**Detailed Session Breakdown**

📌 **Instructor: Yousef Khaled Omar**  
📌 **Target Audience:** Beginners in Embedded Systems  
📌 **Tools & Hardware:** STM32CubeIDE, STM32 development board, sensors, actuators  
📌 **Duration:** 3-4 hours

**🔹 Session 1: Introduction to Embedded Systems**

📌 **Goal:** Provide an overview of embedded systems, introduce ARM architecture, and set up STM32CubeIDE.

**Topics Covered:**

✅ **What is Embedded Systems?**

* Embedded system vs computing system
* Difference between microcontrollers and microprocessors
* Examples of embedded systems in real life (smartphones, cars, IoT)

✅ **Understanding the General Microprocessor Architecture**

* Introduction to microcontrollers Architecture (register file, Control Unit, ALU …)
* Fetch-Decode-Execute Cycle (How a microcontroller runs code)
* Instruction set (RISC Vs CISC)
* Processor Architecture (Von neuman vs Harvard)
* Memory organization in microcontrollers (RAM Vs ROM)
* memory layout (.bss .rodata stack…)
* RAM (SRAM Vs DRAM)
* ROM (Masked ROM, OTPROM, EPROM, EEROM and Flash)
* Tool chain (prepocess, compiler, assembler and linker)
* Flashing (Off circuit vs On circuit)
* Embedded Software Architecture ( APP, HAL LIB AND LL)

✅ **Understanding the ARM Architecture**

* Introduction to ARM (ARM history, what ARM stands for)
* ARM Architecture (voltage regulator, PIO and communication prephrals)
* Intro to AMBA (AHB vs APB, Peripheral bridge)
* Power management (RCC vs Enable)

✅ **Introduction to STM32CubeIDE**

* Why STM32 is widely used in the industry
* Installing and setting up STM32CubeIDE
* Creating a new STM32 project
* Introduction to HAL (Hardware Abstraction Layer) and LL (Low Level) drivers

🎯 **Practical:**

* Running an built-in example in STM32cube