

## **RISC-V and Applications Development**

### **Phase 1 - Capacity building (March to August)**

- Task: The core team comprising of 8 faculty mentors and 60 students to be trained to get first hand experience in SiP and RISC-V
- Activity:
  - Training of core team to work with level 1 training (SiP and RISC-V)
  - Establishment of Smart Radar Research Lab & RISC-V Engines Lab
- Start date: 15<sup>th</sup> March 2025, 10 days, 1 day per week or 6 hours per week (every Saturday)

Dates	Activity	Outcomes
15 <sup>th</sup> March 2025 to 24 <sup>th</sup> May 2025	Training on two tracks SiP and RISC-V	Familiarization to concepts and hands on tools Developing skills to work with projects and use of EDA tools Preparation of project report and technical paper for publications
31 <sup>st</sup> May 2025 to 12 <sup>th</sup> August 2025	Self-learning and project work	Group based activity and project work Innovations through hackathons Outreach programs 60 technical papers and prototypes
30 <sup>th</sup> August 2025	Innovation day celebrations	Demonstration of innovations and achievements

### **Introduction:**

RISC-V is an open-source instruction set architecture (ISA) that is gaining traction in academia and industry due to its flexibility and scalability. This course provides a comprehensive understanding of RISC-V architecture and its applications, with hands-on experience in programming, optimization, and complex application development. Participants will gain the necessary skills to work on advanced-level programming, develop novel applications, and contribute to the growing RISC-V ecosystem.

**Total duration:** 100 Hours (60 hours contact sessions and 40 hours self-learning)

**No. of days (contact hours):** 10 days with 6 hours per day

**Course Objectives:**

- Provide a deep understanding of RISC-V architecture and its components
- Train participants in assembly-level and high-level programming for RISC-V
- Enable hands-on experience with tools such as SPIKE and PULP Simulator
- Develop and optimize real-world applications using RISC-V
- Foster innovation through project-based learning, hackathons, and research
- Prepare engineers for higher-level certifications and industrial applications

**Course Deliverables:**

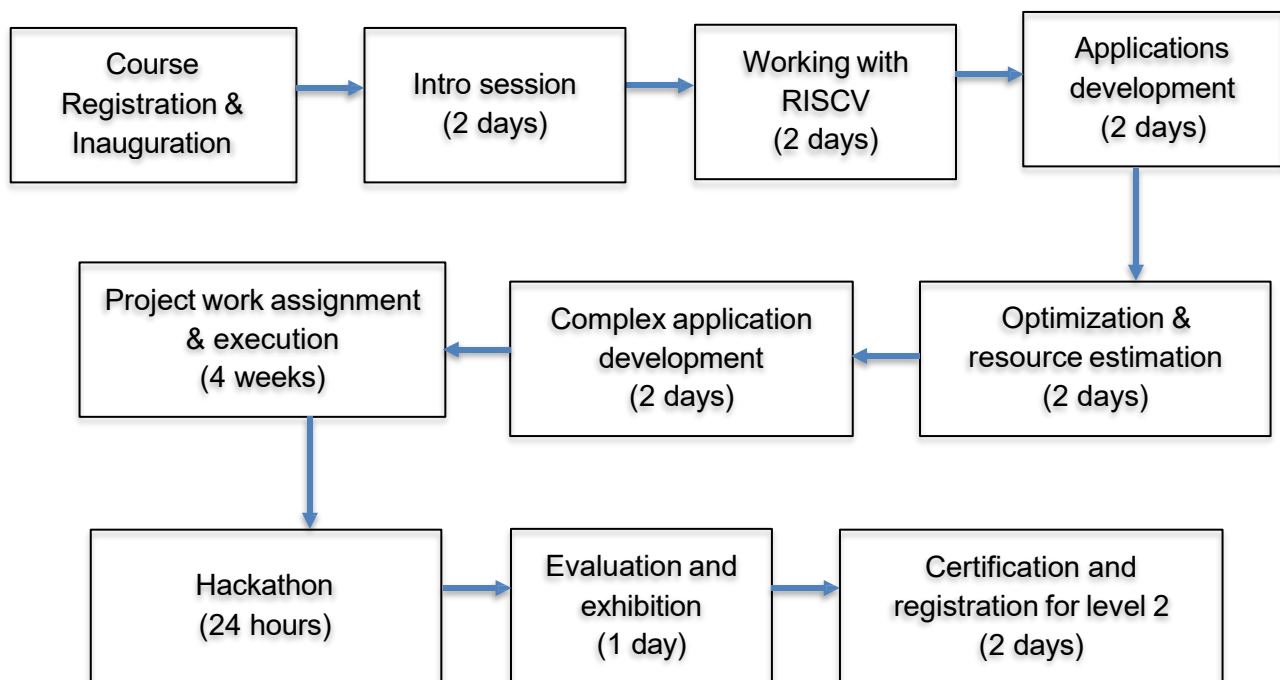
- 60 hours of contact sessions
- 40 hours of Self Learning
- Project work execution and mentorship
- Hackathon participation and evaluation.
- Certification upon successful completion.

**Course Outcomes:** By the end of this course, participants will:

- Develop 10 projects/prototypes and technical papers.
- Create 5 novel and patentable applications.
- Generate 10 innovative solutions as outcomes of the hackathon.
- Be proficient in advanced programming and application development with RISC-V.

**Process flow:**

In this program, students will gain hands-on expertise with the RISC-V platform, working with both software and hardware modules. They will develop applications ranging from simple to complex and demonstrate their functionality. The program provides opportunities for students to participate in a hackathon and engage in industry-relevant projects. Additionally, students will work on innovative projects that may lead to technical papers, prototypes, patents, and functional models.



## Program Schedule

Date	Topics	Trainers
04/04/2025	<b>1. RISC-V Introduction</b> <b>2. Introduction to GitHub - Repository under Angstromers (Org.)</b> <b>3. Installations:</b> Ubuntu SPIKE <b>4. Simulate 4 programs:</b> -Fibonacci -Palindrome -binary search -Bubble sort	Dr. Cyril Prasanna Raj P. Dr. Girish H. Kavinesh J. Kamalashree S
12/04/2025	<b>RISC-V single cycle architecture</b> -Assembly level programming: Operations(+, -, *, ./)	Dr. Girish H. Kavinesh J.
18/04/2025	RISC-V ISA	
26/04/2025	Multi-Cycle architecture and Pipeline	
02/05/2025	Scalar and vector multiplication working with PULP Simulator	
10/05/2025	FSMs and recursive methods	Dr. Cyril Prasanna Raj P. Kavinesh J.
16/05/2025	DFT FFT	
24/05/2025	Cholesky decomposition Matrix multiplication	
30/05/2025	2D convolution using PULP	
07/06/2025	Capstone Project	

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