Sri Sai Vidya Vikas Shikshana Samithi ®
SAI VIDYA INSTITUTE OF TECHNOLOGY
Approved by AICTE, New Delhi, affiliated to VTU, Recognized by Govt. of Karnataka.
Accredited by NBA, New Delhi (CSE, ECE, ISE) NAAC – "A" Grade
DEPARTMENT OF CSE (Artificial Intelligence & Machine Learning)
RAJANUKUNTE, BENGALURU – 560 064, KARNATAKA
Phone: 080-28468191/96/97/98 * E-mail: hodaiml@saividya.ac.in * URL www.saividya.ac.in

11 – 05 – 2025

Report on
INNOVATIVE TEACHING METHODOLOGY

PROCESS ORIENTED GUIDED INQUIRY LEARNING (POGIL) ACTIVITY

Subject: **Microcontroller and Embedded Systems**
Subject Code: **BCO601** –6th Semester,B Section
Subject Type-IPCC,Year:2024-2025

DESIGN, CONSTRUCT AND WRITE THEORY, PROCEDURE AND SIMULATE USING VIRTUAL LABS FOR THE EXPERIMENTS

POGIL (Process Oriented Guided Inquiry Learning) is a student-centered instructional approach that emphasizes active learning through structured group activities. In a POGIL classroom, students work in small teams, with the instructor acting as a facilitator rather than a lecturer. The activities guide students through three phases of learning:

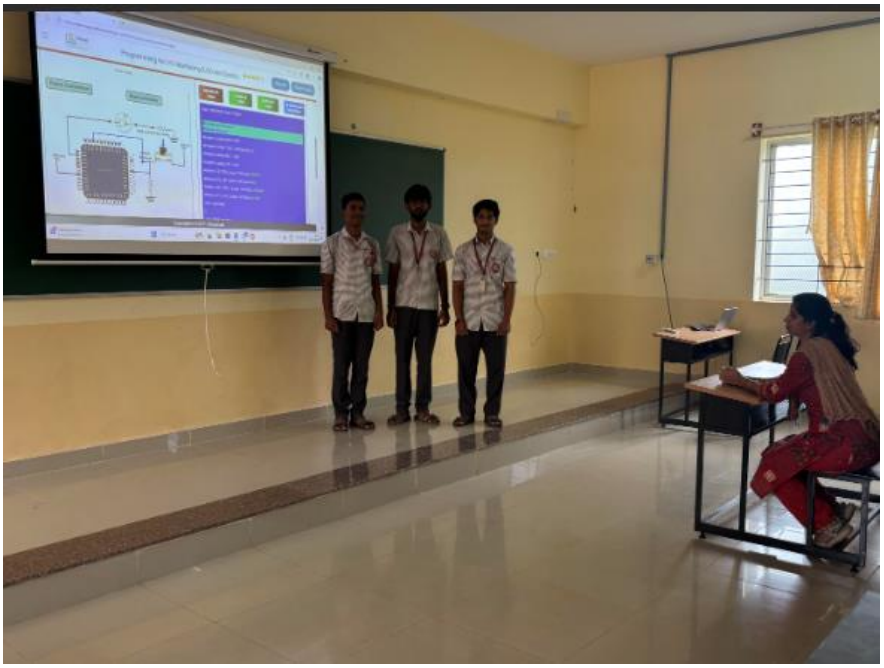
1. **Exploration** – Students analyze data, models, or experiments to identify patterns and trends.
2. **Concept Invention** – Students develop new concepts based on their observations.
3. **Application** – Students apply their newly acquired knowledge to different contexts to deepen understanding.

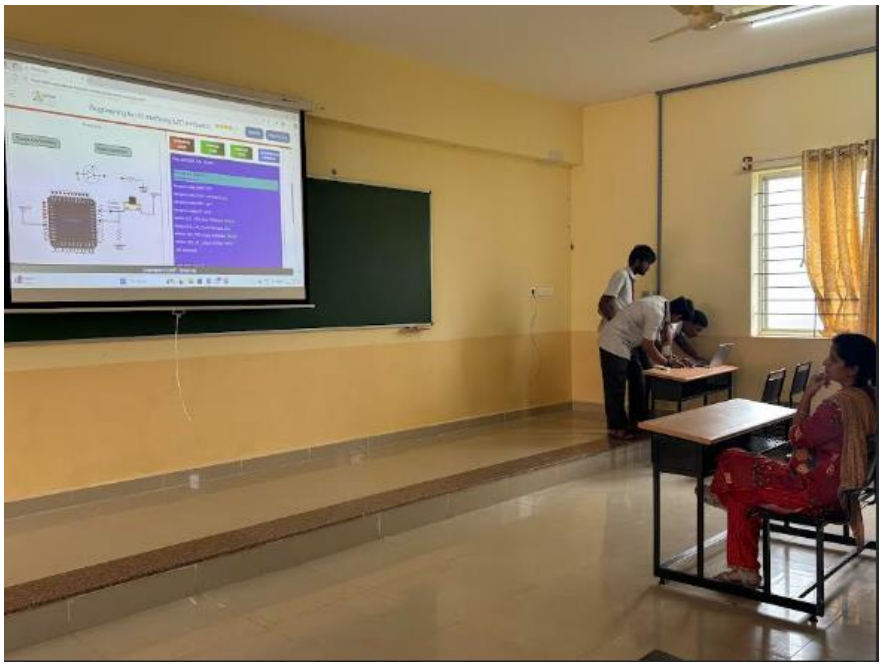
Each student in a group is assigned a specific role, such as manager, presenter, or recorder, to encourage collaboration and engagement. POGIL helps students develop problem-solving, critical thinking, and communication skills while mastering subject content.

