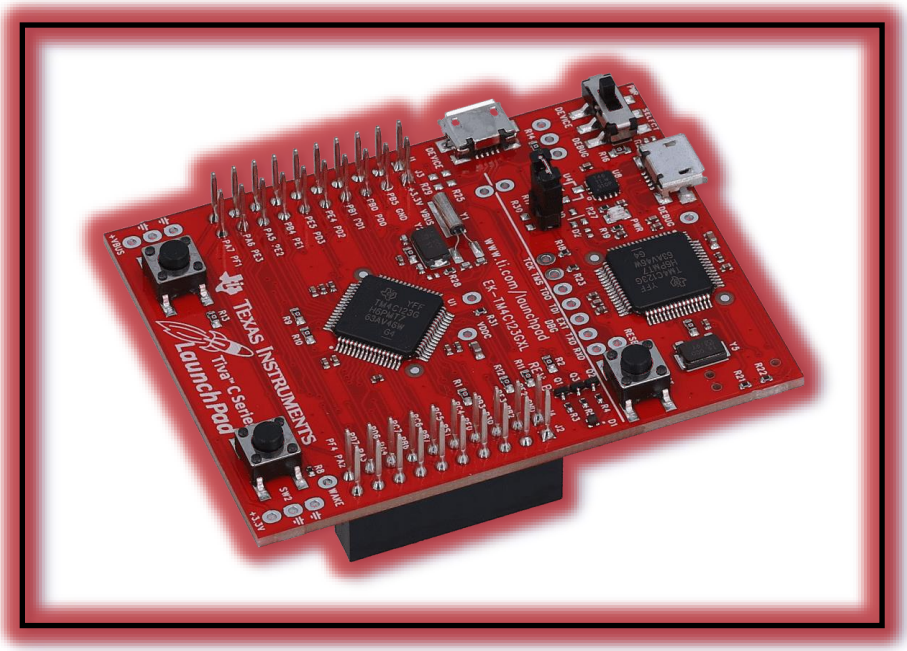
AASTMT

Arabic Academy for Science, Technology and Maritime Transport

College of Engineering / Electronics and Communications Department

Intro. To Microprocessor

Smart House



(Via the TM4C123G Launchpad)

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Intro. To Microprocessor

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Table of Contents

What is Tiva C Launchpad?

The Tiva C LaunchPad is a development board by Texas Instruments based on an ARM Cortex-M4 microcontroller. It's designed for embedded systems projects, offering features like GPIOs, communication interfaces (UART, SPI, I^2C), timers, ADCs, and a USB port. It's low-cost, easy to program, and ideal for learning, prototyping IoT devices, robotics, automation, and real-time applications.

Why It Is Useful for Our Project?

- It offers powerful processing capabilities with low power consumption.
- Easy to program and debug, reducing development time.
- Affordable yet provides professional-grade features.
- **Scalable:** It allows easy expansion with external modules.
- **Community Support:** Plenty of documentation, example codes, and libraries are available.

Why did we use ESP-32S?

We did use the ESP-32S because of its wireless capabilities and its ability to interact with it using the WIFI or Bluetooth, so we did use it to make a web interface to control the system and receive information about the smart house status. It is interactable via the any device that can access the internet and connect to the ESP-32S's WIFI network.

Brief Summary on the project Idea

This project presents the design of a smart house system controlled by the TM4C123G Tiva C Launchpad. The system includes monitoring and automation for both the outside and inside of the house. The outside features a garden with an automated watering system and a water tank with level indicators, along with an LCD screen to monitor the outdoor conditions. The inside consists of four rooms, each demonstrating part of a complete sensor network for security, environment monitoring, and automation. A local Wi-Fi network hosted by an ESP32 enables remote monitoring and control through a web-based dashboard. The project demonstration simplifies the full system design while maintaining the theoretical concept of a fully automated smart house.

Internal Design (Electronics Wise)

A

External Design (Electronics Wise)

A

Demo vs Theoretical

In the demo version of the project, each room will contain only one sensor to simplify the hardware setup and focus on showcasing individual features.
Theoretically, every room in the smart house should include the full sensor system (motion detection, temperature monitoring, gas detection, and light sensing).
The LCD screen is placed outside the model in the demo for ease of display, but in the theoretical design, it would be installed next to the main door inside the house.
The web dashboard provided by the ESP32 offers basic monitoring and control in the demo, while a full version would include a dedicated mobile application capable of sending real-time alerts and notifications about fire detection, intrusions, or other emergencies.
Additionally, the tank system is simulated for watering the garden but would theoretically also supply water for internal house use.