System for Human-Machine Interaction

Skills Acquired

- Programming skills for modelling and automation
- Debugging and verification
- Industry-Relevant
  - Toolchain Mastery
  - Real-World Application Development
  - Collaboration and Documentation
- Problem-Solving and Analytical Skills

Hands-On Expertise

- Embedded systems design and development
- AI algorithm implementation for embedded platforms
- Sensor integration and real-time data acquisition
- Low-power AI model optimization
- Communication protocols for embedded systems
- Embedded AI applications (autonomous vehicles, smart homes, healthcare)
- Cloud integration for IoT-based embedded AI systems
- Cybersecurity practices for embedded systems
- Prototyping, debugging, and performance tuning
- Collaborative project management and technical documentation

Why Ramaiah Skill Academy (RSA) ?

RSA is committed to equipping graduates with desirable technology specific domain skills and knowledge, empowering them to thrive in today's fast-evolving and competitive landscape. Through a wide array of specialized courses and training programs, RSA bridges the gap between traditional academics and the dynamic needs of modern industries.

Our training programs emphasize experiential, project-based learning, delivered by expert professionals who combine instruction with hands-on, practical experience on projects with relevant technologies. This holistic approach not only enhances personal and professional growth but also fosters individual career advancement, organizational excellence, and national progress.

The Skill Enhancement and Internship Program at RSA is an ideal platform for those aspiring to build a successful career in these high-demand industry domains.

Skill Enhancement and Internship Program

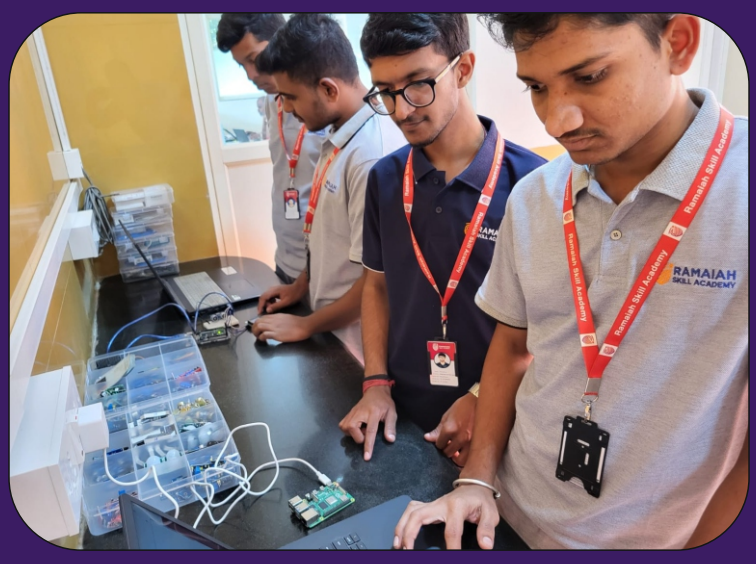
The demand for skilled professionals in VLSI and Embedded Systems highlights the need for focused training and internship programs to align academic knowledge with industry needs.

Our initiative equips participants with industry-relevant skills through structured development programs and hands-on experience with relevant tools and equipment. This approach fosters expertise in designing and optimizing hardware and software solutions, preparing participants for high-demand roles.

The integration of AI with VLSI and Embedded Systems is transforming technology, driving advancements in autonomous systems, edge computing, and high-performance processing. Professionals skilled in AI-driven solutions are pivotal to this innovation.

Program Outcomes

- Preparation of Technical Specifications Documents
- Reporting on Implementation Artifacts
- Review of Performance Metrics
- Ability to Perform Executable Demo
- Project Report and Presentation
- Copious Placement Opportunities



PROGRAM FEE

RAMAIAH STUDENTS: Rs 48,000
OTHER STUDENTS: Rs 60,000

Scan or Click for More Details

CONTACT US

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Start Date: 04th Feb, 2025 Duration : 4 months