"The students were provided with hands-on experiments in a **virtual lab environment** focused on **microcontrollers and embedded systems**. Through these simulations, they engaged in practical tasks such as programming microcontrollers, interfacing sensors, and debugging embedded applications—all without needing physical hardware.

By working in this **interactive digital setup**, they developed essential **technical skills**, including:

- Writing and optimizing embedded code
- Understanding hardware-software integration
- Troubleshooting and debugging embedded systems
- Applying real-world engineering concepts in a simulated environment





The students were able to **conduct experiments** in a **virtual lab environment** using **microcontrollers and embedded systems**, allowing them to gain essential **technical skills**. Through these hands-on simulations, they practiced programming, hardware interfacing, and system debugging, all within a controlled digital setup.

By engaging in these experiments, they developed:

- **Programming skills** for embedded systems
- **Hardware-software integration** expertise
- **Troubleshooting and debugging** techniques
- **Problem-solving and critical thinking** abilities

This virtual approach provided a **practical learning experience**, ensuring students could apply theoretical concepts to real-world scenarios, preparing them for careers in embedded systems development.

SL No	Title	Project Given	Outcome	CO Mapping
1	Interrupt driven data transfer from ADC	Interrupt-driven data transfer from an Analog-to-Digital Converter (ADC) is a method where the ADC notifies the microcontroller when a conversion is complete, allowing efficient data handling without constant polling. This technique improves system performance by reducing CPU workload and enabling real-time processing.	From studying **interrupt-driven data transfer from an ADC**, students gain essential skills and knowledge that help them develop efficient, real-time systems. Here's what they will be able to understand efficient data handling,develop embedded systems,write optimized code for ADC handling,improve system performance,apply in practical projects	**CO3,CO1**
2	Programming for I/O interfacing (LED and Switch interfacing)	Programming for **I/O interfacing** involves controlling input and output devices like **LEDs and switches** using a microcontroller. This is a fundamental concept in embedded systems, allowing interaction between hardware and software.	Studying **I/O interfacing with LEDs and switches** equips students with essential skills for embedded systems and microcontroller programming. Here's what they will be able to do Understand Microcontroller I/O Operations,Develop Embedded System Applications,Write Efficient Code for Hardware Control,Improve Problem-Solving and Debugging Skills,Apply Knowledge in Practical Experiments	**CO3,CO2**

3	Keyboard-MCU interfacing take a input from keypad and display on LCD	Keyboard-MCU interfacing involves connecting a **keypad** to a **microcontroller (MCU)** to take user input and display it on an **LCD screen**. This is commonly used in embedded systems for user interaction.	Studying **Keyboard-MCU interfacing** and learning how to take input from a keypad and display it on an LCD equips students with valuable skills for embedded systems and microcontroller programming. Here's what they will be able to do Improve Problem-Solving and Debugging Skills,Apply Knowledge in Practical Experiments	**CO2,CO3**
4	Temperature control using microcontroller	Temperature control using a **microcontroller** involves monitoring temperature using sensors and adjusting heating or cooling systems accordingly. This is widely used in **home automation, industrial processes, and smart devices**.	Studying temperature control using a microcontroller helps students develop essential skills in embedded systems, automation, and real-time control. Here's what they will be able to do Understand Microcontroller-Based Temperature Control,Develop Automated Control Systems,Write Efficient Code for Real-Time Processing	**CO3**
5	Serial Communication between micro controller and PC	Serial communication between a **microcontroller** and a **PC** allows data exchange using protocols like **UART (Universal Asynchronous Receiver-Transmitter)** or **RS232**. This is widely used for debugging, data logging, and device control.	Studying **serial communication between a microcontroller and a PC** equips students with essential skills for embedded systems and real-time data exchange. Here's what they will be able to do Understand Microcontroller Communication Protocols,Develop Embedded System Applications,	**CO3**
6	LCD - MCU interfacing and displaying a string	LCD-MCU interfacing allows a microcontroller to communicate with an LCD display to show text, numbers, or graphics. This is commonly used in embedded systems for user interfaces, data visualization, and debugging.	Studying **LCD-MCU interfacing and displaying a string** equips students with essential skills for embedded systems and microcontroller programming. Here's what they will be able to do Understand Microcontroller-LCD Communication,Develop	**CO3**

			Embedded System Applications,Write Efficient Code for Display Handling.	
7	Implementation of Recurrent Neural Network on microcontroller	Implementing a **Recurrent Neural Network (RNN)** on a microcontroller is a challenging yet exciting task, as it involves deploying deep learning models on resource-constrained embedded systems.	Studying **Recurrent Neural Network (RNN) implementation on a microcontroller** equips students with valuable skills in deep learning, embedded systems, and optimization for resource-constrained environments. Here's what they will be able to do Understand Neural Network Deployment on Embedded Systems,Develop AI-Powered Embedded Solutions,Write Efficient Code for Neural Network Inference.	**CO2**

Faculty Coordinator

Soumya L N

HOD

Head of the Department
Department of CSE (AI & ML)
Sai Vidya Institute of Technology
Rajanukunte, Bengaluru - 64.