GEETHANJALI COLLEGE OF ENGINEERING AND TECHNOLOGY

Department of ECE

Industry Supported Laboratories

1. VLSI Design Lab using Cadence Software by Entuple Technologies Pvt. Ltd.

Year of Establishment: 2021

Particulars of the industry supporting the lab: Entuple Technologies Pvt. Ltd.

Need for establishing the laboratory:

The laboratory enhances the skills of the students in the domain of VLSI Design using the advanced software used in the industry.

The industry personnel have helped the department in the installation of the state-of-art Cadence software (Standard bundle Analog and Digital FE & BE) catering to 30 user licenses.

In addition to training of the faculty members, the industry experts delivered guest lectures, mentored the students through internship opportunity and conducted workshops.

The following activities are conducted using the resources of the lab in collaboration with the industry:

S.No	Title	Category	No. of students attended	Date
1.	"Latest Trends in ECE and job opportunities in the core area" by Mr. Damodara Sambasiva, Business Head, Entuple Technologies Pvt. Ltd.	Guest lecture	250	18/11/2021
2.	Design and Verification using Verilog	Workshop	35	13/09/2021 to 27/10/2021

3.	3-day Workshop on "Front –end and Back-end VLSI Circuits using Cadence Tools"	Workshop	36	31/03/2023 to 02/04/2023
4.	Project Based Learning EXPO (Analog and Digital VLSI Projects): 24 Projects were executed.	Project EXPO	74	16/02/2023
5.	Two-week Student Development Program (SDP) on VLSI Design flow using Cadence Tools: Mr. Sudhir Kumar, Senior Engineer from Entuple Technologies is the resource person.	SDP	36	23/01/2023 to 04/02/2023
6.	3-day Workshop on "Front –end and Back-end VLSI Circuits using Cadence Tools"	Workshop	30	23/01/2023 to 25/01/2023
7.	"Design and Verification using Verilog" – by technical experts from Entuple Technologies in on-line mode.	Internship	97	10/05/2023 to 04/06/2023
8.	Analog circuit Design and Layout using Cadence EDA software	SDP (Polytechnic students)	40	28/12/2023 to 03/01/2024
9.	Cadence Analog Design Flow: from Circuit design through GDSII	Workshop	30	6th, 13th and 20th April - 2024

2. VEGA Processor Lab by C-DAC, Trivandrum

Particulars of the lab established: VEGA Processor Lab

Year of Establishment: 2024

Particulars of the industry supporting the lab: C-DAC, Trivandrum

Need for establishing the laboratory: VEGA processor lab is established which is outside the ambit of the curriculum to facilitate students to work on Indigenous RISC-V (ARIES) Processor which is advanced compared to the Microcontrollers the students work on, as part of the curriculum.

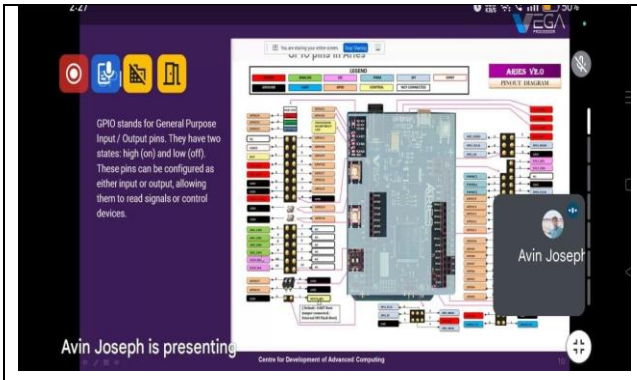
Particulars of Support Received from the Industry:

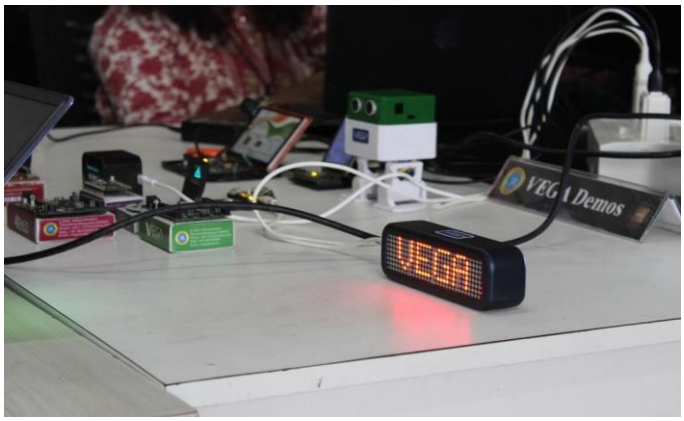
- Mr. Avin Joseph and Mr. Himanshu Diwane, Project Engineers at C-DAC, assisted with the installation of software
- Conducted a workshop to train faculty and students on Aries boards equipped with various sensors and actuators.

