

Call for Applications for IIITB Summer Research Internship Program SRIP 2023

Applications are invited from interested students of IIIT Bangalore to the IIITB Summer Internship Program (SRIP) 2023. This is a unique internship programme being offered at IIITB for giving engineering students an opportunity to work on a real-world funded research project.

Programme Details

Further details regarding SRIP 2023 are as follows:

Name of programme	IIITB Summer Research Internship Program (SRIP) 2023
Minimum eligibility	Any Engineering student who has completed or about to complete 2 nd year is eligible to apply. The internship is open to IIITB students too. Specific projects may have additional minimum eligibility requirements.
Stipend and Certificate	Stipend of Rs. 20,000 for the entire duration of the internship will be paid upon satisfactory completion of the internship. Internship certificate will be issued.
Internship Dates	June 1 – July 31, 2023
Hybrid Mode	On-Campus working between June 1-30 (1 month) Remote working between July 1 – July 31 (1 month)
Hostel Facility	Limited free hostel facility available between June 1-30 for outstation candidates
Total positions available	30 (pprox..)
Last Date to Apply	April 24, 2023 11.59 PM
Internship Website	https://www.iiitb.ac.in/summer-internship

Selection Procedure

Project mentors will go through the applications and select interns for the project. Project mentors may optionally choose to interview short-listed candidates.

Application Procedure

1. You may apply by filling in the form with all details requested
2. Prepare and upload a recently updated resume as part of the application form. Ensure there is a section titled “**Skills and Competencies Document**” where you list all course activities and pProjects, assignments, and activities done as part of course can be listed in the document.

Project Descriptions

A brief description of the projects is provided for your reference. In order to enable a quick selection process, students are advised to apply only for those projects where the student meets the stated requirements. Go to the application link only after going through project requirements.

Project-Code	SRIP23-001
Project Mentor	G R Sinha
Funding source	Mphasis-7111
Project title	Mphasis sponsored project on AI Intervention based Community wellness study of impact of Meditation and Yoga/Indian Knowledge System Lab
Brief project description	https://www.iiitb.ac.in/indian-knowledge-system-lab
Mandatory skills (what skills and competencies should they already have)	Machine Learning and Python Programming
Learning opportunities	1. To understand community wellness 2. To analyze the impact of mindfulness practices such as Yoga and mediation on quality of health using AI

Project-Code	SRIP23-002
Project Mentor	Vinod Veera Reddy
Funding source	NM-ICPS
Project title	5G mmWave communication
Brief project description	The sub-task that the candidate works on is to obtain familiarity with using Xilinx RFSoc. In particular, the student has to demonstrate the use of ADC and DAC that is present in the RFSoc board.
Mandatory skills (what skills and competencies should they already have)	3rd or 4th year BE in Electronics and Communications. Knowledge of micro-controllers/embedded systems or FPGA will be a plus.
Learning opportunities	Experience of using Xilinx RFSoc 4x2 board for wireless communications.

Project-Code	SRIP23-003
Project Mentor	Pradeesha Ashok
Funding source	CIET
Project title	Study of graph algorithms for IoT networks
Brief project description	The project involves design and implementation of graph algorithms in the area of IoT networks. The algorithms will be designed for enhancing security of IoT networks. The project involves understanding the existing algorithms in the area of graph theory, design of improved algorithms, implementation of the algorithm using an appropriate programming language and use of network simulators.
Mandatory skills (what skills and competencies should they already have)	Understanding of algorithm design, basic understanding of graphs, a coding language like Python or C++, experience in network simulators is desirable but not mandatory
Learning opportunities	Understanding of applications of graph theory in IoT networks, experience in algorithm design and implementation

Project-Code	SRIP23-004
Project Mentor	Srinath Srinivasa
Funding source	Karnataka Data Lake project
Project title	Karnataka Data Lake
Brief project description	2 interns required for creating data stories describing different kinds of policy interventions towards specific indicators. 2 interns required for designing data pipelines for ingesting data into data lake
Mandatory skills (what skills and competencies should they already have)	Python programming skill necessary, experience with data visualization and data pipeline frameworks desirable
Learning opportunities	Experience in building data pipelines for Big Data and AI processing, Experience in building visual analytics dashboards

