Hackathon Tracks Overview

Event Date:- 1 & 2 March 2025

Automotive Cabin Environmental Monitoring System

– **Objective**
Explore the exciting world of designing and implementing a one-of-a-kind application called **Cabin monitoring** using the **TRICORE™ TC334 MCU** interfaced with sensor to read real time atmospheric values, visualize real-time outputs through **LCD** interfacing.

– **Key learnings**
Master the integration and programming of Infineon's TC334 microcontroller for real-world applications as well as learn low-power design principles and user-centric design

– **Who can participate**
Students who possess basic knowledge in Embedded systems, Embedded C, Microcontrollers (UART & SPI/I2C protocol is added advantage), and have a keen interest in learning new concepts in these fields.
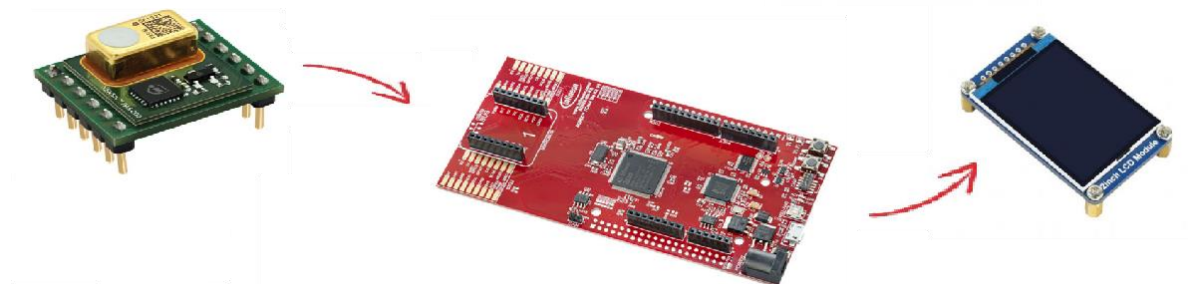
Defend The Kingdom

– Develop a cutting-edge smart algorithm for making intelligent dynamic decisions over humongous possible states
– Store, manipulate and compare complex data models efficiently
– Process gigantic amount of queries in real-time by leveraging sophisticated data structures

Key Learnings:

- **Completely SW** oriented
- Solutions to be judged on the **efficiency(time & space)** of the **algorithms**
- **Proficiency in a GPL**(C++/Python/Java)

Ideal team/skill-sets:

- Preferred skills:
  - In-depth know-how of **known DSA**
  - **Proficiency** in a GPL
  - Hands-on experience with processing **huge data**
  - Awareness with **OS related concepts**(multi-processing, interruptions, etc.)