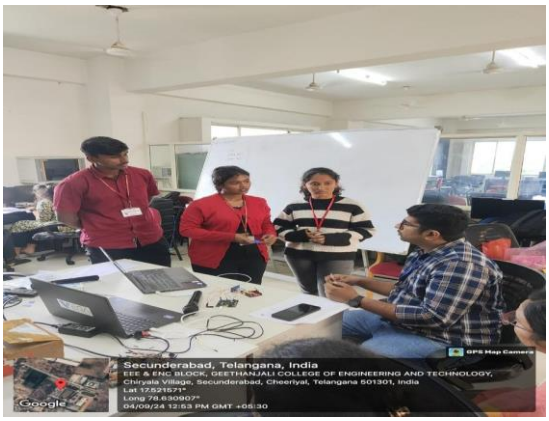
The **VEGA Processor** is a series of microprocessors developed by the Centre for Development of Advanced Computing (C-DAC) in India. These processors are based on the RISC-V instruction set architecture (ISA), which is an open-source alternative to proprietary architecture like x86 and ARM.

The following activities are conducted using the resources of lab:.

1) Workshop on "VEGA Processor and its Applications" was conducted for students from 2nd to 6th September 2024.
2) Workshop on "VEGA Processor and its Applications" was conducted for students from 11th to 13th November for External Students.







3. IoT Learning and Testing Lab by Physitech Electronics Ltd., Hyderabad

Particulars of the lab established: IoT Learning and Testing Lab

Year of Establishment: 2023

Particulars of the industry supporting the lab: Physitech Electronics Ltd., Hyderabad

Aim: To provide students with hands-on experience and practical knowledge in the field of Internet of Things (IoT) and embedded systems.

Objectives:

1. **Skill Development:** Equip students with practical skills in IoT, embedded systems, and modern electronics using platforms like Arduino, NodeMCU, and Raspberry Pi.
2. **Industry-Relevant Training:** Offer students exposure to real-world industrial practices, enhancing their employability and readiness for industry roles.
3. **Innovation and Research:** Encourage students to explore new ideas, develop innovative projects, and engage in research using the available resources.
4. **Collaboration and Partnerships:** Strengthen the relationship between academia and industry through joint projects, training programs, and workshops.
5. **Hands-on Learning:** Provide a practical learning environment where students can implement theoretical concepts and solve real-world problems.

Particulars of the lab established:

- M/s Physitech Electronics Ltd., Hyderabad has established a laboratory under the ***university partnership program***, donating IoT kits along with accessories, as a part of promoting their newly launched trainer kits. List of the kits and accessories donated by M/s Physitech Electronics Pvt. Ltd. is provided in the following page.
- The lab is equipped with an Internet of Things (IoT) Education Kit, featuring a universal board compatible with Arduino, NodeMCU, and Raspberry Pi controllers.
- A cloud space was provided on the name of “Geethanjali College of Engineering” to facilitate students to store data related to IoT kits.

LIST OF TRAINER KITS SPONSORED

S.NO	DESCRIPTION	QUANTITY
1.	PHY-1402 IoT DEVELOPMENT TRAINER KIT for ARDUINO	04
2.	PHY-1403 IoT DEVELOPMENT TRAINER KIT for RASPBERRY PI 4	04
3.	PHY-1412B UNIVERSAL IoT TRAINER	02
4.	PHY-1700 NODE MCU TRAINER KIT	04
5.	IoT WEB DASHBOARD by PCS	01
6.	POWER SUPPLY SMPS for PHY-1412B	02
7.	POWER ADAPTOR 12V/2A for PHY-1402	04
8.	POWER ADAPTOR 12v/2A for PHY-1412B	02
9.	USB to MICROCABLES	06
10.	USB to B-TYPE CABLES	04
11.	POWER ADAPTOR 5V/3A for PHY-1403	04
12.	HDMI to VGA CABLES	04
13.	HDMI to MICROCONVERTER	04
14.	4WAY TO 4 WAY RMC CABLES	50
15.	4WAY TO 4 WAY RMC CABLES	10
16.	16 GB MEMORYCARD for PHY-1412B	02
17.	STEPPER MOTOR for PHY-1412B	02
18.	RFID TAGS for PHY-1412B	02
19.	HEART RATE SENSORS	02

Activities carried out under industry supported lab

1. FDP on "Emerging Trends in IoT and their Applications" held on 20th to 21st January 2023 with resource persons from M/s Physitech Electronics Pvt. Ltd.
2. FDP on "NodeMCU and its Applications" held on 14th March 2023 with resource persons from M/s Physitech Electronics Pvt. Ltd.
3. FDP on "Raspberry pi and its applications" held on19th June 2023 with resource persons from M/s Physitech Electronics Pvt. Ltd.
4. A student workshop on "Introduction to Arduino Programming" held on 09th to 13th October 2023.