Project-Code	SRIP23-005
Project Mentor	Srinath Srinivasa
Funding source	IUDX project
Project title	IUDX Consent Management
Brief project description	Extending the DEPA (Data Empowerment and Protection Architecture) to introduce policy-based consent management.
Mandatory skills (what skills and competencies should they already have)	Python programming, exposure to web API frameworks desirable
Learning opportunities	Experience in creating a policy-based consent management and enforcement mechanism

Project-Code	SRIP23-006
Project Mentor	Madhav Rao
Funding source	MINRO
Project title	Hardware implementation of Non-linear arithmetic functions (only for IIITB IMTech ECE students)
Brief project description	Hardware implementation of Non-linear arithmetic functions (only for IIITB IMTech ECE students)
Mandatory skills (what skills and competencies should they already have)	VLSI courses
Learning opportunities	Hardware implementation

Project-Code	SRIP23-007
Project Mentor	Madhav Rao
Funding source	MINRO
Project title	Benchmarking DL models on different hardware (IIITB IMTech Students)
Brief project description	Benchmarking DL models on different hardware (IIITB IMTech Students)
Mandatory skills (what skills and competencies should they already have)	VLSI and ML courses
Learning opportunities	Benchmarking parameters to be open-sourced

Project-Code	SRIP23-008
Project Mentor	Madhav Rao
Funding source	MINRO
Project title	Finger actuator (only for IIITB IMTech ECE Students)
Brief project description	Finger actuator (only for IIITB IMTech ECE Students)
Mandatory skills (what skills and competencies should they already have)	Analog Circuits and Electronics Circuits Lab
Learning opportunities	Automating the finger actuation mechanism

Project-Code	SRIP23-009
Project Mentor	Subir Kumar Roy
Funding source	Institute
Project title	Single Event Upset (SEU) Fault Injection studies on Pulpino RISC V processor for improved and robust safety analysis for Automotive Embedded Systems.
Brief project description	<p>Safety critical applications in many real-life systems have complex digital circuits (eg. microprocessors) controlling physical systems (eg. BLDC motors). Safety analysis of such hybrid systems is primarily carried out on these complex digital systems for soft error transient induced single event upsets. To mitigate the effect of such faults and to render the overall hybrid system robust from the perspective of safety is a key objective. The key area of research focuses on achieving the above requirements optimally by exploiting the inherent inertial behavior of physical systems to any changes and the corrective nature of the underlying control algorithms to control the physical systems so that minimal additional resources needs to be changed in the original complex digital system.</p> <p>Based on a detailed study of four papers from current literature various sub-problem statements were identified. We summarize these sub-problems below to set the context of our execution efforts pertaining to the internship project. Three of the highest priority items that were chosen are listed below:</p> <ol style="list-style-type: none"> 1. Safety analysis using functional information (behavioral C/RTL) instead of safety analysis using structural gate level netlist as practiced currently – identification of critical microarchitectural components based on implemented functionality. 2. Improve functional safety analysis based on superset/generic workload as against specific workloads, as well as, improve quality of workloads and automatically synthesize workloads. 3. Capturing of application related information - incorporate system level information such as, physical system models and combined considerations of tolerances (value and time). <p>All the above have been shown to work on the 8051 microcontroller. We wish to achieve the same with the PULPINO RISC V processor.</p>
Mandatory skills (what skills and competencies should they already have)	Good knowledge of digital circuits and RISC V instruction set
Learning opportunities	Good understanding of how to carry out analysis of digital systems for SEU fault tolerance.

Project-Code	SRIP23-010
Project Mentor	Kurian Polachan
Funding source	Institute
Project title	Wearables and Systems for Internet of Bodies
Brief project description	<p>Faculty Webpage - https://www.iiitb.ac.in/faculty/kurian-polachan Projects of Interest.</p> <ol style="list-style-type: none"> 1. Biomedical Wearables for Internet of Bodies (IoB): Design of low power biomedical wearables capable of harvesting energy from the body (e.g., energy from body heat) for long-term battery free sensing and communication. 2. Ultra-Low Power and Secure Communication: Explore different modalities of secure and ultra-low-power short-range communication between wearable devices and between wearable devices and off-body transceivers. (e.g., human body communication, capacitive communication, magnetic communication) 3. Hardware Security: Develop hardware security measures to protect the wearable devices from unauthorized access or replacements (e.g., PUFs for wearables)
Mandatory skills (what skills and competencies should they already have)	Embedded Systems, Analog Circuits (Systems), Python Programming
Learning opportunities	Learn to design end-to-end embedded wearables. Hands on experience with systems reserach.

