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Assignment 1

. **Introduction**

Microcontroller is the brain of physical devices that do some specific Automatic tasks (Embedded Systems), and in this report we are going to show some families of a Microcontroller and their brands and the some differences between PIC16f877aA and TM4C123.

. **Microcontroller families**

. **STM32 series**

The STM32 family of 32-bit microcontrollers based on the Arm Cortex®-M processor. It provides products with very high performance, real-time capabilities, digital signal processing, and low power consumption while maintaining full integration and ease of development.

. **ESP32-S3 Series**

The ESP32-S3 family of 32-bit microcontrollers based on the Xtensa® processor. It has recently released an AI voice development kit dubbed ESP32-S3-BOX, based on ESP32-S3 Wi-Fi + Bluetooth 5 (LE) SoC. It provides a platform for developing the control of smart devices with offline and online voice assistants.

. **Attiny85**

Attiny85 8-bit AVR® RISC-based microcontroller. It offers some advantages (high performance, low power consumption, and the size is small (with 8 pins). It is suitable for small projects with small cost to get the advantage of the compact size with high performance.

- . **ATMEGA32U4**

The Atmega32u4 is a low-power Microchip 8-bit AVR® RISC-based microcontroller, The Microcontroller executes powerful instructions in a single clock cycle, and this feature achieves up to 16 MIPS throughput at 16 MHz. This gives the programmers the ability to enhance power consumption against processing speed.

- . **STM8S103F3**

The STM8 family of microcontrollers offers a high-performance 8-bit core and a state-of-the-art set of peripherals in a tiny form factor, high performance, and system robustness. The family is made up of 4 series (the STM8S, the STM8L, the STM8AF, and the STM8AL). the STM8S103F3 is considered to be one of the most popular MCUs in the Series.

- . **ATmega328**

Microchip 8-bit AVR® RISC-based microcontroller, The high-performance, low power with 1 KB EEPROM, 2 KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, High endurance non-volatile memory segment, Six sleep modes (Idle, ADC noise reduction, power-save, power-down, standby, and extended standby)

	PIC16F877A	TMC4123
Architecture	8-bit PIC architecture	ARM Cortex-M4
Communication Interfaces:	UART I2C (Master and Slave) SPI	UART I2C SPI
No of pins	40 pin	43 pin
Dimensions	52.45 x 14.22 x 4.06mm	50 mm x 57.15 mm x 107.95 mm
Support Real Time Applications	support	support
Operating frequency	20MHZ	80MHZ
Program Memory Size	14KB	256KB
Pulse Width Modulation	Support, but limited compare to TM4C132	Support,with multiple timers
Power Consumption	Low power consumption	Low power consumption