4. ChipIN Centre (EDA Tools Accesses) with the support of C-DAC Bangalore

Particulars of the industry supporting the lab: ChipIN Centre (EDA Tools Accesses), C-DAC Bangalore, supported by Meity Govt., of India

Year of Establishment: September, 2024

Need for establishing the laboratory: To generate Manpower in VLSI Domain.

After Pandemic situation due to lack of chips India has launched the **Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS)** for manufacturing of electronics components and semiconductors in INDIA.

In 2021, the MeitY also launched the **Design Linked Incentive (DLI) Scheme** to nurture at least 20 domestic companies involved in semiconductor design and facilitate them to achieve a turnover of more than Rs.1500 Crore in the next 5 years.

India's own consumption of semiconductors is expected to cross USD 80 billion by 2026 and to USD 110 billion by 2030.

ChipIN, the one-stop centre for chip designers across the country, gets fillip with support from semiconductor industry leaders. 85,000 students at B.Tech, M.Tech and Ph.D level to use state-of-the-art EDA Tools at ChipIN Centre to design semiconductor chips
The facility will act as one stop center to provide semiconductor design tools, fab access, and virtual prototyping hardware lab access to fabless chip designers of the country.

Ministry of Electronics and Information Technology has announced the Design Linked Incentive (DLI) Scheme and Chips to Start-up (C2S) Programme with CDAC as nodal implementing agency to not only offset the disabilities but also strengthen the semiconductor chip design ecosystem in the country by providing them the financial support as well as chip design infrastructure support. The ChipIN Centre has been setup at C-DAC as one-stop centre for providing the centralized access to chip design and fabrication services to domestic start-ups and academia across the country. About 100+ academic institutions across the country are already accessing the chip design & prototyping infrastructure made available by ChipIN under the C2S Programme from the Cadence Design Systems, Synopsys, Siemens EDA, Ansys, and Xilinx.

Support Provided:

ChipIN Centre provides Unlimited Tool Licenses, namely, Cadence Design Systems, Synopsys, Siemens EDA, Ansys, and Xilinx

Supporting in installation procedure, Webinars and online Workshops

Activities Conducted

S.No.	Title of the topic	Date	Name of the company
1	Analog, Mixed-Signal (AMS), Power Integrity and Reliability Signoff Using Ansys Totem EDA Tools	28-10-2024	Ansys Team
2	Day 1: Introduction to Technology Computer Aided Design (TCAD), Creating, Editing and Running Sentaurus Workbench projects, Visualizing TCAD simulation results using Sentaurus Visual etc.	21-10-2024	Synopsys Team
3	Day 2: Building a simple NMOS device from scratch in Sentaurus Process for device simulations, Overview of FinFET based CMOS inverter's process flow in Sentaurus Process Explorer, etc.	22-10-2024	Synopsys Team
4	Day 3: Simulating DC transfer and output characteristics of a MOSFET, Simulating AC characteristics of a MOSFET etc.	23-10-2024	Synopsys Team
5	System-level Simulation for RADAR/5G/Phased Array/SATCOM Applications	21-10-2024	Keysight Team
6	SCL's 180nm foundry requirements with an example/sample design for the tapeout	16-10-2024	SCL Chandigarh
7	MPW Services and Other technical topics related to PDKs supported by M/s. IMEC	15-10-2024	IMEC Team