Project-Code	SRIP23-011
Project Mentor	Kurian Polachan
Funding source	Institute
Project title	Wearables and Systems for Internet of Bodies
Brief project description	<p>Faculty Webpage - https://www.iiitb.ac.in/faculty/kurian-polachan Projects of Interest.</p> <ol style="list-style-type: none"> 1. Biomedical Wearables for Internet of Bodies (IoB): Design of low power biomedical wearables capable of harvesting energy from the body (e.g., energy from body heat) for long-term battery free sensing and communication. 2. Ultra-Low Power and Secure Communication: Explore different modalities of secure and ultra-low-power short-range communication between wearable devices and between wearable devices and off-body transceivers. (e.g., human body communication, capacitive communication, magnetic communication) 3. Hardware Security: Develop hardware security measures to protect the wearable devices from unauthorized access or replacements (e.g., PUFs for wearables)
Mandatory skills (what skills and competencies should they already have)	Embedded Systems, Analog Circuits (Systems), Python Programming
Learning opportunities	Learn to design end-to-end embedded wearables. Hands on experience with systems reserach.

Project-Code	SRIP23-012
Project Mentor	Manikandan R R
Funding source	Institute
Project title	Analog CMOS Process Technology Characterization : Analysis and Simulation.
Brief project description	Sub-Micron CMOS process technology nodes (< 180nm) offer a wide variety of active and passive components with improved performance interms of leakage, matching, noise, intrinsic gain and frequency characteristics. Prior to a design start, an Analog Design Engineer must evaluate and understand various peromance parameters of the silicon components and must understand the trade-off involved in the device construction and its performance. In this project we will develop a simulation framework to analyse and evaluate various performance parameters of silicon components such as MOSFETs, resistors, capacitors, BJTs, and diodes in a 65nm or 130nm process technology node.
Mandatory skills (what skills and competencies should they already have)	One of the following course, EC212 Analog Circuits, EC212P Analog Circuits Lab,
Learning opportunities	1. Understanding of component characteristics of any CMOS process technology node. 2. Independent thinking capability to suggest specific characteristics of CMOS process technology nodes for a given performance constraint.

Project-Code	SRIP23-013
Project Mentor	Prof Vinu, Prof Chandrashekar
Funding source	CTRI-DG
Project title	Data Lake Engineering
Brief project description	Architecture and Design of a data lake for capturing information from a wide variety of data sources. A prototype / POC of the design needs to be implemented using big data tools and technologies.
Mandatory skills (what skills and competencies should they already have)	Strong database management systems and SQL skills, preferably on Linux platform
Learning opportunities	Hands-on ability to install, configure and use complex big data infrastructure tools and technologies

Project-Code	SRIP23-014
Project Mentor	Prof Chandrashekar
Funding source	CTRI-DG
Project title	Rapid Software Engineering
Brief project description	There is an increasing demand to develop and deploy software within very short time span. Software engineering methodologies like agile methodologies reduce the time need to develop working software using sprints that can be about 3 weeks. The aim of the Rapid Software Engineering is to reduce this cycle time even further by using modern software technologies and techniques like nano services, micro services, serverless computing, DevOps, and cloud computing.
Mandatory skills (what skills and competencies should they already have)	Strong programming skills in Java or Python, good understanding of software development lifecycle (SDLC)
Learning opportunities	Hands-on exposure to microservices, serverless computing and DevOps

Project-Code	SRIP23-015
Project Mentor	Madhav Rao
Funding source	Institute
Project title	Gait Analysis for Diabetic Patients (only for IITB Students)
Brief project description	Gait Analysis for Diabetic Patients (only for IITB Students)
Mandatory skills (what skills and competencies should they already have)	Electronics Circuit Lab
Learning opportunities	Signal Acquisition Circuit design and dataset collection

Project-Code	SRIP23-016
Project Mentor	Madhav Rao
Funding source	Institute
Project title	UnFOG (only for IIITB students)
Brief project description	Managing Freezing-of-Gait problems in Parkinson Disease Patients
Mandatory skills (what skills and competencies should they already have)	Electronics Circuit Lab
Learning opportunities	Signal Acquisition Circuit and Dataset Collection