Pattern play with CAPSENSE™

- **Objective**: Unravel the mystery of touch as you decode the language of capacitance! The task is to develop an algorithm capable of accurately recognizing the patterns drawn on a capacitive sensor in real-time. This hackathon will give you an insight on PSoC™ microcontroller, CAPSENSE™ and most importantly provide experience in developing a robust algorithm with the fusion of logic and creativity.
- **Who can attend:** Students pursuing CSE/ECE/EEE in 6th Semester who possess knowledge in Python/C programming and microcontroller concepts or have a keen interest in learning new concepts in these fields.
- Detailed problem statement will be explained on iHack day.
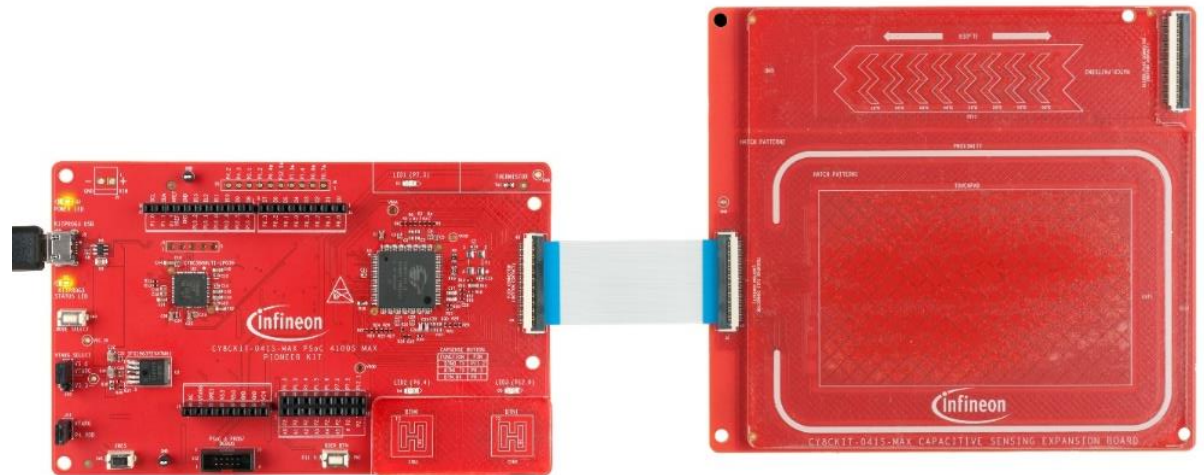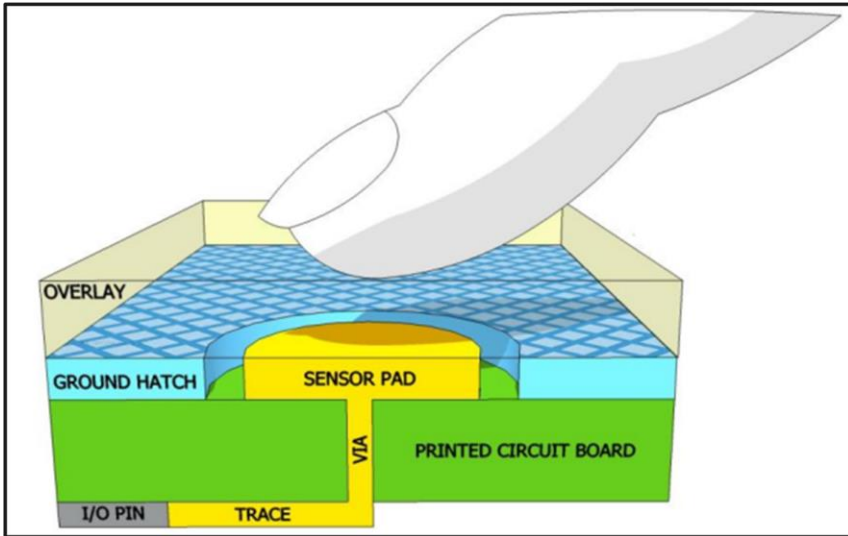
Build-a-SoC: The Tiny MCU Challenge

– **Overview**

  – Embark on an exciting journey into the world of microcontrollers by designing a Tiny MCU (T-MCU) from scratch. This hands-on track will immerse you in the fundamentals of digital design, microcontroller architecture, and computer architecture. From crafting the microarchitecture to verifying the final design, you'll tackle the complexities of integrating various IP blocks, developing robust verification plans, and ensuring your T-MCU meets all specified requirements.

– **Key Learnings**

  – Microcontroller Architecture & Development

  – Microarchitecture Essentials and Digital Design

  – Verilog/SystemVerilog Design & Debugging

  – IP Integration Techniques

  – Design Verification & Testbench Development

  – Hardware Debugging & Best Practices

– **Who Can Participate**

  – This track is ideal for students with a foundational understanding of digital design, Verilog, and computer architecture. If you're passionate about hardware design and verification, this is your chance to enhance your skills. Familiarity with microcontroller architecture, digital logic design, and simulation tools will give you an edge, but a keen interest in learning is the most important prerequisite.

Tiny MCU

Processor	Accelerator-1	External Interfaces

Interconnect Bus

Memory	IO	Peripheral(s)	External Interface	Accelerator-2