8	Introduction to the Power Analysis concepts, need of RTL power at early stage and inputs required for an RTL power analysis. It covers how PowerArtist Analyzes the RTL for average power, Introduction to PowerArtist GUI, interactive power debug feature using GUI.	04-10-2024	Ansys Team
9	Quantum Technology: An Overview, Quantum EDA at Keysight, Designing for Superconducting Qubits in ADS, QuantumPro, Designing for Basic Quantum Amplifiers	01-10-2024	Keysight Technologies Team
10	SCL 180nm Tapeout Process (November Shuttle) by SCL Chandigarh	27-09-2024	SCL Chandigarh
11	Introduction to Chiplet design using Keysight ADS Software	26-09-2024	Keysight Technology
12	Building 64-bit Microwatt OpenPOWER processor targeting Arty A7-100T FPGA Development Board	24-09-2024	IBM
13	Physical Design by ChipIN Team	17-09-2024, 20-09-2024 and 23-09-2024	ChipIN Team
14	Virtual SMART Lab	19-09-2024	NIELIT Calicut
15	Session on RTL to GDS Flow by using Cadence EDA Tool	11-09-2024 & 12-09-22024	Entuple Team
16	Session on SCL's 180nm technology process (both 4-metal and 6-metal) by SCL Chandigarh	10-09-2024	SCL Chandigarh
17	Session on Implementing Unique Host-ID(s) for Effective EDA Tool Usage under C2S Programme	06-09-2024	ChipIN team
18	ASIC Design (Analog and Mixed Signal), Packaging & Testing related design issues, and SCL Foundry Process - Day 2	09-08-2-24	SCL Team
19	ASIC Design (Analog and Mixed Signal), Packaging & Testing related design issues, and SCL Foundry Process - Day 1	08-08-2024	SCL Team

Activities held under ChipIN centre, GCET:

1	Two day workshop on RTS to GDS flow using Synopsys tools	19th and 20th November , 2024	Dr. Madhav Rao, Assistant Professor, BVRIT, Narsapur
2	Complete VLSI Design flow (Backend and Front-end)	28th and 29th Oct, 2024	Entuple Team

5. Five Nines Radio Test bed - 5G Communications Lab

Particulars of the lab established: **Five Nines Radio Test bed – 5G Communication Lab**

Year of Establishment: **2024**

Particulars of the Industry supporting the lab: **M/s Chandar Research Labs,**

Mayiladuthurai District Tamilnadu

S. No.	Name of the Item
1	5G-NINES RADIO - SA and NSA Configuration
	4G EPC and 5G Core Emulator (Release 15) eNB Emulator (Release 15) gNB Emulator (Release 15)
	Sub-6 GHz Radio Unit
	5G IoT Bridge
	5H Smartphone with 10 programmed SIM Cards
	Training and Support
2	5G Enabled Drone

Need for establishing the laboratory:

In view of the growing demand for data traffic and to enable new technologies, there is strong need for the 5G communication technologies which offer faster download and upload speeds than previous networks, allowing for more reliable connection, it is decided to give few insights/trainings in the area of 5G communications.

Industry Support:

Thirty (30) hours of training is being provided to both faculty and students twice in an academic year consecutively for 3 years for the faculty and students on use of 5G communication technologies with hands-on sessions.

Activities Conducted:

Training session has been conducted from 6th June 2024 to 10th June 2024. The following experiments are carried out by the students and faculty in the workshop.

Expt. No.	Name of the Experiment
1	Analyzing - PPT Presentation – Overview of 4G & 5G Communications
2	Overview of 5G in SA mode- Connection Establishment
3	Analysis of Ngap Protocol
4	Analysis of MAC Protocol
5	Analysis of RLC Protocol
6	Analysis of RRC Protocol
7	Coverage Analysis using Smart Phone (Signal Strength Measurement & Link Adaptation)
8	Video Streaming uplink (using IP web cam App) & downlink
9	Connecting IOT Modem in SA mode
10	User Equipment Authentication and Verification
11	Connection Establishment in NSA mode
12	Analysis of SIAP & X2AP protocol in NSA
13	Deep Radio FM Transmission
14	FM Signal Jamming
15	Analysis of Time Frequency grid – Visualization

The second training session/workshop has been organized from 06-11-24 to 10-11-2024 to the faculty and as well as students. The following experiments are carried out during the workshop for 16 students of III ECE-A, B and D Sections.

Expt. No.	Name of the Experiment
1	Analyzing - PPT Presentation – Overview of 4G & 5G Communications
2	Overview of 5G in SA mode- Connection Establishment
3	Analysis of Ngap Protocol
4	Coverage Analysis using Smart Phone (Signal Strength Measurement & Link Adaptation)
5	Video Streaming uplink (using IP web cam App) & downlink
6	Connecting IOT Modem in SA mode
7	Connection Establishment in NSA mode
8	Analysis of SIAP & X2AP protocol in NSA

Apart from the above, all the 16 students are trained for the following projects:

1) Spectrum Analysis of 4G and 5G spectrum
2) Coverage analysis: In-door (5G) in GCET
3) Coverage analysis: Outdoor (4G) in GCET
4) IoT based Home Automation System using 5G Network:
   (a) Relay Module
   (b) PIR Sensor
   (c) Humidity and Temperature Sensor
5) SA Mode PCAP Analysis