Project-Code	SRIP23-017
Project Mentor	Madhav Rao
Funding source	Institute
Project title	Eye Tracking (only for IIITB Students)
Brief project description	Surface EMG signal acquisition circuit and systems for Eye Tracking
Mandatory skills (what skills and competencies should they already have)	Electronics Circuits Lab
Learning opportunities	Signal Acquisition Circuit and Dataset Collection

Project-Code	SRIP23-018
Project Mentor	Madhav Rao
Funding source	Institute
Project title	Hardware Architectures
Brief project description	Systolic Array Architecture Designs
Mandatory skills (what skills and competencies should they already have)	VLSI Architecture Design
Learning opportunities	Systolic Array Architecture working and characterization

Project-Code	SRIP23-019
Project Mentor	Muralidhara V N and Madhav Rao
Funding source	CIET
Project title	Secured AI (only for IIITB students)
Brief project description	Secured Transformer Networks
Mandatory skills (what skills and competencies should they already have)	ML and DSA courses
Learning opportunities	Security characterizations for advanced neural networks

Project-Code	SRIP23-020
Project Mentor	Madhav Rao and Dr. Vikas Vazhiyal
Funding source	MINRO
Project title	Phase recognition in Neurosurgery (only for IITB Students)
Brief project description	Phase recognition in Neurosurgery
Mandatory skills (what skills and competencies should they already have)	ML, and Interest in Medical domain
Learning opportunities	Phase recognition, Video analytics

Project-Code	SRIP23-021
Project Mentor	Madhav Rao
Funding source	MINRO
Project title	Finger Localization (only for IITB students)
Brief project description	Human finger localization using sensory system
Mandatory skills (what skills and competencies should they already have)	Electronics Circuits Lab
Learning opportunities	Sensory signal acquisition and Data collection

Project-Code	SRIP23-022
Project Mentor	V Sridhar, Amrita Mishra
Funding source	7175: Identifying Elements of Ethical Framework for 6G and Creating Opportunities for India and Australia
Project title	7175: Identifying Elements of Ethical Framework for 6G and Creating Opportunities for India and Australia
Brief project description	To develop survey paper on 6G standards and 6G security technologies; prior work has been done; during the summer it is the intention to do exhaustive literature survey and complete the preparation of a survey paper.
Mandatory skills (what skills and competencies should they already have)	Knowledge of networking and communications, including 5G
Learning opportunities	Based on work done and contribution, possible to become a co-author of a paper.

Project-Code	SRIP23-023
Project Mentor	V Sridhar
Funding source	154-23: Formulating a regulatory response to 5G
Project title	154-23: Formulating a regulatory response to 5G
Brief project description	Investigate the 5G spectrum auctions around the world; collect data, build model and analyze.
Mandatory skills (what skills and competencies should they already have)	Understanding of techno-economics; spectrum auction methodologies
Learning opportunities	Possible co-author of a paper depending on contributions

Project-Code	SRIP23-024
Project Mentor	V Sridhar
Funding source	7136: Regulatory impact assessment of the National AI Market place of India
Project title	7136: Regulatory impact assessment of the National AI Market place of India
Brief project description	Develop an agent based model of open versus closed marketplaces; do extensive simulations and analysis
Mandatory skills (what skills and competencies should they already have)	Knowledge of Agent Based modeling; Python programming; knowledge of economics
Learning opportunities	To be an author of a paper depending on contribution and outcome

Project-Code	SRIP23-025
Project Mentor	Manikandan R R
Funding source	Institute
Project title	MOSFET Amplifier Design using (Gm/ID) methodology
Brief project description	<p>Traditional transistor sizing/design methodology follow SPICE + numerical approach which may yield sub-optimal performance due to a large number of silicon parameters involved in the design. (Gm/ID) is a measure of transistor performance and is used to evaluate & compare CMOS process technology nodes. (Gm/ID) parameter is strongly related to analog performance and can be used in transistor sizing.</p> <p>In this project, the steps involved in (Gm/ID) based transistor sizing methodology will be revisited and understood. The simulation and design examples involving amplifiers operating in sub-threshold and strong inversion region will be carried out in a given CMOS process technology node.</p>
Mandatory skills (what skills and competencies should they already have)	One of the following courses : EC212 Analog Circuits, EC212P Analog Circuits Lab, VL 864 Embedded Systems Design
Learning opportunities	Analog design skill : Hands on experience on using (Gm/ID) based transistor sizing methodology. Independent design thinking.

Project-Code	SRIP23-026
Project Mentor	Manikandan R R
Funding source	Institute
Project title	Analog Behavioral Modeling of DC-DC converters
Brief project description	<p>DC-DC power converter is a key component in the batteryless sensor node applications and IoT power management unit. DC-DC converter involves numerous analog sub-block designs and has many top-level performance parameters that depend on sub-block performance and design parameters. Analog behavioral modeling is an effective analog system design methodology which will be useful in these kind of systems.</p> <p>In this project, an efficient analog behavioral model for DC-DC converters will be developed in a cadence virtuoso design environment. The developed model will be validated against design parameters of sensor node applications and the resulting performance parameters will be evaluated.</p>
Mandatory skills (what skills and competencies should they already have)	One of the following courses : EC212 Analog Circuits, EC212P Analog Circuits Lab, VL 864 Embedded Systems Design
Learning opportunities	Design Skill : Analog behavioral modeling. Design thinking and evaluation of analog system performance prior to the start of design cycle.

Project-Code	SRIP23-027
Project Mentor	Janaki Srinivasan, V.Sridhar, T.K. Srikanth
Funding source	Project funding
Project title	Unraveling Privacy Among Consumers of Digital Credit in India (Tally code 7189)
Brief project description	Project description: https://cega.berkeley.edu/research/unraveling-privacy-among-consumers-of-digital-credit-in-india/
Mandatory skills (what skills and competencies should they already have)	Some training/interest in privacy or ICT policy and regulation; willing to do field study in Bangalore and surrounding areas
Learning opportunities	You'll be working on cutting edge research on questions of multi-party privacy, which is an emerging area of enquiry at the intersection of technology and social issues

Project-Code	SRIP23-029
Project Mentor	Madhav Rao
Funding source	MINRO
Project title	SoC Design (only for IITB students)
Brief project description	SoC Design with CNN co-processors
Mandatory skills (what skills and competencies should they already have)	VLSI Architecture Design
Learning opportunities	SoC Design, Hardware CNNs

Project-Code	SRIP23-030
Project Mentor	Jyotsna Bapat
Funding source	Toshiba/COMET
Project title	Network security for 5G and Beyond
Brief project description	Management of ever-increasing complexity of 5G and beyond networks mandates automation of their functions. The vision is to have near-zero human intervention, avoid human errors as well as meet real time and dynamic requirements from different user applications which uses virtualized network functions (VNF). The interns will study various aspects for network security for 5G and Beyond
Mandatory skills (what skills and competencies should they already have)	Computer Networks course
Learning opportunities	report on security

Project-Code	SRIP23-031
Project Mentor	Madhav Rao
Funding source	CIET
Project title	Biomedical Signals and Robotics
Brief project description	Design and development of biomedical physiological signal acquisition and actuation units.
Mandatory skills (what skills and competencies should they already have)	Electronics Circuits
Learning opportunities	Sensory design, and Circuit design

Project-Code	SRIP23-032
Project Mentor	Jyotsna Bapat
Funding source	COMET
Project title	Quantum Network Protocols
Brief project description	A quantum network, which involves multiple parties ping-ponging each other with quantum messages, could revolutionize communication, computing, and basic sciences. The future internet will be a global system of various packet switching quantum and classical networks. The intern will study different aspects of quantum networks and the requirements.
Mandatory skills (what skills and competencies should they already have)	Computer Networks, interest in Quantum Computing
Learning opportunities	report

Project-Code	SRIP23-033
Project Mentor	Jyotsna Bapat, Madhav Rao
Funding source	CIET
Project title	Smart Agriculture
Brief project description	A smart agriculture framework using multiple sensors being developed at IIITB. The intern will work on development of Arduino code for the purpose of interfacing to the various sensors like temperature, light, gas, etc. The integrated sensor-hub (sensors + arduino) will be tested in field situations.
Mandatory skills (what skills and competencies should they already have)	Android Coding
Learning opportunities	Android app for agritech

Project-Code	SRIP23-034
Project Mentor	Jyotsna Bapat, Madhav Rao
Funding source	CIET
Project title	Secure and privacy enhanced RISC-V core
Brief project description	Development of a secure and privacy enhanced RISC-V core for IoT edge
Mandatory skills (what skills and competencies should they already have)	VLSI
Learning opportunities	Developing the algorithms

